ISSN (online): 2320-9836
ISSN (Print): 2320-9828

Can public health spending and maternal education predict future under-5 mortality rate in Nigeria?

Aderopo Raphael Adediyan, Emmanuel Ekomoezor

Economics Department, University of Benin, Benin City, Nigeria
adediyan@yahoo.com, emmanuelekomoezor@gmail.com

Abstract

Objective: This research explores the direction of impact transmissions among public health spending, maternal education, and under-5 mortality, of which the previous researches ignored, in Nigeria.
Method/Findings: The study utilizes yearly time series data covering the period between 1980 and 2018 and employs the Toda-Yamamoto non-Granger causality test approach as the principal tool of analysis. The study controls for instability emanating from the structural break in the model. Surprisingly, the study finds both public health spending and maternal education not to Granger cause under-5 mortality. However, the study established a unidirectional relationship running from under-5 mortality to public health spending and maternal education. This finding appears to align with Wagner's law of increasing state activities, such that an increase or decrease in the rate of under-5 mortality leads to an increase or decrease in the level of public health spending and not vice-versa. The study thus concluded that change in the rate of under-5 mortality could be used to model or predict the future growth in public health spending and maternal educational level, reverse not the case.
Application: Findings emanating from this study is applicable in terms of health funds budget and forecast, and national development policy design.
Keywords**:** Public health spending, maternal education, under-5 mortality, Toda-Yamamoto

1. Introduction

In spite of substantial progress achieved globally in reducing under-5 mortality, concerted efforts from individual governments and parents remain indispensable to avoid veritable under-5 mortality. Indeed, the World has made incredible progress in children's survival rate in decades ago; the survival chance of millions of children are now better and improved compared to what it was in the 1990s. While in the 1990s, 1 in every 11 children died before the age of five (5), the situation is no longer the same; around 1 in 26 deaths were recorded in 2017, and a yearly rate of reduction in under-5 mortality rate from 1.9 % between 1990 and 2000 to 4 % between 2000 and 2017 at the global level has been achieved [1]. However, although progress in reducing under-5 mortality is fast recorded at the global level, yet, over5 million children were recorded to have died in 2017 under the age of 5 of which roughly more than half of those deaths were from sub-Saharan Africa. The NBS and UNICEF 2018 Multiple Indicator Cluster Survey (MICS) reports revealed that, in Nigeria, while roughly 1 in every 15 live births died before their first year of birth, 1 in 9 live births died before attaining the age of five (5). Furthermore, the report anticipated1 in every 18 children from the richest quintile households who live in Nigeria to have died under the age of 5, compare to1in 6 children from the poorest households. Also, the under-five mortality data reported [2-4] shown that the under-five mortality rate is still high in Nigeria, making Nigeria one of the most vulnerable countries in the World. Despite the extremely high average rate of under-5 deaths in Nigeria, far from the Sustainable Development Goals target, it worth to note that nine (9) states have an under-5 mortality rate above the national average of 120 per 1000 live births. The states are Kebbi, Niger, Kano, Bauchi, Jigawa, Gombe, Katsina, Zamfara, and Nasarawa [5]. Table 1 illustrates the estimated under-five deaths in the selected three most vulnerable states across the six geopolitical zones in Nigeria.

ISSN (online): 2320-9836
ISSN (Print): 2320-9828

Table 1. Top 3 states with a high rate of under-5 mortality across geopolitical zones in Nigeria

Geopolitical Zone	Top 3 States with Highest Under-5 Mortality rate	Under-5 Mortality rate (Per 1000 live Births)
North Central	1) Nasarawa	121
	2) Niger	149
	3) Benue	82
North East	1) Bauchi	161
	2) Gombe	162
	3) Taraba	105
North West	1) Zamfara	210
	2) Kano	203
	3) Jigawa	192
South West	1) Osun	101
	2) Ekiti,	86
	3) Oyo	73
South East	1) Imo	96
	2) Abia	83
	3) Ebonyi	62
South-South	1) Bayelsa	93
	2) Akwa-Ibom	73
	3) Delta	63

Note: this estimate relates to 5 years preceding the 2018 MICS (that is, 2013-2017)
Source: [5]

Moreover, the Multiple Indicator Cluster Survey report of NBS and UNICEF showed that with the prevailing under-5 average deaths rate of 120per 1000 live births, Nigeria needs up to 79 %cutback in the current rate of under-five mortality to meet up with the SDG target of as low as 25 per 1000 live births. AlthoughNigeria may not have done enough to eradicate or reduce the incidence of under-5 mortality, the fiscal budgetary allocation made by the Nigerian government to the health sector to provide life-saving healthcare infrastructures and maintenance of healthy environment soars on yearly basis. Data obtained from the World Bank revealed that government health expenditure as a fraction of GDP increased from roughly 0.45 in 2010 and 0.49 in 2012 to about 0.59 in 2014. Also, the expenditure noticeably rose between 2017 and 2018. Some of the reasons for the growth in government health spending may be attributed to the Nigerian government recognitions of investment spending in the health sector as a desirable instrument to combat undesirable health outcomes like under-5 deaths. However, the potency of this instrument remains questionable since government health expenditure equally has an adverse effect such as creating distorting in the health market.

Conversely, studies like [6] and [7] ignored the important role of government healthcare financing and argued in favor of maternal education as the principal determinant influencing under-5 mortality. For instance, between 2013 and 2017, the estimated rate of under-5 deaths in Nigeria is about 145 per 1000 live births for women without education, 164 without formal education, 110 for mother that attended primary school, 73 and 55 for secondary school and the higher institution of learning [5]. Maternal education is ranked high among socioeconomic factors determining the child's survivor rate [7]. Maternal and paternal education helps the parent to be aware of children's health, be health-wise and immensely contribute to the development of child health which could reduce the child's vulnerability to death. Unfortunately, the situation may not be the same if educated parents devoted more time to business or work and spent little or no time with family.

In general, while there is a possibility of exceptional cases, both maternal education and government health spending are independently hypothesized to be important determinants influencing the under-5 mortality rate. How true it is empirically, can the future rate of under-5 mortality be predicted by the level of maternal education and government health spending in Nigeria? The focus of this research is to find the direction of causation among maternal education, public health spending and under-5 mortality in Nigeria

ISSN (online): 2320-9836
ISSN (Print): 2320-9828

2. Literature survey

The need to improve human welfare has been one of the important reasons for the expansion of roles and activities of the state particularly in terms of infrastructure provision. As economic activities expand, economic agents demand for more of public goods and services, and if private individuals are left alone to produce theses goods and services, there would be a problem of market failure: efficient or optimum amount of these goods may not be produced; for this reason, the State often intervene in the market to produce them [8].The more the economy expands, the more would be the need for the government to intervene in the economy. Consequently, expansion in government expenditure is associated with growth in the level of economic activities. This assertion is the central argument of Wagner's theory of public expenditure of which was later referred to as "Wagner law of increasing state activities". Wagner's public spending theory mainly attempts to explain why public expenditure increases over time. However, it is the Keynesian theory on public expenditure that provides economic justification for the need for public spending in the economy especially as a means of promoting human welfare. In [9] encouraged the government to undertake public spending to facilitate the production and distribution of goods and services particularly those that the private sector would not produce optimally. As a result, this call for the government at all levels to spend more to improve the various sectors outputs without exemption of health outcomes in the country [10].

In [7] proposes that maternal education is more important than any other socioeconomic factors (including government spending) in the determination of health incomes. The import of maternal education is higher compared to the combination of the effects of access to healthcare facilities and income. When the mother becomes more educated, they would provide for their children better care since caring for the children is their core duty or responsibility [11]. Moreover, maternal education enhances mothers' access to varieties of social and human capital; these varieties of capital can then be employed by mothers in different ways to improve the health condition of their wards. Children's health is controlled by many factors such as parental education [12]. Grossman's theory of healthcare demand provides a better insight into the significance of maternal education and public health spending to under-5 mortality. In the theory of healthcare demand, health is believed to be a capital good that is determined by several socioeconomic factors such as education, income, diet, health spending or expenses, housing, and lifestyle. These factors serve as an input in the health production function. Thus, to increase health output, an individual has to spend or invest in health; such health investment has spillover effect not only on the immediate environment of the investors but worldwide.

Several empirical studies, using different econometric techniques, have been done globally to authenticate the impact or effect of maternal education and public healthcare spending on health outcomes, in particular, under-5 mortality rate. In [7] assessed the causal relationship between child survival and maternal education in Madagascar. The study argued in favor of mothers' education as a positive determinant of children's survival rate in the region. In [13] examined maternal education as a determinant of infant deaths in Ethiopia using a meta-analysis approach. The study showed that attending primary education lessens the probability of infant mortality by 28% compared to 72% from those born to mothers with no education. Furthermore, about a 45% decrease in the odds of underage death is accounted for by attending secondary education while the remaining percent of child deaths came from the child with illiterate mothers. The study thus concluded that maternal education contributes significantly to infant mortality reduction in Ethiopia. In [14] applied the autoregressive distributed lag model and Granger causality technique to investigate the effect of government health spending on infant mortality in Nigeria. The research confirms the presence of a long-run relationship between infant mortality and private and public health expenditure in Nigeria. The results further suggest feedback or bi-directional relationship between the public health expenditure and infant deaths. The study thus concluded that government health spending is a determinant of infant mortality in Nigeria. In [15] researched in Uganda to investigate the impact of public health spending on the rate of under-five mortality. The study adopted the OLS technique. Results showed that under-five mortality is strongly influenced by health expenditure, percentage of the population living in urban and women literacy rate.

The research thus suggested an increase in government health spending and accessibility of education for female children as a way of reducing under-five death. Using instrumental variables method and data from 2003

ISSN (online): 2320-9836
ISSN (Print): 2320-9828

to 2015 from 25 States selected in Nigeria for the study, the study of [8] accesses the impact of public health expenditure on maternal death in Nigeria. The study establishes that public health spending is an essential factor in reducing the incidence of maternal death in Nigeria. A similar finding is reported by [16]. In [16] research suggests cutting back public healthcare spending could lead to an increase in mortality rate in the EU. The research further suggests that practicing austerity measures and similar policies by the government could worsen the death rate in the EU. However, Burnside and [17] could not establish a significant relationship between child mortality and public spending in low-income countries.

From the literature reviewed above, the center of attention of most of the researchers was mainly on the direct impact of maternal education and public healthcare spending on under-5 mortality as a particular case of health outcomes. However, the direction of the channel of transmission of impulse or impact from each of these variables to the other is largely ignored, which is vital at least for the sake of designing and implementation of policies. Also, a simultaneous causality or feedback may exist which implies that rather than modeling the response of under-5 mortality to a change in either maternal education or public health expenditure, the assumption of vice-versa is applicable. Furthermore, under the circumstance of bidirectional feedback, there will be a problem of simultaneity and lack of apt treatment of this problem could undermine the true relationship of the model estimated leading to a wrong inference of policy implications. Thus, an appropriate test of direction of influence among under-5 mortality, public healthcare spending, and maternal education is required. This, therefore, is the core area of the contribution of this research.

3. Data and Method

Data on maternal education, under-five mortality and public healthcare spending used in this study were obtained from the World Bank. The data gathered were annual time series data, running from 1980 to 2018. Methodologically, this study adopts Toda and Yamamoto (TY) Augmented Granger Causality or Modified Wald (MWALD) non-Granger causality approach as the primary technique of analysis. Like the "ordinary" Granger Causality test, Toda and [16] approach are widely used to investigate whether the lagged values of a variable of interest could be used to predict the future value of another variable. Toda-Yamamoto Granger causality is more superior to others where the variables of interest are of different orders, say, I(0)and I(1). Given a multivariate VAR system of the form

$$\boldsymbol{W}_t = \boldsymbol{\beta} + \sum_{j=1}^{mlag} \boldsymbol{\alpha}_j \boldsymbol{W}_{t-j} + \sum \boldsymbol{\omega_j DUM_t} + \boldsymbol{\mu}_t \qquad 1)$$

Where $\boldsymbol{W}_t$ stands for the vector of maternal education, public health spending and under-5 mortality at time; $\boldsymbol{\beta}$represents vectors of intercepts, $\boldsymbol{\alpha}_j$ denotes vectors of all the variables coefficients in the stated model, $\boldsymbol{W}_{t-j}$ is the past values of all the variables,$m$agic the maximum or optimal lag length and dumps the dummy (treated as exogenous)variable introduced to control for structural change or instability in the economy owing to the Structural Adjustment Programme (SAP) policy adopted in 1986. The$\boldsymbol{\omega_j}$ represents coefficients of dummy variable while$\boldsymbol{\mu}_t$ is the list of error terms in the model. The non-Granger causality test in the presence of combined order of integration of series as suggested by [18]is derived from equation 1) obtained from equation 2)below

$$\boldsymbol{W}_t = \boldsymbol{\beta} + \sum_{j=1}^{mlag} \boldsymbol{\alpha}_j \boldsymbol{W}_{t-j} + \sum_{j=mlag+1}^{mlag+d} \boldsymbol{\alpha}_j \boldsymbol{W}_{t-j} + \sum \boldsymbol{\omega_j DUM_t} + \boldsymbol{\mu}_t \qquad 2)$$

Where "d" implies the highest or maximum integration order detected in the model. In other to determine the maximum order of integration of the underlying series, both KPSS and ADF unit root testing tools were

ISSN (online): 2320-9836
ISSN (Print): 2320-9828

employed. Information criteria such as SIC, AIC, FPE, and HQ are useful for the selection of appropriate or optimal lag length. Since it is not possible to have co-integration among series without the presence of Granger causality, reverse not the case, ARDL Bound co-integration test is utilized to check the authenticity of the result of the TY Granger causality method adopted. The ARDL Bound co-integration approach is select because it performs well whether the series is of the same order of integration or not.

4. Results and Discussions

1. Descriptive statistic and Correlation analysis report

The descriptive statistic of each of the variables of the model is reported in Table 2. The Table showed that PHS (Public Health Spending) has a mean value of roughly 63.63, and its value ranges from a minimum of 0.00 to a maximum value of about 296.44 over the sample period. PHS has a standard deviation of about 89.87. The variable, U5M (Under-Five Mortality Rate), has the highest mean value of about 171.05 over the study period; its standard deviation around its mean value is about 47.94, and a minimum and maximum value of about 0.00 and 213.70 respectively. The MED (Maternal Education) variable showed the least level of disparity (roughly16.69) around its mean value of19.17. The maximum and minimum values of MED over the sample period are 53.49 and 0.00 respectively.

Table 2. Descriptive statistic

Statistic Index	Maternal Education	Under-5 Mortality	Public Health Spending
Mean	19.16624	171.0538	63.63089
Maximum	53.48824	213.7000	296.4428
Minimum	0.000000	0.000000	0.000000
Std. Dev.	16.69324	47.94427	89.87238
Jarque-Bera [Prob.]	2.617419 [0.270169]	19.36145 [0.000062]	10.62732 [0.004924]
Observations	39	39	39

Source: Authors' computation

On the other hand, the correlation report, detailed in Table 3, revealed a strong negative association between U5M and PHS, a strong positive correlation between MED and PHS and a relatively mild level of a negative association between MED and U5M. In particular, the study found that the correlation between U5M and PHS is negative (about 94%), and positive between MED and PHS (approximately 50%). Lastly, the strength of the relationship between MED and U5M is about 46% and negative. The reported level of association between each pair of these variables was found to be statistically significant at 5% as shown in Table 3.

Table 3. Correlation analysis report

Correlation t-Statistic			Maternal
Observations	Public Health Spending	Under-5 Mortality Rate	Education
Public Health Spending (PHS)	1.000000		

	39		
Under-5 Mortality Rate	-0.937592	1.000000	
(U5M)	-16.40077	-----	
	39	39	
Maternal Education	0.499952	-0.463470	1.000000
(MED)	3.511437	-3.181516	-----
	39	39	39

Source: Calculated by the Authors

ISSN (online): 2320-9836
ISSN (Print): 2320-9828

2. Stationarity test result

The result of the unit root test conducted showed that the variable: maternal education (MED), Under-5 mortality (U5M) and public health spending (PHS) exhibit different order of integration at 5% level; thus, appropriate for the Toda-Yamamoto non-Granger causality model as shown in Table 4.

Table 4. Unit root test summary

Series	ADF Test (5% level)		KPSS Test (5% level)	
Level	t - statistic	Remark	t - statistic	Remark
LnPHS	-3.861950 [0.0238] [b]	Stationary	0.133366 (0.146000) [b]	Stationary
MED	-2.524362[0.1433]	Non-stationary	0.097377 (0.146000)[b]	Stationary
LnU5M	-11.58458 [0.0000][b]	Stationary	0.668070 (0.463000)	Non-Stationary
1st diff				
d(MED)	-7.568321[0.0000][a]	Stationary	0.177138 (0.463000)[a]	Stationary
d(LnU5M)	-4.320900 [0.0021] [a]	Stationary	0.097822 (0.146000) [b]	Stationary

"a" & 'b" denote drift stationery, and drift and trend stationery

3. Optimum lag length

From Table 5, each of the information criteria suggests the maximum lag length of 2. Consequently, the optimum lag order selected for the model is 2.

Table 5. Lag length selection criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-192.3479	NA	16.79211	11.33417	11.60080	11.42621
1	-26.77997	283.8308	0.002198	2.387427	3.054005	2.617529
2	27.43555	83.64681*	0.000169*	-0.196317*	0.870207*	0.171847*
3	32.57833	7.052951	0.000220	0.024095	1.490566	0.530321

** indicates optimal lag length selected*

4. Granger Non-Causality Test (Toda-Yamamoto) Results

The Toda-Yamamoto augmented Granger Causality test result is presented in Table 6. The result showed, at 5%, a unidirectional relationship between under-5mortality and public health spending with the impulse running from Under-5 mortality to public health spending.

Table 6. Toda and Yamamoto augmented granger causality result

Dependent Variable: Under-5 Mortality				
Excluded	DF	Chi-Sq	Prob.	Direction of Causality
LnPHS	2	0.391978	0.8220	LnPHSΘLnU5M
WED	2	0.031105	0.9846	WED Θ LnU5M
Dependent Variable: Public Health Spending				
Excluded	DF	Chi-Sq	Prob.	Direction of Causality
LnU5M	2	7.679725*	0.0215	LnU5M →LnPHS
WED	2	1.094997	0.5784	WED ΘLnPHS
Dependent Variable: Maternal Education				
Excluded	DF	Chi-Sq	Prob.	Direction of Causality
LnU5M	2	9.169578*	0.0102	LnU5M → WED
LnPHS	2	1.307113	0.5202	LnPHSΘWED

*Note: * indicates significant at 5%; Θ = No causation*

ISSN (online): 2320-9836
ISSN (Print): 2320-9828

This means that changes in the rate of Under-5 mortality can be used to predict the future trend in government health spending and not vice-visa. Similarly, there is evidence of causality between maternal education and under-5 mortality in Nigeria. Under-5 mortality is observed to "Granger-cause" maternal education at 5%, but maternal education could not be established to be a future value predictor of Under-5 mortality in Nigeria. Surprisingly, neither maternal education "Granger-cause" public health spending nor public health spending is found to "Granger-cause" maternal education in Nigeria; hence, we can accept the null hypothesis of no causality in either of the cases. To ensure the model is valid, stability and serial autocorrelation tests were conducted. The inverse AR root characteristic polynomial graph plotted and its corresponding table revealed an absence of any root outside the circle or modulus being greater than one; therefore, the model meets the stability condition. Additionally, at 5%, the null hypothesis of no serial autocorrelation is accepted up to 10 lags as shown in Tables 7-8.

Table 7: Autocorrelation Test

Lags	LM-Stat	Prob
1	12.66604	0.1783
2	12.72321	0.1755
3	8.069026	0.5272
4	12.39626	0.1919
5	11.24796	0.2591
6	8.242658	0.5099
7	2.032205	0.9909
8	7.575965	0.5774
9	8.482359	0.4864
10	5.945723	0.7453

Table 8: Root of Characteristic Polynomial Table

Root	Modulus
0.930206 - 0.129291i	0.939148
0.930206 + 0.129291i	0.939148
-0.200888 - 0.492319i	0.531728
-0.200888 + 0.492319i	0.531728
0.125320 - 0.304524i	0.329303
0.125320 + 0.304524i	0.329303

5. ARDL Co-integration analysis

From the co-integration test report presented in Table 9, at 5%, since the value of the F-statistic (27.50) is larger than both the [19] and [20] upper limit critical values of 5.85 and 5.243, we reject the null hypothesis of no co-integration.

Table 9. ARDL Co-integration Results

Bounds	10%	5%	1%
1(0)	3.380	4.137	5.940
1(1)	4.377	5.243	8.690
1(0)	4.19	4.87	6.34
1(1)	5.06	5.85	7.52
27.50111			

The acceptance of the alternative hypothesis further supported the result of the Toda-Yamamoto non-Granger causality test obtained [18].

ISSN (online): 2320-9836
ISSN (Print): 2320-9828

5. Summary and Conclusion

Motivated by the inadequacy of the previous studies to have examined the issue of direction of influence or channel of transmission mechanism among under-5 mortality, maternal education and public spending on health, this research investigated public health spending and maternal educational level that could be employed to predict the future rate of under-5mortality in Nigeria. Adopting the augmented Granger causality test, the thrust of the findings is that both public health expenditure and maternal education cannot be employed to predict the future rate of under-5 mortality in Nigeria. Notwithstanding, the research finds that under-5 mortality is a good predictor of the future level of maternal education and public expenditure on health; also, there is an absence of causation between public health spending and maternal education. Furthermore, the study suggested a long-run relationship among under-5 mortality, public health spending, and maternal education. In the light of the aforementioned findings, the study concluded that changes in the future value of public expenditure on health and the level of maternal education could be anticipated by the current rate of under-5 mortality in Nigeria.

6. Reference

1. UNICEF. Under-five Mortality. https://data.unicef.org/topic/child-survival/under-five-mortality/. Date accessed: 09/2019.
2. UNICEF for every child. https://data.unicef.org/country/nga/. Date accessed: 11/2019.
3. Nigeria - Under-five mortality rate. https://knoema.com/atlas/Nigeria/Child-mortality-rate. Date accessed: 2019.
4. UNICEF says Nigeria has one of the world's highest infant mortality rates. https://www.trtworld.com/life/unicef-says-nigeria-has-one-of-world-s-highest-infant-mortality-rate-23596. Date accessed: 25/01/2019.
5. National Bureau of Statistics (NBS) and United Nations Children's Fund (UNICEF). 2018 Multiple Indicator Cluster Survey 2016-17, Final Report. Abuja, Nigeria: National Bureau of Statistics and United Nations Children's Fund. 2018.
6. D. Mekonnen. Infant and Child mortality in Ethiopia: The role of socioeconomic, demographic and biological factors in the previous five years period of 2000 and 2005. Lund, Sweden: Lund University. 2011.
7. S. Badji. Mother's Education and increased child survival in Madagascar: What can we say? Halshs-01407812. 2016; 46.
8. C.E. Nwankwo. The effects of public health spending on maternal mortality in Nigeria*. Journal of Economics and Sustainable Development*. 2018; 9(20), 141- 152.
9. J.M. Keynes. The general theory of employment interest and money. London, Macmillian Publisher. 1936.
10. I.A. Ilori, S.S. Olalere, B.M. Adeleye. An empirical analysis of public health expenditure on life expectancy: evidence from Nigeria. *British Journal of Economics, Management and Trade.* 2007; 17(4), 1-17.
11. M. Grossman. Education and Non-market outcomes. In Handbook of the Economics of Education edited by E. Hanushek and F. Welch. Amsterdam: North-Holland, Elsevier Science. 2006; 1, 577-633.
12. S. Chou, J. Liu, M. Grossman, T.J. Joyce. Parental education and child health: evidence from a natural experiment in Taiwan. Working Paper 13466. 2007; 2(1), 33-61.
13. G.T. Kinross, C. Chojenta, D. Barker, T.Y. Tiruye, D. Loxton. The effect of maternal education on infant mortality in Ethiopia: a systematic review and meta-analysis*. PLoS ONE*. 2019; 14(7), 1-12.
14. J. David. Infant mortality and public health expenditure in Nigeria: the empirical explanation of the nexus. *Timisoara Journal of Economics and Business.* 2018; 11(2), 149-164.
15. K. Kato, A. Mugarura, W. Kaberuka, F. Matovu, B.L. Yawe. The effect of public health spending on the under-five mortality rate in Uganda. *African Journal of Economic Review*. 2018; 6(1), 47-71

ISSN (online): 2320-9836
ISSN (Print): 2320-9828

16. M. Maruthapu, K.Y.B. Ng, C. Williams, R.Atun, P. Agrawal, T. Zeltner. The association between government health care spending and maternal mortality in the European Union, 1981 to 2010: A Retrospective Study. *Obstetric Anesthesia Digest*. 2016; 36(2), 73-74
17. C. Burnside, D.C. Dollar. Aid, the incentive regime and poverty reduction. The World Bank, Washington DC. Macroeconomics and Growth Group. 1998.
18. H.Y. Toda, T. Yamamoto. Statistical inference in vector autoregressions with possibly integrated processes. *Journal of Econometrics*. 1995; 66(1-2), 225-250.
19. M.H. Pesaran, Y. Shin, R. Smith. Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics,* 2001; 16(3), 289-326.
20. P.K. Narayan. Reformulating critical values for the bound f-statistics approach to co-integration: An Application to the Tourism Demand Model for Fiji. Discussion Paper No. 02/04. 2004

The Publication fee is defrayed by Indian Society for Education and Environment (www.iseeadyar.org)
Cite this article as:
Aderopo Raphael Adediyan, Emmanuel Ekomoezor. Can public health spending and maternal education predict future under-5 mortality rate in Nigeria?Indian Journal of Economics and Development. December 2019, Vol 7 (12), 1-9.

Received on: 10/11/2019
Accepted on: 02/12/2019