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Health Care Expenditure and National Income: The Ghanaian Case

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Abstract:

This empirical study investigates the health care expenditure and national income in Ghana, more specifically, the study investigated the determinants of health expenditure in Ghana. The results from the ordinary least squares (OLS) method reveal that the proportion of population aged 65 and above, proportion of population aged between 0-14, GDP per capita and literacy rate are significant in explaining the changes in real health care expenditure per capita in Ghana. Moreover, the empirical outputs show that healthcare expenditure is a necessity good in the studied area. The findings of this study exhibit both positive and negative relationship between health care expenditure and national income in Ghana economy.

Key words: Health care expenditure, national income, ordinary least squares (OLS), Ghana.

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1.0 Introduction

Increasing health expenditure has been challenging worldwide even among wealthy countries because of frequent economic recession and rising healthcare costs, in low-income countries, public healthcare spending has been relatively low, despite the potential benefits that could be achieved in regard to health outcomes (see Nolte E, McKee M; 2004 and Jacob Novignon etal ; 2012). The little public healthcare spending that happens in these countries is mainly financed with insufficient tax revenues, internal and external loans and restricted foreign grants, other healthcare funding sources available are either private or out-of-pocket payments, fee-for-service and private health insurance schemes (poullier .JP 2002).

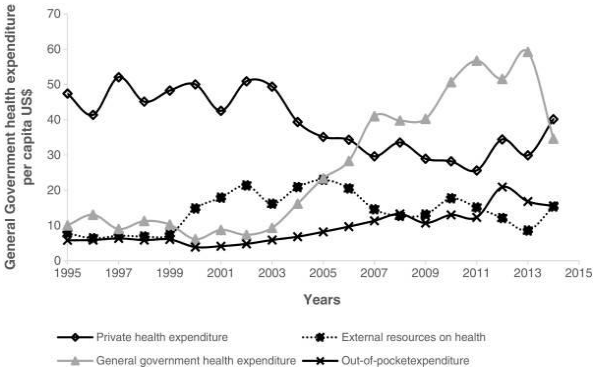
The "Development Strategy for Poverty Reduction" (DSFPR) by the Ghana Ministry of Finance (MOF), and the Government of Ghana (GOG) has been committed to the reduction of poverty and a general improvement in the welfare of Ghanaians. To achieve broad-based growth resulting in effective poverty reduction and an improvement in health care, an investment in human capital has been identified as one of the high priorities. The GOG has increased total government budget allocation to the social services from 17.4 to 22.5 percent as of 2002, with an emphasis on improving access to services for the poor (Sudharshan & Xiao Ye 2001). In the late 1970s, the GOG adopted the primary health care strategy as the vehicle for achieving Health for All by the year 2000. The economic crisis in the early 1980s drastically reduced resources available to the health sector, resulting in a deterioration in the population's health status. Ghana has re-embarked on a Medium-Term Health Strategy (MTHS) that aims to achieve Health for All, by improving service quality and efficiency. As the Ministry of health (2000) states "Since 1995, health policy has been based on Ghana's MTHS which seeks to promote greater equity in access to health and outcomes. In pursuit of

this objective, Ghana's MTHS aims at strengthening district health services, promoting community involvement in the delivery of health services, redirecting health resources to the needy or deprived areas." Although it is difficult to discern the factors that have contributed to the improvement in some health indicators, there is no doubt that the health reform has, to some extent, contributed to the improvements. Based on World Bank data, between 1990 and 1998, infant mortality decreased by a total of 16 percent, infant mortality under five by 24 percent, and life expectancy at birth increased by 5 percent in Ghana. The health care system in Ghana is an amalgamation of public and private structure. The health care system operates together with strong involvement of public sector which is heavily subsidized by the government under a scheme called national health insurance scheme (NHIS). The healthcare system has five levels of suppliers in Ghana; health centers and clinics, regional hospitals, district hospitals, tertiary hospitals and Health posts. Health posts are the first level of primary care for rural area.

In the past two decades, Ghana has experienced rapid economic growth, along with the increase in spending on health, since 2001, the country has increased its public healthcare spending by 11%, which is 15% higher than the accompanying increase in government revenues, concurrently, there has been a tremendous population growth over the past decade with at least 65% of the populace expected to be urban dwellers by 2030 (Schieber. G etal 2012). With this growth in population coupled with ageing, rapid urbanization and increasing adoption of sedentary lifestyle, there could be a shift in focus from communicable diseases (CD) to non-communicable diseases (NCD), which would place further pressure on the scarce healthcare resources (see Saleh.K 2012&2013).

In Ghana, general expenditures rose after 2003 and slightly decreased in 2008 (Figure 1.1). Apart from Ghana's

socioeconomic problems, this decrease could be attributed to the global financial crisis.



Source: Eric Adua et al 2017.

In the figure above, Ghana seems to have performed better in its commitment to health. The general government health expenditure increased from 53 per capita US$ in 1995 to 60 per capita US$ in 2014 (Eric Adua et al 2017).

Most empirical studies on healthcare expenditure in Ghana and perhaps some African countries largely focused their studies on how Government can improve the health sector (Saleh K 2012, Pillinger J.2011). Some of these studies are also based on theoretical investigations largely on selected few characteristics in the health industry (Yoshida S, Martines J, Lawn JE, Wall S, Souza JP, Rudan I, et al 2016, Nolte E, McKee M 2004, Aboagye E, Agyemang OS, Sidney K 2014 etc.). Based on these seemly distortions in the existing literature, this study seeks to examine the relationship between health care expenditure and national income in Ghana using a time-series configuration from the standpoint or perspective of pull side factors. This study will contribute by showing the financing status of health care as a form of necessity or luxury in the context of Ghana using time-series data.

2.0 LITERATURE REVIEW

The interactions between health care expenditure and national income portray equivocal and debatable windups. Numerous studies were found using different types of data and different methods to get the empirical outputs. Basically, researchers can use time-series data, cross-sectional data or combination of both time-series and cross-sectional known as panel or pooled data to conduct their studies. These different approaches yield varying results.

In the cross-sectional framework, a number of studies have been conducted. V. N. R. Murthy, A. A. Okunade (2009) examined the determinants of health care expenditure in 44 African countries. They studied on the cross-sectional data for the year 2001 using Ordinary Least Square (OLS) and Two-Staged Least Square (TSLS) method. They concluded that per capita real GDP and per capita real foreign aid were the two major determinants of health care expenditure. The non-income factors in this study were like persons per physician, percentage of population over 65 years and mortality per 1000 persons played a small role as determinants in health spending. K. M. Wang (2011) noted that the influence of health care expenditure growth was significantly different on countries with low level of economic growth when the economic growth was quantile. Countries with medium and high levels of economic growth, exceeding 5 percent would have positive influence of health care expenditure growth on economic growth. The panel quantile regression applied in this study had an advantage of providing estimated results of various quantiles under a change in economic growth. However, Baumol (1993) believes that health care is "an industry whose costs are driven by technological imperatives to rapid rise".

R.R. Rao (2008) performed a study to identify the link between health care expenditure to GDP and quality of Life (QoL) on five ASEAN countries namely; Malaysia, Singapore,

Thailand, Philippines and Indonesia from 1981 to 2005. The authors used GDP and health care expenditure to measure the quality of life and applied the Granger causality test to the direction of causality between GDP and health care expenditure. The results found that there was existence of unidirectional Granger causality running from GDP to government health care expenditure for in Malaysia and Singapore. On the other hand, Thailand and Indonesia showed a bidirectional Granger causality of GDP and health care expenditure. It concluded that economy performance is important in determining quality of life

Filmer and Pretchett (1999) provided evidence to show that while health care spending impact on child mortality, it is not the dominant driver of this health outcome. Factors such as education, technological change, income and cultural differences have been identified by some researchers as major drivers of health outcomes rather than health care spending.
Akinkugbe and Mohanoe (2009) performed time series analysis using the error correction model (ECM) and found that in addition to public health care expenditure, the availability of physicians, female literacy and child immunization significantly influenced health outcomes in Lesotho.

K Gyimah- Brempong etal (2004) used data from 21 Sub-Saharan African countries over the period of 1975 to 1994 and 22 OECD countries over the period of 1961 to 1965 to test on the effects of human capital on the growth rate of per capita income. They found the marginal effect of positive relationship between health human capital and the growth rate per capita income eventually diminishes. Health human capital investment yields positive correlation with per capita income growth for both Sub-Saharan African countries and OECD countries.

N. lien et al (2009) used panel data of the year 1993 to 2004 and two-stage estimation procedure to examine the determinants of health care expenditure in a decentralized

health care system as a case study in Finland. The authors concluded that the differences in municipal total health expenditure were mainly explained by shares of elderly, the employment-to-population ratio, the rate of disability pensions, the municipal tax rate, the NHI reimbursements of prescription medicines and private dental care, income and population density. The measures of income elasticity were small, indicating the public health care is a major necessity in Finland.

3.0 Methodology and Data Source

This section highlights and describes the econometric methodology and the data that were used to established and analyzed the underlining topic of discussing.

The study employed annual data from 1995-2015 which is sourced from the website of world Bank databases (https://data.worldbank.org/) and Gapminder databases (https://www.gapminder.org/data/). The variables extracted from this database includes; The variables extracted from the world bank database includes, health care expenditure per capita (HCE), which includes healthcare goods and services consumed during each year. Total fertility rate (TFR), total fertility rate represents the number of children that would be born to a woman if she were to live to the end of her childbearing years and bear children in accordance with age-specific fertility rates of the specified year. Proportion of population aged 65 and above (POP65). Proportion of population aged 0-14 (POP14). Crude death rate per 1000 person (CDR), Crude death rate indicates the number of deaths occurring during the year, per 1,000 population estimated at midyear. Subtracting the crude death rate from the crude birth rate provides the rate of natural increase, which is equal to the rate of population change in the absence of migration. Literacy rate (LTR) which is proxied as educational level. Literacy rate

in this study refers to the number of secondary students enrolled in technical and vocational education programs, including teacher training. GDP per capita (GDP).

The study adopted the ordinary least square (OLS) method for the empirical econometrics' analyses. The justification for utilizing this method is that it minimizes the sum of the square's errors of the differences between the observed regressand (dependent) and the predicted regressors (independent). The OLS estimator is consistent when the regressors are exogenous, and optimal in the class of linear unbiased estimators when the errors are homoscedastic and serially uncorrelated.

Under these conditions, the method of OLS provides minimum-variance, mean-unbiased estimation, when the errors have finite variances.

The model can empirically be expressed in matrix notations as follows;

$$\mathbf{Y= X\beta + \varepsilon} \quad \textbf{(1)}$$

$$\text{HCE} = \begin{Bmatrix} TFR & POP65 & POP14 \\ CDR & GDP & LTR \end{Bmatrix}$$

Where Y and ε are N×1 vectors of the values of the observed or response variable (the regressand: health care expenditure per capita) and unobserved scalar random variables (the errors) for the various observations. β is a p×1 vector of unknown parameters; regressors.

Equation (1) can further be expressed as;

$$\boldsymbol{Y_i= \beta_1 X_{i1} + \beta_2 X_{i2} + \ldots \beta_w X_{iw} + \varepsilon_i} \quad \textbf{(2)}$$

Where Y_i (regressand) is a linear function of the regressors $X_{i1} \ldots X_{iw}$ and $\beta_1 \ldots \beta_w$ are unknow parameters and ε_i is the 'noise' or error term.

Equation (2) is further extended to include the study variables as follows;

$$HCE = \beta_0 + \beta_1 TFR + \beta_2 POP65 + \beta_3 POP14 + \beta_4 CDR + \beta_5 GDP + \beta_6 LTR + \varepsilon \quad (3)$$

Where:

The regressand

HCE_t = Health care expenditure per capita time t

The regressors are;

TFR_t = Total fertility rate at time t

$POP65_t$ = Proportion of population aged 65 and above at time t

$POP14_t$ = Proportion of population aged 0-14 at time t

CDR_t = Crude death rate per 1000 person at time t

GDP_t = GDP per capita at time t

LTR_t = Literacy rate at time t

β = coefficients of the regressors

ε = Represents the random error term.

4.0 Analysis and Discussion

Table 4.1 Descriptive Statistics

Variables	Obs	Mean	Std. Dev.	Min	Max
hce	21	67.52125	20.15929	41.55531	104.6271
tfr	21	4.550381	.3484933	4.042	5.168
pop65ab	21	3.266862	.2072551	2.974965	3.51029
Pop0-14	21	8831529	1106444	7158165	1.07e+07
cdr	21	9.826143	.8203838	8.314	10.701
gdp	21	838.2894	530.9525	263.1125	1814.492
ltr	21	37107.1	24004.87	14090	79986

Heteroskedasticity Test: Breusch-Pagan-Godfrey

The results for the Breusch-Godfrey test for Heteroskedasticity in table 4.2 (residual diagnostic test), shows that the p-value is greater than 5% significance level (0.0975>5%), hence, we fail to reject the null hypothesis and conclude that, the data is free from Heteroskedasticity.

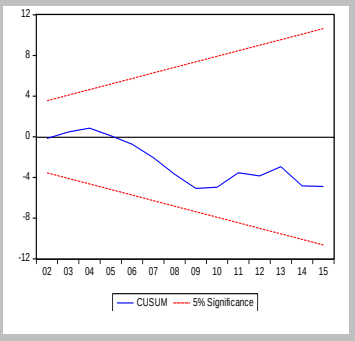
Table 4.2 Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	2.431647
Obs*R-squared	10.71664
Prob.F(4, 16)	0.0801
Prob.Chi-Square(6)	0.0975
Prob.Chi-Square(6)	0.2680
Scaled Explained SS	6.611526

Stability Diagnostic Test

Figure 4.1 also shows the CUSUM tests and CUSUM of squares test of stability for the variables employed in the study. The figure reveals no structural breaks in the study parameters since they line entirely within the 5% significance line. (the red line).

Figures 4.1 CUSUM Tests and CUSUM of Squares Test



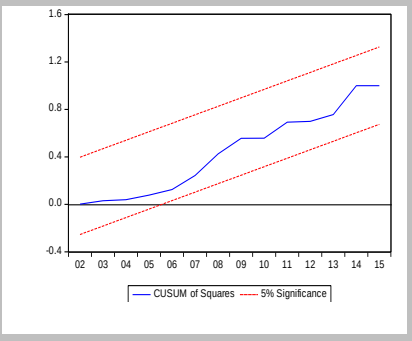


Table 4.3 OLS Estimates. Dependent variable; health care expenditure per capita (HCE)

Variables	Coefficients	Robust Standard error	t-vale	p-value	95% conf. Interval	
LnPOP65	4.31582	.8034293	5.37	0.000***	2.612626	6.019014
LnPOP14	1.096524	.3499579	3.13	0.006***	.3546468	1.838402
lnGDP	.3530306	.0759154	4.65	0.000***	.1920972	.513964
lnLTR	.2574853	.1308838	1.97	0.068*	-.0214868	.5364575
Constant	-21.10304	4.963717	-4.25	0.001	-31.62565	-10.58043

R-squared =0.9870, F(6, 14)= 427.74, Prob > F=0.0000, Root MSE = .08068, Number of obs =21

Asterisk *** and * indicates 1% and 10% significance levels respectively. ln= natural log

Interpretation and Discussion

From table 4.3, the estimated p-values for total fertility rate, and crude death rate per 1000 persons were greater than the significant levels (1%, 5% and 10%), perhaps, they are not significant in explaining changes in health care expenditure per

capita in Ghana, due to this they were removed from the analysis so as to deal with multicollinearity. However, the estimated p-values for proportion of population aged 65 and above, proportion of population aged between 0-14, GDP per capita and literacy rate falls within the significant levels, specifically within 1% and 10% levels. These parameters are therefore crucial and significant in explaining the changes in real health care expenditure per capita in Ghana.

The coefficient of the natural log of GDP per capita variable in the model can be elucidated as an estimate of the income elasticity of health care expenditure per capita. Income elasticity of a good between zero and 1 is a necessity good whereas income elasticity of a good greater than 1 is a luxury good. Therefore, a value of 0.3530306 implies that a substantial spending on health is due to a marginal increase in income. Therefore, health care expenditure is a necessity good in Ghana.

The positive relationship of proportion of population aged 65 and above and health care expenditure per capita is in support of the popular notion of ageing population leads to increase in health care expenditure. Again, the positive sign of the proportion of population aged between 0-14 raised the health care expenditure as this group of individuals needed more health attention such as vaccination and immunization. The negative sign of literacy rate also suggest that the more people are educated, the more they will be aware of certain health infections and probably avoid them or get early treatment, therefore reducing the total health expenditure per capita.

5.0 Conclusion Remarks

This empirical study looks at health care expenditure and national income in Ghana, more specifically, the study investigated the determinants of health expenditure in Ghana.

The results reveal that the proportion of population aged 65 and above, proportion of population aged between 0-14, GDP per capita and literacy rate are significant in explaining the changes in real health care expenditure per capita in Ghana. Moreover, the empirical outputs show that healthcare expenditure is a necessity good in the studied area. The findings of this study exhibit both positive and negative relationship between health care expenditure and national income in Ghana economy, this relationship further supported "The Income View"; national income determines health care expenditure.

In order to obtain more effective result, a longer data set should be employed in future, it would be better that the supply side factors of health care expenditure such as technological and medical progresses and human capital to capture the determinants of health care expenditure wholly for both the demand side and supply side factors that ensure a more complete analysis.

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