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Exploring the Empirical Link Between Globalization, Health and Sustainable Development in Nigeria: an Autoregressive Distributed Lag Model

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Abstract

This paper explored the link between globalisation, health and sustainable development in Nigeria by examining the effects of globalisation on population health, and subsequently traced its transitory effect on sustainable development. The study is founded on a combination of Modernisation theory and endogenous mortality and life expectancy. The Autoregressive Distributed Lag (ARDL) bound testing approach to cointegration method of estimation was employed in the empirical analysis given the outcome of the order of integration of variables in the model, which run between order zero and order one ($I(0)$ and $I(1)$). Findings revealed that global factors negatively and significantly determine population health; Nigeria currently lies in the negative quadrant of the effects of these factors, and this has adverse effects on efforts towards sustainable development.

JEL CODES: C22, F47, I11, I31

Keywords: *ARDL Model, Globalisation, Health, Nigeria, Sustainable Development, Transition Effects.*

Introduction

Globalisation as a phenomenon has led to the dismantling of the traditional country-protective walls that centuries ago were instrumental to growth and development of today's industrial economies. Dominant argument in modern day political economy no longer support traditional trans-border barriers as a reliable and sustainable path to growth. Instead, current emphasis is heavily placed on increased integration of national economies in diverse forms as a more reliable common path to growth and sustainable development. Therefore, countries embrace the concept irrespective of its differential impact on national economies. Effects of this integration manifest in various forms, such that it now dominates that of other known macroeconomic variables across sector of the economy. These effects as a matter of fact, are known to be both positive and negative in nature and exert significant influence on citizens' wellbeing. Under this scenario, the issue of

how the individuals is affected depends largely on which of the divide off-sets the other. Given this prevailing circumstance, empirical evidence on the effects of global factors on national economies, and options or ways of its management should be of great concern for public policy.

In global health for instance, it is generally agreed that, “the wealthier is the healthier” and gains from rapid growth flow into health gains (Pritchett and Summers, 1996). This strong correlation between income and health was earlier brought to the fore by Preston (1975). Preston proposes that income (GDP per capita) is an important health determinant in poor countries than rich countries given observed curvilinear relation between income and health. However, more recent studies provided evidence that points to the fact that, these observed positive income-health gradient among poor countries tend to disappear as more variables are controlled for. (Asiedu et al., 2015; Sterck et al., (2018). Specifically, Asiedu et al pointed out that global factors are increasingly becoming more important as health outcome determinant than country-specific factors including GDP per capita; this is not surprising. In Nigeria like most African countries, health interventions are largely driven by fund from Development Agencies (DA) than from within. For instance, net bilateral aid flows to Nigeria in 2006 was \$10,970390000; this declined to \$1,019170000 in 2012, but increased again to \$2,019420000 in 2017 (World Bank 2018). In contrast, highest budgetary allocation to health in Nigeria since 2001 lies below 6% of annual budget – the highest was 5.95% in 2012. Furthermore, recent empirical evidence supports the fact that in the area of child health, interventions from DA account for more of child survival to adult than within health policy intervention. (Ikpe 2018). In spite of this and other known advanced medical technology accessible to the Nigerian public through diffusion, influences of the negative effect inducing factors seem to off-set the positives. Such negative effects inducing factors include common business cycle and major influenza; this affect health in multiple countries simultaneously.

Statistical evidence points to the fact that Nigeria performed poorly in all indices of health and general wellbeing in recent times. For instance, child mortality rate for Nigeria is reported to be 100.2 per 1000 live births (World Bank 2017). Maternal mortality rate remains high; 100 per 100 000 live births (WHO 2014). As a summary measure, life expectancy of an average Nigeria stands at 53.9yrs as against 78yrs and 76yrs for Morocco and Algeria respectively (World Bank 2020).

Such poor health condition no doubt has great consequences on growth and development. It reduces human development level of the economy and makes the average worker less efficient in production. Secondly, it increases the number of productive hours lost to ill-health, and reduces the average productive years of labour. A number of studies have established connection between health, productivity and growth (Sachs 2001; Tammy and Chris 2019; Anowor et al. 2020; Ikpe et al. 2022). All these directly mitigate meaningful efforts towards meeting “Goal 3” (healthy lives and improved wellbeing for all ages) of Sustainable Development Goals (SDGs). Multiplier effects of this has negative consequences for achieving “Goal 1” (eradication of poverty), “Goal 2” (achievement of food security and improved nutrition), and “Goal 8” (promotion of sustained, inclusive and sustainable economic growth). The fact is that, such unhealthy situation of health, apart from inadequate investment on health (synonymous with the Nigerian health system) could find explanation on the neglect of influences of global factors in public policy.

Currently there is a dearth of studies that focused on the effect of this social macroeconomic variable on health in the context of the Nigerian economy; though quite a few exist. For instance, study by Swende (2008) by design is a literature review. Nwankwo (2015) has a sociology background therefore provided no empirical information that could guide policy decision. The study by Fatile and Adesanya (2016) is state level survey study; it relied on data from a single health facility - Lagos state University Teaching Hospital (LASUTH). Information from such a study cannot be used to draw conclusion for the entire economy. On the other hand, Oberlander et al., (2017) is a cross-country global investigation. It is not specific to Nigeria therefore; results from such-investigation cannot explain events in Nigeria. This study departs from known Nigerian studies by empirically providing information on the impact of globalisation on health and wellbeing in Nigeria. Secondly, it distinguished trade from social globalisation, and discussed implications of results on sustainable development in Nigeria. Objectives that guided the study include: (i) determination of impact of globalisation on population health; (ii) determination of where Nigeria currently lies between positive and negative quadrants of the effects of globalisation on population health; (iii) implication of this on sustainable development.

The paper is divided into five sections, succeeding this introductory section is section two which explores relevant literature, section three specifies method of analysis, presentation of results and

discussion of findings were the focus in section four, while five sums up the investigation, draws conclusion highlighting policy implication of findings, and offers recommendation.

Literature Review

Currently there is a dearth of papers focusing on the effect of globalisation on health, both at country and global level. At the global level, quite a number of papers examined this effect in different contexts (Hawks 2006; Thow & Hawkes 2009; Miljkovic, Shaik, Miranda, Barabanov & Liogier 2015; Asiedu et al. 2015; Oberlander et al 2017; Garcia-Dorado, Cornselsen, Smith, and Walls 2019). For instance, in a study of middle-income countries, Hawks (2006) examined links between globalization and nutrition transition. Study by Garcia-Dorado, et al (2019) is a cross-country review of quantitative studies. In a separate study, Oberlander et al. (2017) in a panel of 70 countries examined the distinct effect of social globalisation and trade openness on national trend and markers of quality of diets; by adopting a grouped fixed-effect approach to estimation, the study found that social globalisation has a significant positive association with supplies of animal protein, while openness of trade insignificantly affects dietary outcome and health. On the other hand, Asiedu et al. (2015) implicitly examined this effect in the context of examination of effect of income per capita on health. Within the framework of System General Method of Moment (SGMM) approach to estimation, the study controlled for global factors. Result of this investigation showed significant negative association across period.

Among Nigeria specific studies, all but one adopted non-empirical approach in their investigation. These include Adesina (2012), Fetile, et al. (2016), Swende and Sokpo (2008), and Nwankwo, (2015). Each of these studies adopted content analytical approach in their investigation therefore has no empirical foundation. The study by Ikpe (2018) focused on child health and failed to distinguish between trade and non-trade globalisation. Drawing from the analysis above, there are three notable points; first, no known Nigerian study empirically examined this effect using summary measure of health (life expectancy) as much as this study is aware of, second, past Nigerian studies did not distinguish trade globalisation from social globalisation, third, no known study in Nigeria deemed it necessary to examine where Nigeria currently lies between positive and negative quadrant of the effects of globalisation, fourth, no study examined the implication of result outcome on sustainable development. Theoretically, globalization is known to act through

its commonly known features like governance structures, markets, communication and diffusion of information, mobility, cross-cultural interaction, and environmental changes to determine and influence distal factors like health policies, trade, social interactions, knowledge as well as provision of goods and services. Changes in distal factors in turn shapes the level of health through proximal determinants of health (Huynen et al 2005). The health effect is then transmitted widely to determine productivity level and output, then development. Bridging each of this observed literature gap is where this study departs from known Nigerian studies.

Methodology

Data

Time series data which span over the period 1986 – 2017 was utilized in the analysis. LE is life expectancy (proxy for population health), GDPC and ANAEMIA are control variables for country specific factors that affects health. While GDPC denotes per capita gross domestic product (proxy for the economy's level of income), ANAEMIA represents prevalence of anaemia among women of reproductive age (proxy for within country health shock). TOPEN and NTGLOB are proxy for non-country-specific factors (global factors) that affect health. TOPEN denotes trade openness of the economy (trade related global factors); it is calculated as sum of trade (export + import) as a ratio of GDP, NTGLOB is time dummy variable which captures non trade related global factors that affect countries simultaneously. Data for import, and export are sourced from Central Bank of Nigeria's statistical bulletin, while that for all other variables are sourced from World Bank database 2018.

Theoretical Framework and Model Specification

Theoretical basis of analysis is anchored on a combination of modernisation theory, and endogenous mortality and life expectancy theory. Modernisation theory argues that there exist a relationship between globalisation and health. The nature of this relation in any country depends on the country's global competitiveness in international relation. On the other hand, the endogenous mortality and life expectancy relates individuals' survival and longevity to health investment. Increased health investment on individual increases chances that the individual will have more years of life, and it is both a direct and indirect function of income. An examination of

these views indicates that health is determined by both country-specific and non-country-specific factors.

Drawing from the above theoretical framework, the study's empirical specification of globalisation-health relationship is a combination of Oberlander et al (2017) group fixed-effect model and Asiedu et al., (2015) GMM model for developing countries. This same method of analysis has also been adopted by Ikpe (2018).

The estimated equation is as follows:

$$LE_t = \alpha_0 + \alpha_1 NTGLO + \alpha_2 TOPEN_t + \alpha_3 GDPC_t + \alpha_4 ANAEMIA_t + \eta_t \quad 1$$

Where LE is life expectancy in years, NTGLO denotes non-trade global factors, TOPEN is trade openness (Trade global factors), and GDPC is per capita GDP, while ANAEMIA is a measure of health of the population. α_0 , α_1 , α_2 , α_3 , and α_4 are estimated parameters, η is the error term, and t is time subscript. A priori expectation is that $\alpha_3 > 0$, $\alpha_4 < 0$, α_2 can be greater or less than zero.

Equ (1) is a general or baseline model. You have to specifically present the ARDL model as Equ (2), which will capture the long and short run effects, as well as the speed of adjustment

RESULTS AND DISCUSION OF FINDINGS

Table1: Results of Stationarity Tests

Variable	ADF				ADF BREAK POINT				Order of integration
	Constant		Constant & Trend		Constant		Constant & trend		
	Statistic	P-val	Statistic	P-val	Statistic	P-val	Statistic	P-val	
LE	0.310	0.975	-1.946	0.603	-3.332	0.485	-3.753	0.530	
Δ LE	-2.135	0.234	-2.001	0.575	-4.221	0.093	-5.384	< 0.01	I(1)
GDPC	-1.020	0.733	-1.990	0.583	-4.401	0.056	-2.996	0.913	
Δ GDPC	-3.561	0.013	-3.469	0.061	-5.801	< 0.01	-8.087	< 0.01	I(1)
TOPEN	-3.261	0.026	-3.481	0.059	-5.059	< 0.01	-4.949	0.038	I(0)
Δ TOPEN	-8.463	0.000	-5.974	0.000	-8.663	< 0.01	-8.394	< 0.01	
ANAEMIA	0.107	0.960	-4.337	0.010	-4.062	0.137	-5.134	0.022	I(0)
Δ ANAEMIA	-2.475	0.132	-2.360	0.391	-3.765	0.251	-4.080	0.323	

Note: Δ denotes first difference

Stationarity properties of each of the variables in the model were examined using both the Augmented Dickey-Fuller (ADF), and Augmented Dickey-Fuller (ADF) break point tests. Results

from both statistics show a combination in order of stationarity among the variables between zero and one. This outcome necessitated choice of Autoregressive Distributed Lag (ARDL) bound test approach to estimation as proposed by Pesaran, Shin, and Smith (2001) in the analysis. The unique feature of this approach to estimation provided ground for examining both the long run impact of each of the explanatory variables on life expectancy, and their specific short run dynamics. However, justification to explore the advantage of this unique feature was addressed by examining the cointegration properties of the model; result of this is presented in table 2.

Table 2. ARDL Cointegration Results

	Selected Model		F-Statistics
	ARDL(2,2,3,3)		9.783845**
	I(0)	I(1)	
1%	4.29	5.61	
5%	3.23	4.35	
10%	2.72	3.77	

** indicates significance at 5% level. *Source of Asymptotic critical value bounds: Narayan (2005)*

Evidence from the table shows existence of a long run relationship between life expectancy and the set of explanatory variables. This conclusion is supported by the F-statistics value of 9.783845, which exceeds the upper critical bound at the 5% level of significance. As noted by Narayan (2005), this provides evidence of a long-run relationship. The results of the long-run relationship between Life Expectancy (LE) and global factors are presented in Table 3.

Table 3: Results of Long run Regression

Variable	Coefficient	Std Error	t – statistics	P-value
<i>GDPC</i>	-0.000155	0.000365	-0.425183	0.6782
<i>ANAEMIA</i>	-1.661462	0.274551	-6.051555**	0.0001
<i>TOPEN</i>	-4.698344	0.824310	-5.699727**	0.0001
<i>NTGLOB2</i>	-0.524849	0.211102	-.486233**	0.0286
<i>NTGLOB3</i>	-0.505699	0.347051	-1.457130	0.1707
<i>NTGLOB4</i>	-0.664004	0.507904	-1.307341	0.2156
<i>C</i>	138.077519	15.156643	9.110033	0.0000

Note: ** denote variables that are significant at 5% level of significance.

Result from the long run regression shows that all explanatory variables in the model have negative relationship with life expectancy. This indicates tendency for decrease in the value of life expectancy on event of an increase in level of any of the explanatory variables. All but per capita GDP conformed to expectations of underlying theory, and are also significant. Empirically, life expectancy exhibited tendency to reduce by -4.7% should trade global factors increase by 1%. Secondly, non-trade global factors defined by fluctuations in business cycle, spread of major influenza, diffusion of medical technology and its access, significantly reduce life expectancy by -0.6% for every 1% increase between the periods 1994 - 2001. This effect decreased to -0.5% in the period 2005 - 2009 but subsequently increases to -0.7% between 2010 – 2017, but no longer significant beyond 1994 - 2001. On the other hand, effects of variables specific to Nigeria, on life expectancy are mixed. While per capita; GDP has an insignificant impact on life expectancy, prevalence of anaemia has a strong significant negative impact on LE. Specifically, LE reduces by -1.7% for every 1% increase in ANAEMIA. The specific dynamics of these observed effects are presented in table 4.

Table 4: Results of Dynamic Short Run Regression

Variable	Coefficient	Std Error	t – statistics	P-value
GDPC	3.06E-05	1.78E-05	1.718265	0.1114
GDPC(-1)	2.52E-05	2.56E-05	-0.594051	0.5635
GDPC(-2)	2.85E-05	2.85E-05	-0.999992	0.3371
ANAEMIA	-0.017970	0.038421	-0.467704	0.6484
ANAEMIA (-1)	-0.035628	0.056028	-0.635900	0.5368
ANAEMIA (-2)	0.006798	0.053566	0.126906	0.9011
ANAEMIA (-3)	-0.093654	0.036813	-2.544071**	0.0257
TOPEN	-0.119494	0.034374	-3.476255**	0.0046
TOPEN (-1)	-0.103302	0.029486	-3.503423**	0.0044
TOPEN (-2)	-0.096491	0.029323	-3.290629**	0.0065
TOPEN (-3)	-0.077894	0.031744	-2.453777**	0.0304
NTGLOB2	-0.044369	0.017672	-2.510701**	0.0274
NTGLOB3	-0.042750	0.029461	-1.451087	0.1724
NTGLOB4	-0.056132	0.043394	-1.293548	0.2202
C	11.67257	2.311999	5.048690**	0.0003
Conteq(-1)	-0.84536			0.0004
R-Square	99			
Adj.R-Square	99			
F Statistics	90499.94			0.0000
Diagnostic Test	Statistics			P-value
Jarque-Bera	0.260081			0.878060
B-Pagan Godfrey	3.776697			0.0123
Breush-Godfrey LM	2.657761			0.1187
Ramsey RESET	1.913321			0.1940

Note: ** denotes variables that are significant at 5% level of significance

The short run dynamics of the relationship between life expectancy (LE) and each of the global factors are as presented in table 4; choice of lag length was made based on Akaike information criterion (AIC). Results of the estimation show that in the current period, 1% increase in TOPEN significantly reduces LE by -0.12%. The magnitude of this observed effect improved progressively to -0.08% after three periods. On the other hand, non-trade global factors (NTGLOB) significantly reduce LE by -0.04% within the period 1994 - 2001. This effect averagely worsened to -0.06% in

the period 2010 - 2017 but no longer significant. Examination of the impacts of factors specific to the Nigeria economy shows that effect of per capita GDP on LE is insignificant across periods. The second variable, (prevalence of anaemia (ANAEMIA)) exerted insignificant effect on LE from the current period to the second period down the line, but this effect became significant in the third period. In the third period, 1% increase in ANAEMIA significantly reduces LE by -0.09%. The model has an R^2 of 0.99 - an indication that 99% of changes in LE is actually explained by the set of explanatory variables. Again, the model is adjudged to be significant given and F statistics value of 90499.94 and probability value of 0.0000. The error correction term is -0.84536; this indicates that adjustment to equilibrium occurs at the rate of -0.85% every period on event of disequilibrium, and it has the right sign.

The model in all but one case passed tests of diagnostics. Specifically, Jarque-Bera test of normality produced a test statistic of 0.260081 with a probability value of 0.878060. Breusch-Godfrey LM test of serial correlation has a statistics value of 2.657761 and probability of 0.1187. Value for Ramsey Reset test of specification bias is 1.913321 and probability value of 0.1940; this indicates failure to reject the null hypothesis in each case. The implication of this is that, the model is normally distributed, there is no case of serial correlation in the model, and there is no case of misspecification bias. However, result of Breusch-Pagan-Godfrey test of heteroscedasticity reject the hypothesis of no heteroscedasticity, with statistic of 3.776697 and probability value of 0.0123. This implies that the variances are not constant across periods. Such outcome is however not surprising, since the time series variables have mixed order of integration between I (0) and I (1). It is natural to detect heteroscedasticity under such situation (see also Mano-Bakalinov, 2016). Additionally, the results of CUSUM and CUSUM of Squares indicate that the coefficients of the variables remain stable across all periods, as demonstrated in Figures 1a and 1b."

Figure1a: Result of CUSUM plot

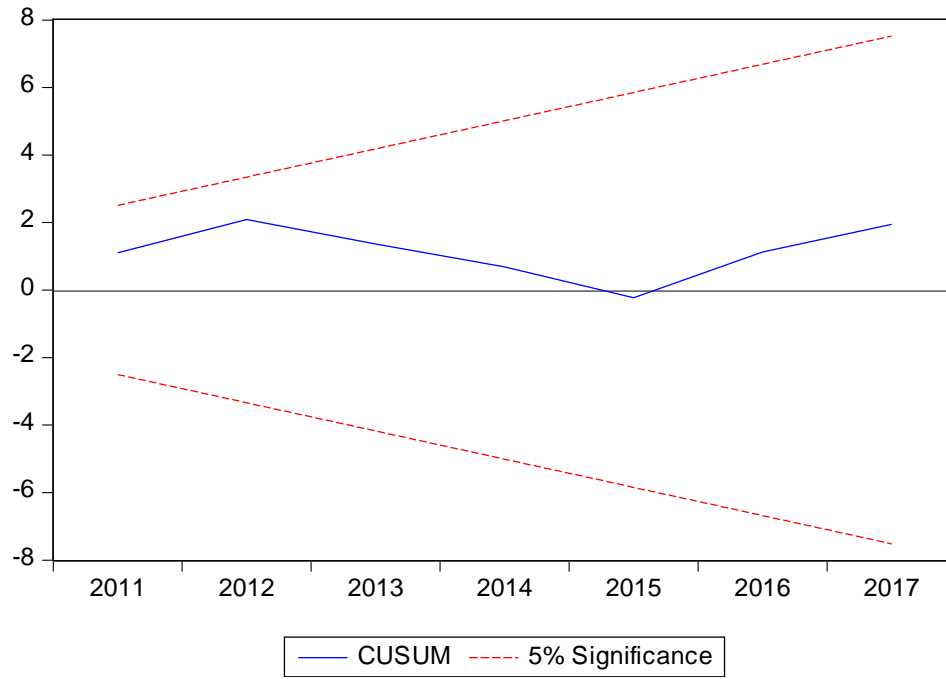
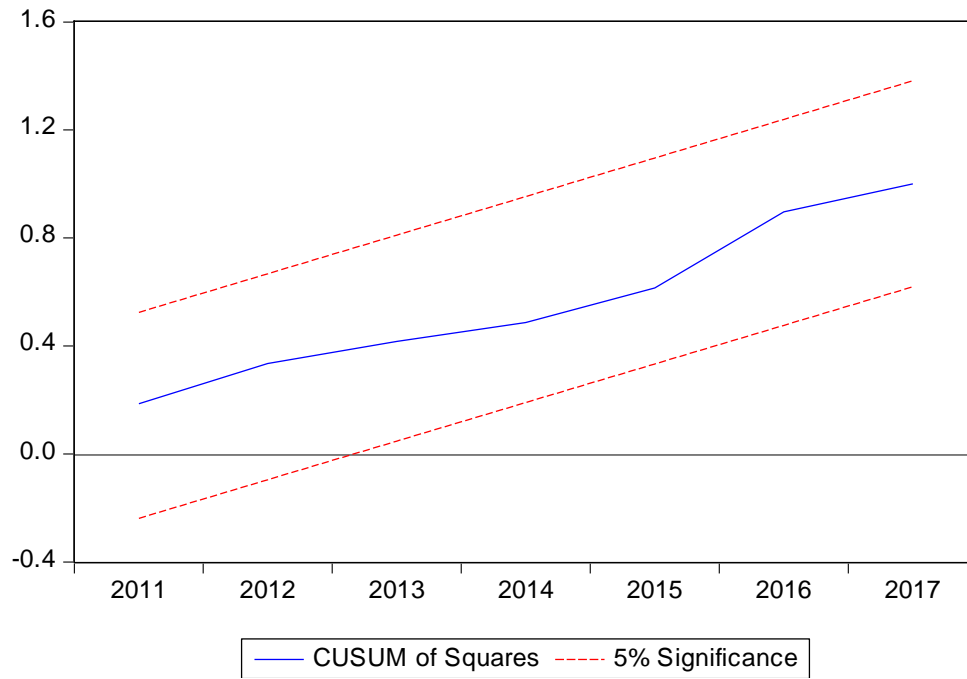


Figure1b: Result of CUSUM OF SQUARES plot



Conclusion, Policy Implication of Findings, and Recommendation

Primarily, this investigation was embarked on to determine how important global factors can be to the achievement of improved health and general wellbeing for the Nigerian populace. Secondly, efforts were also made to determine where Nigeria currently lies, between positive and negative guardrant of the influences of global factors, and the effect that this has on sustainable development in Nigeria. Results show that, against earlier conclusion that country specific factors are increasingly becoming less relevant in determination of health outcomes, this study made discoveries that point to the contrary. Though (in line with previous findings) per capita GDP was discovered to have an insignificant negative association with life expectancy but, ANAEMIA (a different country specific factor) was discovered to have a strong reducing effect on LE. These findings are consistent with finding by Asiedu et al (2015) and Ikpe, (2018). On the other hand, globalisation (in every form) has strong negative effect on health. This indicates that Nigeria currently lies on the negative guardrant of the effect of globalisation. This means that, in Nigeria, negative effect of globalisation offsets its positive effects. The implication of this is that globalisation by means of its specific components like dumping of sub-standard products, brain drain of health care workers; spread of major influenza and business cycle effects mitigates efforts towards sustainable development in Nigeria. This is consistence with findings by Nwakwo (2015), and Asiedu et al., (2015), but inconsistent with study by Oberlander et al., (2017).

On the bases of these discovery, the paper concludes that negative effects of globalisation offsets its positive effect in Nigeria, therefore hinders meaningful efforts towards sustainable development. As a result, and given that globalisation has come to stay, Nigeria should evolve ways of harnessing the benefits of globalisation, and managing its negative effects to levels that do not pose serious threat on meaningful efforts towards sustainable development. To this end, both child and maternal health intervention measures can be relied on for improving the health and wellbeing of the child, and pregnant mothers. On event of an outbreak of influenza, increased restrictions at the nation's entry point, and strengthening of the health system can serve as an effective check against such outbreak and its possible spread within the economy. In the area of trade and given that the world is a "global village", development of the manufacturing sector to create an effective interface with the agricultural and mining sectors is needed to create value

addition for internationally competitiveness of our exports. Given the foregoing, this study recommends capacity building in the health sector aimed at checking spread of major influenza, on event of its outbreak across the border, and at the same time guarding against brain drain syndrome. Secondly, proactive macroeconomic policy measure is advocated for tackling possible negative effects of business cycle.

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