VOL. 4, NO. 2, March 2015 ISSN 2307-2466
International Journal of Economics, Finance and Management

http://www.ejournalofbusiness.org

Convergence of Health Expenditure and Health Outcomes in Ecowas Countries

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ABSTRACT

The study examined the convergence of health expenditures as well as health outcomes for a group of Economic Community of West African States using annual data between 1995 and 2011. We employed beta convergence and Johansen (1998) Co-integration technique to investigate convergence in health expenditure and health outcomes. The evidence from our results showed that the variable that measures the speed of convergence in health expenditure among member of ECOWAS region is positive and significant for both absolute and conditional convergence which indicated that there is no convergence in health expenditure. Divergence in health expenditure indicates that there are differences across countries in health expenditure which direct each country to converge to its own steady state. However, the study found evidence of convergence in health outcomes. Convergence in health outcomes shows that health outcomes variables move towards the same direction for member states. The result obtained from Cointegration test also confirms divergence in health expenditure and convergence in health outcomes for this region. The implication of these findings is that health challenges facing this region may continue, if member states are not ready to improve on resources allocated to health. Therefore the study suggested that policy makers should be more committed to regional policy especially in the area of resources allocated to health in their countries.

Keywords: *Health expenditure, health outcomes, convergence, ECOWAS countries.*

1. INTRODUCTION

Health expenditure has been on increase in both developing and developed countries. The rise in health expenditure according to Okunade et al.[1] has constitutes a major concern for health policy makers in both developing and developed countries, even though geographical distribution of money spend on health is uneven. In this respect, health economist researchers have focused on the factors determinants health expenditure (Gupta, Verhoeven and Tiongson, [2]; Temple, [3]; Kim and Moody, [4]; Musgrove, [5]; Filmer and Pritchett, [6]; and Filmer et al.,[7]) and the effect of this health expenditure on variables like income, diseases etc(Hitiris and Posnett, [8]; Hansen and King, [9]; Di Matteo and Di Matteo, [10]; Karatzas, [11]; Herwartz and Theilen, [12]) also, the effect of health expenditure on health outcomes has been documented in the literature (Or, [13]; Baldacci, Emanuele, Maria Teresa Guin-Sui, and Luiz de Mello, [14]; Akinkugbe and Afeikhena, [15]).

In recent time, another area that concerned health economist is on determine if differences in health expenditures and health outcomes are diminishing over time within identifiable regions of the world or between developing and developed countries, that is if health expenditure converges for a group of countries. Convergence is defined as the result of a process in which the structures of different societies come increasingly to resemble each other, Nixon, [16]. Studies that have focused their attention in this area include (Barros, [17]; Hitiris, [18]; Nixon,[19]; Hitiris and Nixon, [20]; Narayan, [21] and Wang [22]). Studies have also looked at convergence in health outcomes among countries as well{John Nixon, [16]; Panopoulou and Pantelidis,[23]

Evidence from the literatures shows that the empirical results depend on the region or the characters of the countries brought together. This area has not received much attention in developing countries, especially among member countries of Economic Community of West African states (ECOWAS). This group of countries is working toward harmonized in health sector through West African Health Organization (WAHO) and just like other regions in the world, ECOWAS region also present a unique features of testing whether differences in health expenditure diminishing over time. For example, Towards the improving health status for their citizens, ECOWAS Conference of Heads of State and Government emphases the need to adopt a coordinated regional approach by pulling their resources together, harmonies policies, and to partner with other bodies through it specialist institution on health, West African Health Organization (WAHO). According to Wang, [22] adoption of common policy is another factor that may lead to converges among countries. The idea of health convergence among ECOWAS countries would be useful in evaluating the relationships among these countries and the impact of West African Health Organization activities in ECOWAS region. Therefore, this study will examine whether health expenditures converge for a group of Economic community of West African States. This study will also investigate whether health outcomes convergence\divergence in ECOWAS region.

This rest of this paper is divided into six sections. Section two summarized the literature, section three discussed the activities of West African Health Organization, section four covers model specification, measurement of variables and sources of data used is discussed in section five, in section six econometric analysis and results is presented and conclusion in the last section.

2. LITERATURE REVIEW

From the summary of literature on convergence in health expenditure and health outcomes presented in table 1 below, it reveals that results depend on region or group of countries used. Apart from this, most of the studies focused on developed countries. Hence there is need for a study that will reveal whether health expenditure and health outcomes converges or not for the group of ECOWAS member countries, this with a view to know more about the direction of health expenditure and health outcomes in this region and to reveal more evidence on convergence of health expenditure and health outcomes.

Table1: Summary of Literature on Convergence in health expenditure and health outcomes

Author / year	Country	Focused of the paper	Results conclusions
Hitiris[1997]	European union	Examined convergence of Health Expenditure	Found no evidence of convergence
Barros {1998}	O ECD countries	Examined convergence of Health Expenditure	Found Evidence of convergence
Hitiris and Nixon {2001}	European union countries	Examined convergence in Health Expenditure and Health outcome	Found Evidence of convergence among the countries
Narayam's {2007}	Uk, Canada, Japan, Switzerland, Spain, and USA	Examined Whether per capital health expenditure of Uk, Canada, Japan, Switzerland and Spain converge to USA per Capital health Expenditure	The author found strong evidence in favor of convergence
Alper Aslan {2008}	OECD countries	Investigated the convergence of health expenditure per capital	Found no convergence
Wang {2008}	USA	Investigated the degree of convergence of us health care expenditure and its components using state level data	The Study provide evidence of moderate convergence in total health care expenditure
Panopoulou and Pantelidis {2009}	19 OECD countries	Examined if there is convergence in health expenditure in 19 OECD countries and if it will lead to convergence in health outcomes	The study provides evidence of convergence in per capital health care expenditure for 17 countries, while USA and Norway follow different path. In case of health expenditure the study found no convergence in health outcome.

3. A BRIEF OVERVIEW OF ACTIVITIES OF WEST AFRICAN HEALTH OGANISATION (WAHO)

West African Health Organization (WAHO) is the health institution of the Economic Community of West African States (ECOWAS). The West African Health Organization (WAHO) was formed in 1987 when the Heads of State and Government from all fifteen countries in the Economic Community of West African States (ECOWAS) adopted the Protocol creating the organization. The Protocol, which was subsequently ratified by each government in the sub-region, grants WAHO status as a 'Specialized Agency of ECOWAS' (ECOWAS report, 2009)

WAHO was formed from the two existing inter-governmental health organizations in the ECOWAS region, the Francophone Organization de Coordination et de Cooperation pour la Lutte Contre les Grandes Endemies (OCCGE) and the Anglophone West African Health Community (WAHC). The aim was to combine the efforts and the resources of the two bodies to enhance their performance in the region. In March of 2000, WAHO began active operations as a leading health authority in the sub-region, serving ECOWAS Member States.

The main objective of the West African Health Organization is to bring to West African peoples high quality health care and protection of health of the peoples in the sub-region through the harmonization of the policies of the Member States, pooling of resources, and cooperation with one another and with others for a collective and strategic combat against the health problems of the sub-region. (Article III, Paragraph I 1987 Protocol of WAHO)

Since its inception WAHO has supported ECOWAS Member States in key areas of its mandate and has been instrumental and beneficial to the health situation of ECOWAS citizens. For example, Partnership of WAHO with WHO and United Nation Children Fund (UNICEF) has made polio vaccination available to approximately 79 percent to ECOWAS citizens which has in turn reduced actual reported cases of polio within the region to less than 1000 cases per annual.(Global Polio Eradication Initiative 2006). WAHO is also, supporting health practitioners in the region by providing baseline data and communities with best practices to overcome

malnutrition, be it over- or under-nutrition. The main purpose is to improve the nutritional status of the populations in the ECOWAS region, in order to mitigate mortality and morbidity and reinforce human capital. The body has promote effective institutionalization of traditional medicine in the health systems of the region and these have created enabling environments for training, collaboration between practitioners of traditional medicine and conventional medicine, for networking and information exchange. Today countries such as Burkina Faso, Guinea, Ghana, Mali, Nigeria, and Togo have reported to be locally producing traditional medicines for the treatment of various diseases and some of the medicines have reported promising results.

Other programs includes partnership with International Development Research Centre of Canada(IDRC) and COHRED to strengthening Health research in the region, launching of West African Regional Disease Surveillance (WARDS) the aim is to address the threat of epidemic prone diseases by strengthen response capacity of ECOWAS member countries, and WAHO is dialogue with Member States with a view to facilitating access to quality healthcare and developing harmonized sub-regional health policies, standards and legislations. In fact, with the help of WAHO, member states have the opportunity to meet and exchange experiences, to determine the strengths and weaknesses of each other and share best practices, thus facilitating the harmonization of policies and thereby improving the health of the citizens

Apart from the states, several international development agencies, the private sector (pharmaceutical industries), civil society and grassroots communities constitute the bulk of WAHO's partners. As a result, the health sector received increasing attention domestically and support from the multi-lateral and bi-lateral institutions over the past decade also increase

A regional approach has facilitated sharing among member countries, and support better sharing among global projects and multilateral organizations. Integration in health care markets and common policies to promote health, living and working conditions, and to coordinate medical and health research have been identified in the literatures as factors that drive convergence in health.

4. MODEL SPECIFICATION

This study employed beta convergence test and Cointegration methodology. The beta convergence equation in this study is specified after the model used by Nixon,[16]. Therefore, the model for the panel data for health expenditure will be specified as follow;

$$In(HE_{it+1} - HE_{it}) = \alpha + \beta_1 InHE_{it} + \beta_2 InGDP_{it} + \varepsilon_{it} \quad (1)$$

and the model for the panel data for health outcomes is;

$$In(HS_{it+1} - HS_{it}) = \alpha + \beta_1 InHS_{it} + \beta_2 InGDP_{it} + \beta_3 InHE_{it} + \varepsilon_{it} \quad (2)$$

From equation 1, HE is the health expenditure for country i at time t, α and β are the parameters. GDP is per capital Gross Domestic Product and is included as a control variable, ε is the error term. The log of first-differences of per capital health expenditure, $HE_{it+1} - HE_{it}$, is explain by the log of per capital health expenditure at level, HE_{it}, and log of explanatory variable, $InGDP_{it}$,

From equation 2, HS is the health status, GDP is the Gross Domestic Product, and HE is the health expenditure. The log of first-differences of per capital health expenditure, $HS_{it+1} - HS_{it}$, is explain by the log of per capital health expenditure at level, HE_{it}, and log of explanatory variables, GDP_{it}, and HE_{it}.

The study adopts beta convergence, because this method limit the lapses found in sigma convergence. According to Nixon,[16] the results of sigma convergence may be disproportionately influenced by discontinuities, outliers and short-run shocks. With beta convergence method, two forms of convergence are distinguished, absolute and conditional convergence. Evidence of β-convergence requires that the estimated coefficient β which measures the speed of convergence is negative, $\beta < 0$. Therefore, $\beta \geq 0$, implies that no convergence occurs.

In equation (1) and (2) absolute convergence occurs if the sign of β is negative and statistical significance. While Conditional convergence occurs if the estimated coefficients of the control variables are statistically significant in addition to the significance and negative β value, indicating that there are difference across countries which direct each one to converge to its own steady state.

5. MEASUREMENT OF VARIABLES AND SOURCES OF DATA

In this study, the following variables were employed and measures as follows;

5.1 Health Outcomes

This variable is captured by health status indicators, and it is measure by two variables namely mortality rate and life expectancy at birth. Mortality rate measured as crude death rate per 1000 people, and the life expectancy at birth measured as average life expectancy. Existing studies also used this measurement to capture health outcomes (Filmer D, and Pritchett L, [7]; Berger MC, and Messer J, [25]; Jacob Novignon,et, al, [26])

5.2 Health Expenditure

Health Expenditure is the expenditure on health sectors, this study employs total health expenditure. The total health expenditure is measured as total of private health expenditure and Government health expenditure. This measurement is also used by existing literature (Filmer D and Pritchett L, [7]; Berger MC and Messer J, [25]; Jacob Novignon et al, [26])

5.3 Income or GDP

Gross domestic Production is measured as per capital real GDP. This variable is employ as explanatory variable and it is assumed to have positive relationship with health outcome.

The study covered the period 1995 to 2011 for 15 ECOWAS member states. The countries are Nigeria, Benin, Burkina Faso, and Cape Verde, Cote d Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Niger, Senegal, Sierra Leone, and Togo. This study makes use of secondary data. The data on variables were sourced from World Development Indicators online database published by World Bank. We estimated equation (1) and (2), with Panel Generalized Method of Moments (GMM) econometric technique. This technique takes into accounts the possible endogeneity of the explanatory variables. The lagged values of variables act as instruments

6. ECONOMETRIC ANALYSIS AND RESULTS

6.1 Descriptive Statistics

This section initially examined the descriptive statistics of data series employed in this study. Table 2 reports the descriptive statistics of data employed in this study. All data series used for the econometric investigation in this study covers the period 1995 to 2011. For the purpose of this study, data on per capital GDP (gdp), total health expenditure (texp), life expectances (lexpt), mortality rate (MOR) are employed in the study.

Table 2: Descriptive statistics of data (Sample 1995- 2011)

	TEXP	GDP	MOR	LEXPT
Mean	1.754863	11.52334	4.372013	3.977411
Meadian	1.685818	12.20906	4.427239	3.981329
Maximum	3.099487	14.92168	5.031091	4.306856
Minimum	1.136081	3.834032	2.970414	3.578510
Std. Dev	0.375539	2.175748	0.398033	0.125870
Skewness	1.654174	-1.727445	-1.241097	-0.141601
Kurtosis	5.986951	5.821687	5.123740	4.567264
Jarque-Bera	208.6040	211.4183	113.3854	26.95053
Probability	0.000000	0.000000	0.000000	0.000001
Observations	252	252	252	252

Table 2 shows that all the series display a high level of consistency as their mean and median values are perpetually within the maximum and minimum values of these series. Moreover, the standard deviation of data series shows the degree of variability in the data. The skewness and kurtosis statistics provide useful information about the symmetry of the probability distribution of various data series as well as the thickness of the tails of these distributions respectively. These two statistics are particularly of great importance since they are used in the computation of Jarque-Bera statistic, which is used in testing for the normality or asymptotic property of a particular series.

6.2 Time Series Properties of Data

Time series properties of data employed was also examined. This is because recent innovations in econometrics have shown that most macroeconomic time-series or variables are non- stationary in there levels(the level of such variables can become arbitrarily large or small so that there is no tendency for them to revert to their mean level) and that several of these series are most adequately represented by first difference. Test for stationarity of variables is therefore known as the unit root test. To actually test for unit root test, this study employed panel unit root test, using Augmented-Dickey- Fuller and Philip-Perron test. Data on all the variables are transformed into logarithm form. This is necessary since the descriptive statistic table have shown that these variables are larger than other. Moreover, embarking on this exercise will help to eliminate the overriding influence of these variables on others.

Table 3: Panel Unit Root Test Results

Variables	ADF		PP		Order of Integration
	Level	First Difference	Level	First difference	
Lntexp	-2.5709**	--7.9159***	-1.8822***	-10.8601***	1(0)
Lnmor	-2.1273*	-1.6851*	3.2219	3.5805	1(0)
Lnlexpt	-6.2783***	-8.6597***	2.0608	3.4901	1(0)
LnGDP	-0.37624	-4.65051***	2.0469	-7.6064***	1(1)

Note: (*), (**) and (***) means that unit root(non-stationarity) is rejected at 10%, 5% and 1%, level of significance

Table 3 above shows that lntexp, lnmor and lnlexpt are integrated of order Zero1 (0) while ln GDP is integrated of order one 1(1). However, the result indicates that all variables are integrated of order one 1(1)

6.3 Empirical Analysis of Convergence in Per Capital Health Expenditure

This study used panel Generalized Method of Moment (GMM) technique to estimate equation (i) and (ii). GMM is known to be robust to heteroskedasticity and autocorrelation of unknown form and it has several advantages over other estimation techniques such as OLS (kim and Limpaphayom, [27]; Hansen, [28]). The reliability of the GMM estimate depends on the validity of the instruments. To test for the validity of the instrument used, we examine the value of the J- statistic and instrument rank of the GMM estimate. Table 4 shows the results of estimated models. From table 4 the instrument rank is greater than the number of estimated coefficients for both absolute and conditional model therefore, we may use it to construct Sargan test of over-identifying restrictions. The Sargan statistic is distributed as (p - k), where k is the number of estimated coefficients and p is the instrument rank. Constructing the Sargan test of over-identifying restrictions which is computed using 'scala pval = @chisq (P-K)' under the null hypothesis that over-identifying restrictions are valid. In this case a higher P-value indicates that instruments used are valid. The Probability values for the sargan test carried out using J-Statistic and instrument rank for absolute and conditional convergence test in table 4 are 1.0000, 1.0000, which indicates rejection of null hypothesis. Therefore, the instruments used in table 4 are valid, which shows that the results in table 4 are reliable. The results of both absolute and conditional beta convergence in table 4 shows that the coefficient that measures the speed of convergence in health expenditure log (texp) are positive and significant at $p<0.05$. This indicated that there is no absolute convergence in health expenditure. The results for conditional beta convergence also indicated that there is no conditional convergence in total health expenditure because the explanatory variable which is log (GDP) is positive but not significant. The result of our study shows that there is no convergence in health expenditure among ECOWAS countries. Thus there exists a divergence in health expenditure among ECOWAS countries. Since health expenditure is a component of GDP, our results on health expenditure is consistent with Jones, [29]} that found divergence in income for ECOWAS countries and McCoskey, [30] that found divergence for Sub Saran African. According to McCoskey divergence may be due to the huge intra and inter-regional differences among the countries considered.

Table 4: Panel GMM of Convergence of Health Expenditure in ECOWAS Region

Variables	Absolute	Conditional
Log(texp)	2.005097 (3.069111)**	1.875416 (2.703714)**
Lngdp	-	0.190055 (0.576975)
Instrument Rank	30	31
J- Statistics	0.538127	0.599
No of Observation	154	154

*, **, *** indicate 10%, 5%, and 1% level of significance
Figures in parenthesis are t- statistic
Sources: Author's Computations

6.4 Empirical Analysis of Convergence in Health Outcomes

This study also employed beta convergence to examined convergence in health outcomes for ECOWAS countries. Table 5 reports the results of assessment of convergence in health outcomes for member countries of ECOWAS. The study used life expectance and mortality rate as measurement of health outcomes. In table 5, estimated results using log of first difference of mortality rate and life expectance as dependent variables is presented. To test for the validity of the instrument used, we examine the value of the J- statistic and instrument rank of the GMM estimate. From table 5 the instrument rank is greater than the number of estimated coefficients for both mortality rate and life expectance therefore, we may use it to construct Sargan test of over-identifying restrictions. The P-value for Sagan test for both absolute and conditional models are (0.993899, 0.829419) for life expectance and (0.951232, 0.107913) for infant mortality rate. Based on these p-value we reject the null hypothesis of over-identifying, which indicates that the results for the models estimated are valid. The results show that in the estimation of absolute convergence the β coefficient is both negative and statistically significant at $p< 0.01$ for

the two models. The results for conditional convergence, taking GDP and total health expenditure as the explanatory variables, shows that the coefficients of GDP and total health expenditure estimated are not statistically significant, for mortality rates, confirming absolute convergence. However, for life expectance, there is evidence of strong conditional convergence as the two explanatory variables used are significant at $p<0.01$ and $p<0.05$. The results show that there is convergence in health outcomes for ECOWAS region unlike the health expenditure. Evidence of absolute convergence is found for mortality rates and conditional convergence for life expectance. This indicated that in the long-run a number of convergence clubs may be form for health outcomes, because of differences in GDP and health spending across the ECOWAS State.

There is convergence in health outcomes for ECOWAS region despite no convergence results for health expenditure unlike OECD countries where convergence was found in health expenditure but found no convergence in health outcomes as shown in Panopoulou and Pantelidis,[23] study.

Table 5: Panel GMM of Convergence of Health Outcomes in ECOWAS Region

Variables	Absolute	Conditional
Log(lexp)	-8.644979 (-4.198345)***	-16.50134 (-5.393389)***
Log(gdp)	-	0.501696 (3.126093)**
Log(texp)	-	2.135342(4.732661)***
J- Statistics	12.09962	20.90180
Instrumental Rank	29	32
No of Observation	173	186
Log(mor)	-0.083405 (-8.497015)***	-0.052611 (-3.043139)**
Log(gdp)	-	0.005328 (1.581103)
Log(texp)	-	-0.014082 (-1.244931)
Instrument Rank	27	32
J- Statistics	14.55219	42.12461
No of Observation	165	208

*, **, *** indicate 10%, 5%, and 1% level of significance
Figures in parenthesis are t- statistic
Sources: Author's Computations

6.5 Cointegration Method

The study also applied Johansen, [31] Cointegration test to examined convergence in health expenditure and health outcomes among ECOWAS countries. The advantage of Cointegration methodology lies in its ability to capture the long run. The results of the Cointegration test is presented in table 6 based on the results the Eigen value and trace statistics support the existence of co-integration in health outcomes at $p<0.05$ but did not reject the hypothesis of no Cointegration for health expenditure. The result obtains from Cointegration test confirmed the results of beta convergence that find convergence in health outcomes and no convergence in health expenditure for the group of countries used.

Table 6: Johanson (1998) Multivariate Cointegration Test

No of CE	No of CE	Eigen test	Prob	Trace test	Prob
Healt expenditure	None	53.68	0.0000*	54.27	0.0000*
	At most 1	15.31	0.2247	15.31	0.2247
Health outcome	None	418.2	0.0000*	386.0	0.0000*
	At most 1	250.0	0.0000*	250.0	0.0000*

*denotes the rejection of the hypothesis of no co-integration at 5 percent significant level

7. CONCLUSIONS

The issue of health expenditure and health outcomes has attracted the interest of many researchers over time. This study contributes to the existing literature by examined convergence in health expenditure and health outcomes among 15 ECOWAS countries from 1995 - 2011. The study employed beta convergence test and Cointegration methodology. Evidence from the results of this study indicates that there is no convergence in health expenditure. However, the study found convergence in health outcomes for ECOWAS region. Divergence in health expenditure indicates that there are differences in health expenditure across countries which direct each country to converge to its own steady state.

The study suggest that health policy maker in this region should formulate policies that will increase resources to health in their respective country, especially they should ensure that health spending target are met, that is 15 percent of their GDP is expected to be spending on health related issue annually as pledge in Abuja declaration in 2000 by African head of government. According to {WHO report 2013}, about quarter of African Union members majority of this countries belong to West African are allocating less than what they are spending before the Abuja declaration.

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