International Journal of Advanced Studies in Business Strategies and Management | IJASBSM
p-ISSN: 2354-4236 | e-ISSN: 2354-4244
Volume 11, Number 1 February, 2024

Trade Openness and Life Expectancy: Evidence from Nigeria

[1]Olakunle Sarumi Olusola, [2]Kalu, Chris Ulua & [3]Orji, Alexander Chinedu
[1]Department of Economics, Enugu State University of Science and Technology, Enugu
[2&3]Department of Economics, Nnamdi Azikiwe University, Awka

Article DOI: 10.48028/iiprds/ijasbsm.v11.i1.01

Abstract

The health sector in Nigeria is at risk following barriers to international trade, as trade across Nigeria and the rest of the world may not be sufficiently promoting health indicators in particular life expectancy. This paper examined the impact of trade openness on life expectancy in Nigeria from 1986 to 2023. This paper utilized the autoregressive distributed lag model (ARDL) on trade openness, foreign direct investment, hospital infrastructure, electricity consumption and government health expenditure. From the result, it was showed that trade openness had a negative impact on life expectancy, while the three lagged value of foreign direct investment had a positive impact on infant mortality. As a way of policy implementation, the Government should create mechanisms to control the extent to which the economy is opened to the external world. This is because illicit and substandard health goods could be brough tinto the country which could have adverse and negative effect on the health come in the long run in Nigeria.

Keywords: *Autoregressive distributed lag, Foreign direct investment, Infant mortality, Life expectancy, Trade openness, Nigeria*

Corresponding Author: **Olakunle Sarumi Olusola**

Background to the Study

Healthcare is important in an economy as its improvement accounts for one-third increase in GDP growth. The improvement of healthcare is important as it is one of the vital means attain higher health outcome thus reducing infant mortality and increasing life expectancy (Edeme, Emecheta & Omeje, 2017). Life expectancy which is the measure of health outcome in this paper is the average life is the most vital indicator of an economy's health status (Shahbaz, Shafiullah & Mahalik, 2019). Life expectancy at birth is the average number of years a newborn infant is expected to live if health and living conditions at the time of birth remained the same throughout life. It reflects the health of a people, the quality of care they receive from the health system (Sani & Abubakar, 2019). On a comparative basis, Nigeria's average of 54 years is very far behind those of developed countries as evidenced in the Japan, United States of America and China with average life expectancy above 80, 76 and 71 years respectively (Nurudeen, Kunle & Sodiq, 2021)

Trade openness is the ratio of exports plus imports over GDP. It is generally accepted to be essential for economic growth and it is expected to trickle down to specific sectors of the economy. Trade is capable to change the structure and growth rate of the economy (Stevens et al., 2013; Novignon & Atakorah, 2018; Farooq *et al.,* 2019; Byaro *et al.,* 2021). In the case of Nigeria, despite some years of economic improvement, social and demographic indicators present a dismal picture. Nigeria still has one of the highest low life expectancies when compared with other developing countries. Nigeria is a developing country facing the problem of low life expectancy.

Improvement in trade relationship between countries facilitated by the globalization is expected to promote health outcome in particular life expectancy. Trade openness may increase life expectancy (Alam *et al.,* 2016) and decrease life expectancy (Qadir & Majeed, 2018). Thus, trade can both promote health and have adverse effect on health. Infectious diseases such as HIV, SAR and COVID-19 can spread through the economy (Kawachi & Wamala, 2006). Trade affects life expectancy in two aspects- first, trade expansion and industrialization which leads to high economic activities and resulted to raising the income of the people in the society leading to improvement in life expectancy. Second, industrial expansion increases carbon emission (CO_2) which leads to negative implications on human health thereby reducing life expectancy.

The objective of this paper is to examine the empirical relationship between trade openness and health outcome, proxy of life expectancy. The scope of the paper is from 1986 to 2022. The rest of this paper is structures as follows: Following the introduction is the empirical literature review in section 2; section 3 presents the methodology while section 4 presents the empirical results and analysis. Section 5 is the conclusion and policy implications.

Empirical Literature Review

This section reviewed the empirical studies relating to trade openness and life expectancy. Several studies have been carried out to determine the impact of trade openness on health outcome. Results have shown that these studies have mixed findings, that is, either a positive impact (Byaro *et al.,* 2021, Owen & Wu, 2007, Tahir, 2020, Farooq *et al.*, 2019, Jawadi *et al.,* 2018, Timothy, 2018, Herzer, 2015, Alam *et al.,* 2016, Palamuleni, 2017, Novignon and Atakorah, 2018 and Shah et al., 2021) or a negative impact (Qadir & Majeed, 2018 and Aigheyisi & Oligbi, 2019). Therefore, there is no consensus on the magnitude of the effect of trade openness on life expectancy.

Some of these studies were carried out for more than one country (Byaro et al., 2021, Owen and Wu, 2007, Akyuz et al., 2020, Farooq et al., 2019, Gövdeli, 2019, Jawadi et al., 2018, and Novignon and Atakorah, 2018), while others were country specific (Tahir, 2020, Qadir and Majeed, 2018, Alam et al., 2016, Timothy, 2018, Herzer, 2015, Shah et al., 2021, Palamuleni, 2017, Aigheyisi and Oligbi, 2019, Edeme *et al.,* 2017 and Stevens *et al.,* 2013). However, (Palamuleni, 2017) observed an interesting bidirectional relationship between trade openness and health outcome, stating that improved health outcome increases in trade.

Meanwhile, Byaro *et al.* (2021) using data from 33 sub-Saharan African countries over the year 2000–2016 examined the contribution of trade openness to health outcomes (measured in terms of under-five mortality and life expectancy). The findings reveal that, trade openness, income (GDP per capita), and health financing (total public and private health expenditure) all contribute to a longer life expectancy. Their findings therefore suggested that the health sector in sub-Saharan African countries is not at risk as a result of increased trade. From the reviewed empirical studies, it can be concluded that economic globalization through trade openness mainly via export have positive and significant impact on life expectancy in Nigeria (Aigheyisi & Oligbi, 2019) while import adversely affects life expectancy in a country. Furthermore, there are conflicting results from the reviewed works.

Theoretical Framework and Methodology

Theoretical Framework

The framework for this paper is based on the theoretical health production function developed by Grossman (1972) which has been adopted in similar studies by Fayissa and Gutema (2008), and Novignon and Lawanson, (2016), and Novignon and Atakorah, (2016). The theory considers social, economic and environmental factors as inputs for the health production system. The theoretical health production function for a micro (individual) health production analysis is thus stated as:

$$H = f(X) \quad 1$$

Where;

H = Individual health output which is a column vector of one outcome - infant mortality rate.

$$H = (IFR) \quad 2$$

X = Vector of individual inputs to the health production function.

Empirical Model Specification

Given the theoretical health production framework developed by Grossman (1972) and adopted by Novignon and Atakorah (2016), the model for this paper is specified in its mathematical form as:

$$LEX = f(TOPEN, FDI, REXCH, HOSBED, ELCON, GOVEXP) \quad 3$$

Re-specifying equation 3 in its functional econometric form becomes:

$$\text{Ln LEX} = \beta_0 + \beta_1 \text{LnTOPEN} + \beta_2 \text{Ln FDI} + \beta_3 \text{LnREXH} + \beta_4 \text{LnHOSBED} + \beta_5 \text{LnELCON} + \beta_6 \text{LnGOVHEXP} + \mu \quad 4$$

Where;
LEX = Life expectancy; TOPEN = Trade openness, FDI = Foreign direct investment, REXCH = Real exchange rate, HOSBED = Hospital bed, ELCON = Electricity consumption and GOVEXP = Government health expenditure and μ is the stochastic error term.

Apriori, it is expected that the relationship between trade openness and life expectancy is expected to be ambiguous, depending on whether the country exports more than imports and vice versa. The relationship between foreign direct investment and life expectancy is expected to be positive while exchange rate is expected to be negative. The relationship between hospital infrastructure and life expectancy is expected to be positive and electricity consumption and government expenditure on health is expected to be positive.

The data for these variables were sourced from the Central Bank of Nigeria Statistical Bulletin, the National Bureau of Statistics and the World Development Indicator (2022). The paper employed the structural vector autoregressive (SVAR) model to estimate the parameters of the model. This choice of technique is made based on the objectives of the study –which is to examine the effect of trade openness and life expectancy. To avoid a spurious regression, the paper undertook the preliminary tests including the unit root and co-integration statistical tests.

Data Presentation, Analysis and Discussion of Findings

Descriptive Statistics

Table 1 presents the summary of the descriptive statistics i.e., the measures of central tendency which explains the extent of distribution of values of a variable around the mean, and measures of dispersion-which measures the tendency of values of a variable to scatter away from the mean.

Table 1: Descriptive Statics

	LEX	TOPEN	ELECON	HOSBED	FDI
Mean	46.52711	116.3068	34.29536	17.91904	1.583895
Median	45.99200	122.5000	37.62450	18.91340	1.412202
Maximum	52.67200	162.2000	53.27796	22.84479	5.790847
Minimum	41.39200	80.40000	9.135846	5.967770	-1.150856
Std. Dev.	2.667953	20.89497	12.30493	4.101348	1.262564
Skewness	0.538164	-0.035140	-0.647412	-1.547874	1.196683
Kurtosis	3.093890	2.517868	2.467810	4.683806	5.313248
Jarque-Bera	2.140042	0.435215	3.592963	22.76790	20.31208
Probability	0.343001	0.804441	0.165881	0.000011	0.000039
Sum	2047.193	5117.500	1508.996	788.4375	69.69138
Sum Sq. Dev.	306.0729	18773.79	6510.682	723.3053	68.54488
Observations	44	44	44	44	44

Source: Researchers' computation using EView 12

Table 1 presents the results of the descriptive statistics while Table 2 presents the correlation matrix results.

Correlation Matrix

The correlation matrix is carried out in support of the descriptive statistic results. The correlation matrix plays an important role in multi-variance analysis of this type of study since it captures the degree of relationship between different components of a random vector. The correlation matrix shows the correlation coefficient between the variables related to health outcomes.

Table 2: Correlation Matrices

	LEX	TOPEN	ELECON	FDI
LEX	1.000000			
TOPEN	0.179339	1.000000		
ELECON	0.520337	-0.079282		
FDI	0.030517	0.076193	-0.126069	1.000000

Source: Researchers'' computation using EViews12

Table 2 shows the results of the correlation matrix. From the results presented, it shows that none of the variables are correlated.

Unit Root Test

The unit root test is conducted to determine the stationarity of the data. It has been observed that most economic data are not level stationary thus the need for stationarity test is needed.

Table 3: ADF Unit root test Result

Variable	ADF at level	ADF at first difference
LEX	-4.3670 (0.0059)*	-4.2471 (0.0093)*
TOPEN	-2.9224 (0.0604)	-7.8635 (0.0000)*
ELECON	-3.1639 (0.0296)*	-5.2625 (0.0001)*
FDI	-4.1080 (0.0022)*	-6.2477 (0.0000)*

Source: Researchers' computation using EView 12

From the Table 3, it showed that not all the variables considered in the paper are at levels of stationarity. The result showed that only trade openness attained stationarity at first difference (i.e. I(1)) while other variables are level stationary. This therefore justify the usage of Autoregressive Distributed Lag model as estimation technique.

Lag Length Selection Criteria and the ARDL Bound Tests
This test enables us to determine the lag length criteria.
Table 4a: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-202.7388	NA	129.3504	10.53694	10.87471	10.65907
1	8.503778	359.1123	0.004102	0.174811	0.681475	0.358005
2	133.6356	200.2109	9.67e-06	-5.881780	-5.206228	-5.637522
3	177.8098	66.26132	1.31e-06	-7.890491	-7.046051	-7.585168
4	205.2805	38.45903*	4.12e-07*	-9.064027*	-8.050700*	-8.697640*
5	208.0864	3.647640	4.48e-07	-9.004321	-7.822106	-8.576869

Source: Researchers' computation using Eview 12

The optimal lag length chosen for the study is four (4) following the AIC prescription for consistency.

Table 4b: ARDL Bounds Test

F-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	10.92853	10%	3.47	4.45
K	3	5%	4.01	5.07
		2.5%	4.52	5.62
		1%	5.17	6.36

Source: Researchers' computation using EView 12

The result of the co-integration test showed that there is a long run relationship among the variables. The F-statistic value of 10.9285 is greater than the lower and upper bound value of 5% level of significance. Hence, there is a long run relationship among the variables.

Short-Run Estimates

Table 5: ARDL Error Correction Regression

ECM Regression

Case 5: Unrestricted Constant and Unrestricted Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.342601	0.049390	6.936610	0.0000
@TREND	0.002008	0.000269	7.457380	0.0000
D(LEX(-1))	2.503562	0.073020	34.28589	0.0000
D(LEX(-2))	-2.310748	0.132950	-17.38061	0.0000
D(LEX(-3))	0.802588	0.066195	12.12454	0.0000
D(ELECON	0.001115	0.000531	2.099132	0.0457
D(ELECON(-1))	0.001533	0.000581	2.637946	0.0139
D(FDI)	0.000736	0.000530	1.388928	0.1766
D(FDI(-1))	0.001426	0.000604	2.362018	0.0259
D(FDI(-2))	0.001297	0.000618	2.100090	0.0456
D(FDI(-3))	-0.000868	0.000520	-1.668270	0.1073
CointEq(-1)*	-0.007917	0.001134	-6.982698	0.0000

R-squared	0.999789	Mean dependent var	0.253561
Adjusted R-squared	0.999709	S.D. dependent var	0.222218
S.E. of regression	0.003792	Akaike info criterion	-8.072730
Sum squared resid	0.000417	Schwarz criterion	-7.571197
Log likelihood	177.4910	Hannan-Quinn criter.	-7.890099
F-statistic	12484.90	Durbin-Watson stat	2.616597
Prob(F-statistic)	0.000000		

From the result presented in table 5, it revealed that the trend of life expectancy at birth is positive which implies that life expectancy at birth is increasing year on year and sloping upwardly and statistically significant. The result also showed that previous value of life expectancy at birth has a statistically significant impact for about three periods with the second lagged value having negative impact while other lagged values are positively impacting current life expectancy at birth. Also, it also revealed that fossil fuel energy consumption is statistically significantly impact life expectancy at birth positively for more than one periods. It shows that ELECON has a two periods positive impact on LEX, this could be as a result of burning fossil fuel energy for research and development on how to improve life, produce drugs for human health.

The result also showed that foreign direct investment has a two-periods impact positive impact on life expectancy at birth which implies that as foreign direct investment increases, life expectancy at birth also increases. This could mean that as multinational companies open up their subsidiaries in the country, there is an increase in health outcomes of people especially when the foreign firms deal with the production of health-related goods such as drugs, soap, and toothpaste. Also, the result showed that the model has a statistically significant self-correcting coefficient of about 1%. This implies that a deviation from the normal trend of LEX is corrected annual at the rate 0.7%. The Durbin-Watson statistic value of 2.6166 suggested that there is no serial correlation among the variables of the life expectancy at birth model. From the result of the adjusted R-squared, it is vivid that 99.9 percent of the total variation that occurred in health outcome, i.e. life expectancy at birth is explained by independent variables. The p-value of the F-statistic showed that the model is significant and at 1% level of significance.

Long-run Estimates

Table 6: Levels Equation

Case 5: Unrestricted Constant and Unrestricted Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TOPEN	-0.010507	0.012930	-0.812639	0.4238
ELECON	-0.126223	0.095417	-1.322852	0.1974
FDI	0.026990	0.199257	0.135453	0.8933

Source: EView 12

Unlike the short-run analysis, the long-run result showed that none of the independent variables has a statistically significant impact on the dependent variable in the life expectancy at birth model. This shows that trade openness, fossil fuel energy consumption and foreign direct investment do not have a significant long-run impact on life expectancy at birth but only a short-run impact.

ARDL Cointegration Test

Table 7: Infant Mortality Model – ARDL bounds Test

F-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	68.77628	10%	3.47	4.45
K	3	5%	4.01	5.07
		2.5%	4.52	5.62
		1%	5.17	6.36

Source: Researcher's computation using EView 12

The ARDL bounds test result for co-integration showed that there is a long run relationship among the variables. The F-statistic value of 68.7763 is greater than the lower and upper bound value of 5% level of significance. Hence, there is a level relationship amidst the variables.

Short-run Estimates

Table 8: ARDL Error Correction Regression

ECM Regression

Case 5: Unrestricted Constant and Unrestricted Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.465857	0.421526	17.71148	0.0000
@TREND	-0.083150	0.004701	-17.68951	0.0000
D(IFM(-1))	0.965201	0.009754	98.95230	0.0000
D(OPN)	0.001665	0.001712	0.972512	0.3405
D(OPN(-1))	-0.005118	0.001636	-3.128749	0.0046
D(OPN(-2))	-0.006510	0.001700	-3.828912	0.0008
D(FFC)	-0.008961	0.012200	-0.734499	0.4698
D(FFC(-1))	-0.023715	0.012625	-1.878393	0.0725
D(FFC(-2))	0.016801	0.012394	1.355594	0.1878
D(FDI)	0.036967	0.012148	3.043006	0.0056
D(FDI(-1))	-0.006853	0.013627	-0.502916	0.6196
D(FDI(-2))	-0.015014	0.012958	-1.158702	0.2580
D(FDI(-3))	0.033337	0.011536	2.889820	0.0081
CointEq(-1)*	-0.049522	0.002815	-17.59242	0.0000

R-squared	0.997933	Mean dependent var	-1.753659
Adjusted R-squared	0.996938	S.D. dependent var	1.476499
S.E. of regression	0.081708	Akaike info criterion	-1.906139
Sum squared resid	0.180257	Schwarz criterion	-1.321017
Log likelihood	53.07584	Hannan-Quinn criter.	-1.693069
F-statistic	1002.664	Durbin-Watson stat	2.343388
Prob(F-statistic)	0.000000		

Source: Researcher's computation using EView12

The result displayed in Table 8 showed that a positive and significant constant exist in the model with a significant negative trend. This implies that infant mortality per 1000 live births is declining year on year. Only one lag value of infant mortality is statistically significant and positively impact current infant mortality. The result also showed that trade openness has a negative impact on infant mortality. This implies that as the economy increases its openness to the global world, the lesser the mortality of infants in the economy. This could be as a result of getting exposure to experiences of how to curtail the death of infants through medical health care and health tips and information related to causes of infants' mortality.

The result further showed that fossil fuel energy consumption does not have a statistically significant impact on infant mortality. However, foreign direct investment has a statistically significant impact on mortality rate of infant. It showed that the current and three periods lagged value of foreign direct investment has a positive impact on infant mortality. This could be as a result of environmental pollution and degradation caused by multinational firms' operation in Nigeria especially in the oil exploration region. The model, however, has an approximately 5% speed of adjustment. This shows that there is an annual self-correction of about 5% in the model in case of any external shock. The Durbin-Watson statistic of 2.3433 suggests that there is no serial correlation problem. This implies that the residuals of the model are normally distributed. The 99.6% value of the adjusted R-squared showed that the model has very good goodness of fit and 99.6% of the total variation in infant mortality rate is explained by the dependent variables. Also, the p-value of the F-statistic suggests that the model is statistically significant at 1% level of significance.

Long-run Estimates

Table 9: Levels Equation

Case 5: Unrestricted Constant and Unrestricted Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
OPN	0.134965	0.066260	2.036888	0.0528
FFC	-0.013159	0.189776	-0.069339	0.9453
FDI	0.661047	0.608473	1.086403	0.2881

The long-run result showed that only the trade openness has a positive impact on infant mortality in the long-run. This implies that as the economy openness increases to the external world, infant life expectancy increases. On the other hand, fossil fuel energy consumption and foreign direct investment have insignificant impact on life expectancy.

Discussion of Findings

The result showed that previous value of life expectancy at birth has a statistically significant impact for about three periods with the second lagged value having negative impact while other lagged values are positively impacting current life expectancy at birth. Also, it also revealed that fossil fuel energy consumption is statistically significantly impact life expectancy at birth positively for more than one period. It shows that ELECON has a two periods positive impact on LEX, this could be as a result of burning fossil fuel energy for research and development on how to improve life, produce drugs for human health.

The result showed that the LEX model has a statistically significant self-correcting coefficient of about 1%. This implies that a deviation from the normal trend of LEX is corrected annual at the rate 0.7%. The Durbin-Watson statistic value of 2.6166 suggested that there is no serial correlation among the variables of the life expectancy at birth model. From the result of the adjusted R-squared, it is vivid that 99.9 percent of the total variation that occurred in health outcome, i.e. life expectancy at birth is explained by independent variables. The p-value of the F-statistic showed that the model is significant and at 1% level of significance.

The model, however, has an approximately 5% speed of adjustment. This shows that there is an annual self-correction of about 5% in the model in case of any external shock. The Durbin-Watson statistic of 2.3433 suggests that there is no serial correlation problem. This implies that the residuals of the model are normally distributed. The 99.6% value of the adjusted R-squared showed that the model has very good goodness of fit and 99.6% of the total variation in infant mortality rate is explained by the dependent variables. Also, the p-value of the F-statistic suggests that the model is statistically significant at 1% level of significance.

Conclusion

From the study which examined the implications of trade openness on health outcome in Nigeria, the key finding revealed as follows: health outcomes have been stable in Nigeria overtime as LIE has maintained a positive trend overtime and IFM has maintained a negative trend overtime. A significant positive relationship was observed between trade openness and health outcome in Nigeria.

The three formulated hypotheses and their alternates were tested at the 5% level of significance and from the first hypothesis, the H_1 of the study is rejected for the acceptance of Ho which states that health outcome in Nigeria is stable. From the ARDL Error Correction Regression results of the second hypothesis, the H_o of the study is rejected for the acceptance of H_I which states that trade openness has a positive and significant impact on health outcome (LIE) and (IFM) in Nigeria. This implies that as the economy increases its openness to the global world, the lesser the mortality of infants in the economy and the higher the life expectancy in the short run. The co-integration results show that trade openness does not have a significant long-run impact on life expectancy at birth but only a short-run impact and as such H_o which states that there is no long run relationship between trade openness and health outcome in Nigeria is accepted and H_1 rejected. Conversely, the long-run result showed that infant mortality in Nigeria increases in the long as the economy openness increases to the external world in the long run. The H_o which states that there is no long-run relationship between trade openness and health outcome in Nigeria is rejected and the H_1 is accepted. The short run results reveal that trade openness has a positive and significant impact on LIE and IFM in Nigeria. It was also found that trade openness does not have a significant long-run impact on life expectancy at birth but there is a positive impact on infant mortality in the long-run in Nigeria.

Policy Implications

In the light of the key findings the following are recommended as policy measures:

I. From the findings, trade openness has a positive and significant impact on life expectancy at birth, the government and policymakers should initiate policies that open up the economy and ensure greater collaboration between Nigeria and foreign investors who wish to invest in the health sector of the country.
ii. The openness of the economy as an advantage could also be harnessed by the training of more domestic doctors in more advance countries who will come back and support the growth of the health sector of the country. This will help reduce the infant mortality rate and keep a growing positive trend in life expectancy at birth.

iii. The openness of the economy as an advantage in the short run is to ensure that more in investments come into the country and as such more people are employed by multinationals and business that have come into the country, and because such people have become employed, they are able to earn more income and afford better healthcare services. This leads to decline in the mortality rate and a positive implication on the life expectancy at birth.
iv. Government should create mechanism to control the extent to which the economy is opened to the external world. This is because illicit and substandard health goods could be brough tinto the country which could have adverse and negative effect on the health come in the long run in Nigeria.

References

Aigheyisi, O. S. & Oligbi, O. B. (2019). Trade openness, Foreign direct investment and life expectancy in Nigeria. *The Annals of the University of Oradea. Economic Sciences* Tom XXVIII (2) ISSN 1222-569X, eISSN 1582-5450

Akyuz, M., Karul, C. & Demir, I. (2020). Life expectancy and trade openness: causality in Latin America. *International Journal of Social Economics* 47 (10), 1265-1281 © Emerald Publishing Limited 0306-8293 DOI 10.1108/IJSE-01-2020-0013

Alam, M. S., Raza, S. A., Shahbaz, M. & Abbas, Q. (2016), Accounting for contribution of trade openness and foreign direct investment in life expectancy: the long-run and short-run analysis in Pakistan, *Social Indicators Research*, 129 (3), 1155-1170.

Byaro, M., Nkonoki, J. & Mayaya, H. (2021). The contribution of trade openness to health outcomes in sub-Saharan African countries: A dynamic panel analysis. *Research in Globalization* 3 (2021) 100067

Edeme, R. K., Emecheta, C., & Omeje, M. O. (2017). Public health expenditure and health Outcomes in Nigeria. *International Journal of Dual Diagnosis*. 2(1), 1-7. doi: 10.11648/j.ijdd.20170201.11

Farooq, F., Yusop, Z. & Chaudhry, I. S. (2019). How do trade openness and public expenditures affect health status in OIC member countries? An empirical analysis. *Pakistan Journal of Commerce and Social Sciences* (PJCSS), ISSN 2309-8619, Johar Education Society, Pakistan (JESPK), Lahore, 13, Iss. (4), 1041-1056

Gövdeli, T., (2019). Life Expectancy, direct foreign investments, Trade openness and economic growth in E7 countries: Heterogeneous panel analysis, *Third Sector Social Economic Review,* 54(2), 731-743

Herzer, D. (2015). The long-run effect of trade on life expectancy in the United States: An empirical note, *Applied Economics Letters*, 22(5), 416-420.

Jawadi, F., Gouddi, S. E., Ftiti, Z. & Kacem, A. (2018). Assessing the effect of trade openness on health in the MENA Region: A panel data analysis, *Open Economies Review* 29(2), 469–479. doi:10.1007/s11079-017-9450-3.

Novignon, J., Atakorah, Y. B., & Djossou, G. N. (2018). How does the health sector benefit from trade openness? Evidence from sub-Saharan Africa, *African Dev. Rev., 30*(2), 135–148.

Odior, E. S. O. (2011). Government expenditure on health, economic growth and long waves in a CGE micro-simulation analysis: The case of Nigeria. *European Journal of Economics, Finance and Administrative Sciences, 31*(31), 99–113.

Owen, A. L. & Wu, S. (2007), "Is trade good for your health?", *Review of International Economics*, 15 (4) 660-682.

Palamuleni, M. L. (2017). Trade openness and life expectancy nexus in less-developed countries, *International Journal of Trade and Global Markets* 10 (4): 290–302. doi:10.1504/ IJTGM.2017.090268.

Qadir, N., & Majeed, M. T. (2018). The impact of trade liberalization on health: Evidence from Pakistan, *Emperical Economic Review, 1*(1), 71–108.

Stevens, P., Urbach, J. & Wills, G. (2013), "Healthy trade: the relationship between open trade and health, *Foreign Trade Review*, 48 (1), 125-135.

Tahir, M. (2020). Trade and life expectancy in China: A cointegration analysis, *China Economic Journal*, DOI: 10.1080/17538963.2020.1783745

Timothy, P. O. (2018). Impact of economic globalization on life expectancy in Nigeria, *Health Economics & Outcome Research Open Access* 4 (152), 2. doi:10.4172/2471-268X.1000152.

Grossman, M. (1972). On the concept of health capital and the demand for health, *Journal of Political Economy*, *80*(2), 223–255.

Fayissa, B. & Gutema, P. (2008). *A health production function for sub-Saharan Africa'*, Department of Economics and Finance Working Paper Series, August. Middle TennesseeState University

Novignon, J. & Atakorah, Y. B. (2016). *How does the health sector benefit from trade openness? Evidence form panel data across sub-Saharan Africa countries*, Online at https://mpra.ub.uni-muenchen.de/72258