مجلة بحوث الإدارة والاقتصاد

Management & Economics Research Journal
ISSN 2710-8856 (Online)
ISSN 2676-184X (Print)

Vol. 3 No. 2 (2021), pp. 88-103

https://doi.org/10.48100/merj.2021.158

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Healthcare Financing and Health Outcomes: Analysis of Oil-Producing Countries in Africa

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Received: 17-02-2021 *Accepted: 11-04-2021* *Available online: 13-04-2021* *Published: 01-09-2021*

Abstract:

The major concern of the study is on healthcare financing and health outcomes in the major oil-producing countries in Africa. We used the data sorted from World Development Indicators (WDI) to identify the effect of four different health expenditures on the rate of mortalities on maternal, under-five, infant, neonatal and life expectancy at birth through random and fixed-effect models. This paper also takes cognizance of the environmental variable (pollution) that is common to the top 10 oil-producing countries in Africa. Our findings showed that high health expenditure from government, private and external sources improved health outcomes, while health expenditure from out of pocket is detrimental to health outcomes. Also, the environmental variable has a negative impact on life expectancy. The outcome of the paper indicated that there is a need to reduce environmental pollution, increase health expenditure from government, private, external sources and reduce out of pocket payments in the selected areas.

Keywords: Health Outcome, Pollution, Life Expectancy and Government.
JEL Codes: C1, H51, I12, Q5.

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1. Introduction

Healthcare financing is one of the most crucial components of the health system because, without expenditure, staff emolument, medical equipment, and many health facilities will not be in place. It yields the inputs and economic algorithm for the functioning of the health system and serves as a causal element of health system performance in terms of outcomes on health, equity, and efficiency. In most countries, health outcomes are usually used to evaluate the health status of a country ranging from the rate of mortalities on maternal, infant, neonatal, adult, under-five to life expectancy. Globally, the Africa continent shoulders the bulk of morbidity and mortality, which is a reflection of the level and style of spending on health. Although, the continent is beginning to have changes in mechanisms of healthcare financing to catch up with sustainable development goals (SDGs) and global expectations.

In the last decade, economic growth in Africa, especially among non-resource intensive economies, has been noted to be faster than expected. For instance, the continent's real production growth recovered from global and domestic shocks in 2016, with progressive growth rates; from 2.2 percent in 2016 to 3.6, 4.1 percent in 2017 and 2018 respectively. Despite growth rate increases, health outcomes in this country continue to show disparities relative to developed countries in other areas. Although, there has been improvement in health outcomes in a bid to meet up with health-related SDG goals. The healthy life expectancy in the region moved from approximately 61 years to 54 years between 2012 and 2015, with a reduction in the gap in healthy life expectancy from 27.5 to 22 years between the top and lowest performing countries (WHO, 2018). Between 2000 and 2015, the level of morbidity and mortality had significantly reduced as disability-adjusted life years (DALYs) as a response from the common ten causes of illness reduced to more than half, which is pushed by a decrease in malaria, HIV/AIDS, and diarrheal diseases (WHO, 2018). As a result, the rate of death from the common ten causes of illness also reduced from 87.7 to 51.3 per 100,000 populations in the same period. Despite improvements in some of the noted crude health outcomes, the region is still at the lower pyramid in terms of health outcomes compared to the rest of the world due to the high burden of diseases from communicable diseases, violence/injuries and non-communicable diseases. For instance, in the year 2016, African countries account for eighty percent of the universe HIV burden in adolescents between ages 10 and 19 years and more than 70 percent of new HIV infections are among adolescent girls. Out of the 57

percent of maternal deaths occurring in the world resulting from pregnancy-related complications, Africa accounts for 33 percent, giving the region the highest maternal mortality ratio in the world. Of about 6million children dying before their fifth birthday in the world from pneumonia, diarrhea, measles, HIV, tuberculosis and malaria, the region also accounts for 50 percent of under-five deaths.

Paramount among factors hindering access to healthcare quality in Africa, as identified by the World Health Organization (WHO), are lack of healthcare funding, shortage of services, costly medicines due to imported pharmaceutical products (approximately 70% imported), and lack of qualified staff. Funding healthcare is the bedrock of the identified problems and one of the major constraints springing from the shortage of funds in the health sector of most African countries is that the policies and techniques that promote the healthcare financing systems constitute problems. WHO (2013) ascertains that household out-of-pocket payments constitute at least forty percent of the aggregate health expenditure in about half of the African countries, which has a potential tendency to lead to catastrophic health expenditure and impoverishment for some households in the course of accessing quality healthcare. Limited access to quality healthcare has contributed to the health status of many African countries, which in turn has a major impact on many macro and microeconomic variables.

With a central focus of reduction in reliance on "out of pocket payment" and consequently increase access to healthcare and increment of financial risk protections as part of objectives of Universal Health Coverage (UHC), the African leaders agreed to allocate 15 percent of the total budget to health at Abuja Declaration in 2001. Many of the African countries are still struggling to achieve this target in recent time but the average per capita spending on health was raised from $70USD in 2000 to $160USD in 2014. Of course, the difficulty in achieving this target may arise as a result of difficulties faced in raising public fund from many of the African countries due to the informal sector of their economies, but what about some oil dependence countries where revenue are easily generated through offshore and onshore taxes? Calain (2008) averred that less growth is achieved by countries with endowed natural resources compared to no endowed countries and usually have adverse health outcomes due to destruction of public health, stemming from the exploration of natural resources.

Handful studies on health outcomes and healthcare financing in Africa have demonstrated that the size of government spending, private spending, and donor's fund on healthcare has a significant positive/negative impact on health outcomes, which invariably has a recursive effect on

individuals' labour and non-labour activities (Calain, 2008; Anyanwu & Erhijakpor, 2009; Nwakanma, 2013; Akinci et al.,2014; Asbu et al.,2017; Bein et al.,2017; Nikoloski & Amendah, 2017). However, many of these studies ignored the environmental variable resulting from exploration that causes damages to general health and affects outcomes on health in resource endowed countries in Africa. Thus, this study focuses on the effect of healthcare financing on health outcomes in selected oil-producing countries in Africa, taking cognizance of the mediating role of environmental pollution in the selected areas.

1.1 Background

This sub-section discusses stylized facts about average gross domestic product (GDP), total health expenditure (THE), health expenditures from out of pocket, from government, from private, from external, life expectancy, maternal mortality rate, under-five mortality rate, infant mortality rate, neonatal mortality rate, and CO2 emissions in 10 selected oil-producing African countries[1] between the periods of 2000 and 2017[2] (see Table 1). Equatorial Guinea is ranked least with a GDP of $12,100 million, while South Africa has the highest GDP of $356,981 million, followed by Nigeria, Egypt, Algeria, Gabon, Libya, Republic of Congo, Sudan, and Angola respectively. Among these ten countries, the share of health expenditure from the government as a share of GDP ranges between 3.49 percent and 0.34 percent with South Africa having the highest share of health expenditure from GDP. As shown in table 1, health expenditure from the government as a percentage of THE shows that Algeria shoulders the highest percentage of 71.46 percent and the least of 8.86 percent is from the Republic of Congo. Despite the fact that Nigeria is ranked second with the average GDP of $299,358 million, Nigeria accounts for the highest private health expenditure as a percentage of THE and highest health out of pocket payments of 76.93 percent and 75 percent respectively among the selected ten African countries. While Congo has received more external health funding on average, Algeria and Libya received the least among these countries.

[1] South Africa , Algeria, Libya, Egypt, Sudan, Nigeria, Angola, Equatorial Guinea, The Republic of Congo and Gabon (these countries are the top 10 oil producers in Africa).
[2] The selected periods are based on availability of data.

Table 1. GDPand health funding sources between 2000 and 2017

	Nigeria	Algeria	Angola	Libya	Egypt	Sudan	Equatorial Guinea	Congo	South Africa	Gabon
GDP (current $ 'million US)	299,36	137,25	74,09	47,91	186,44	53,38	12,10	21,89	356,98	12,14
Government health exp. (% of GDP)	0.58	3.46	1.78	2.34	1.57	1.54	0.43	0.34	3.49	1.43
Government health exp. (% of THE[3])	16.96	71.46	53.55	64.88	33.18	30.92	23.10	8.86	47.43	43.97
Privatehealth exp. (% of THE)	76.93	28.50	43.81	35.08	63.67	66.31	72.60	59.41	50.56	49.49
Out of pocket (% of THE)	75.0	26.7	31.1	35.1	62.2	62.8	67.9	51.4	10.1	40.3
External exp. (% of THE)	6.08	0.04	2.64	0.04	0.85	2.77	4.30	31.74	2.00	1.53

Source: World Development Indicators (WDI, 2020)

Among the ten selected oil-producing countries, closer scrutiny of table 2shows that Nigeria performs worst in terms of all the identified health indicators with the highest CO2 emissions of 28,193 (1000 metric tons). On average, life expectancy for Algeria recorded the highest value of approximately 73.8 years, which is very close to that of the United States as in 2017 of about 78.54 years. Libya and Egypt are ranked second and third in terms of life expectancy of approximately 71.4 and 70.1 respectively, while Nigeria recorded an average life expectancy of about 50 years. The country with the lowest rate of mortalities on maternal, infant, under-five and neonatal among these countries is Libya but was ranked sixth as per CO2 emissions. As shown below, not all countries under consideration with high CO2 emissions perform poorly as regards their health indicators. While some countries recorded high CO2 emissions with poor health indicators, other countries have relatively high CO2 emissions with average or good health indicators, which could be as a result of their health funding patterns discussed in table 1.

[3] Total health expenditure (THE)

Table 2. Health Indicators and CO2 Emissions between 2000 and 2017

	Nigeria	Algeria	Angola	Libya	Egypt	Sudan	Equatorial Guinea	Congo	South Africa	Gabon
Life expectancy at birth	50.0	73.8	55.8	71.4	70.1	61.8	55.4	55.6	56.6	62.2
Maternal Mortality rate (per 100,000 live births)	894.3	145.5	625.1	10.4	44.4	387.7	439.7	763.3	123.5	334.8
Infant Mortality rate (per 1,000 live births)	86.5	26.1	85.7	16.6	26.5	54.1	85.3	88.4	42.7	44.8
Under-five Mortality rate (per 1,000 live births)	139.8	30.4	138.6	19.4	32.1	81.6	121.1	124.0	63.5	66.5
Neonatal mortality rate (per 1,000 live births)	39.7	18.0	39.2	10.2	16.7	33.2	37.3	34.0	14.0	25.5
CO2 Emissions (1000 metric tons)	28,19	24,41	6,90	9,22	15,48	4,45	15,48	3,95	19,92	2,17

Source: World Development Indicators (WDI, 2020)

2. Literature Review

Literature abounds the connection between health outcomes and healthcare financing relies on two schools of thought. The first one focuses on the Grossman theory of 1972, which emphasizes that spending on medical care affects health outcomes through a household's healthcare production function. Grossman argued that health is durable equity that produces an output of physical, mental, and emotional strength with the assumptions that people inherit an embryonic bundle of health that reduces little by little, with the occurrence of death when the level of health drops below a particular level, gross investment in health capital is produced by household productions; which depends on direct inputs (personal time of consumer), market goods (housing, diet, recreation, exercise, and medical care) and environmental variable (education of the producer). The novelty of his argument is that people demand 'health' for two major reasons: (1) consumption commodity and (2) investment commodity, in order to remove disutility from sick days and to improve the entirety of available time for market and non-market activities. However, in demand for health, demand for health may reduce with an increase in shadow price, while the quantity of medical care demanded may increase subsequently. On the basis of his idea, Riman and Akpan (2012), Kulkarni (2016) and Rana et al. (2018) have

adopted socioeconomic and environmental factors as inputs in the production of health goods to explain the link between health outcomes and healthcare financing with different crude health outcomes such as rate of mortalities on maternal, under-five, infant, adult, neonatal, quality-adjusted life years (QALY) and life expectancy. The second school of thought was from Martin et al. (2008) that the health policymakers decide on how to allocate health budget with each health production function associated with every health programme of care that suggests the connection between health outcomes and health spending. They assumed that a health policymaker should set out to maximize

the total social welfare function that subsumes health outcomes subject to health spending budget constraint and health production function. The outcome of the optimization should be that an increase in expenditure should yield improvement in health outcomes. A variant of this idea also sprouted from Calain's (2008) analytical framework through corporate social responsibilities in a resource curse environment. He claimed that in a resource curse environment, policymakers should maximize total social welfare (healthcare financing and healthcare projects) by mandating corporate sectors to engage in healthcare financing through corporate social responsibility as their activities in that environment /country have some damaging effects on the public health. In view of this claim, this paper includes an environmental variable to ascertain its role in health outcomes.

Different results have emerged from various methodologies applied by different researchers on the variant of this study. Few studies have used comprehensive descriptive analysis for cross country data to compare the level of healthcare financing across the countries in the same region (Nwakanma, 2013; Asbu et al., 2017, Nikoloski & Amendah, 2017), while panel pooled or fixed Ordinary Least Squares (OLS) to account for endogeneity was adopted by Gani (2008), Farag et al. (2013), Akinci et al. (2014), Kulkarni (2016) and Bein et al. (2017). However, some studies claimed that it is good to account for cross-section dependence and heterogeneity with the inclusion of cointegration relationship among variables, which called for the application of two-stage least squares (2SLS), Error Correction Model (ECM), Linear Mixed Model, Panel Autoregressive distributed lag, fully modified ordinary least squares (FMOLS) and panel cointegration test (Martin et al.,2009; Anyanwu and Erhijakpor,2009; Kim and Lane 2013; Fazaeli et al., 2016; Rana et al., 2018). Other methods applied are logistic regression for state analysis and OLS for single country analysis (Riman and Akpan, 2012; Edeme et al., 2017). Based on the methodological review, most of the studies used up to

three variables as crude health outcomes with a fixed or random-effect model. However, this study uses up to five different crude health outcomes with a combined effect of fixed and random models to aver empirical outcomes.

Empirically, different methods of estimation have generated mixed findings as a result of different proxies used to capture healthcare financing and health outcomes. Health care financing proxies ranging from health expenditure from government, private, military, out of pocket spending to external sources while health outcomes proxies range from life expectancy, maternal mortality, under-five mortality, infant mortality, adult mortality, neonatal mortality, reproductive health to quality-adjusted life years (QALY). For instance, Nwakanma (2013) used adult mortality rate, infant mortality rate, and life expectancy to proxy health outcomes, and found that underinvestment in public health is a reflection of low health profile in West African countries. Studies by Martin et al. (2009), Anyanwu and Erhijakpor (2009), Kim and Lane (2013), Akinci et al. (2014), Kulkarni (2016), and Edeme et al. (2017) averred that high government spending as well as health spending from private and out of pocket improve life expectancy and reduces infant and maternal mortalities. While Bein et al. (2017) affirmed a similar positive impact between healthcare expenditure and health outcomes; they also established that healthcare expenditure had a powerful effect on female's life expectancy than male life expectancy in Uganda, Burundi, Sudan, Eritrea, Kenya, Rwanda, Ethiopia, and Tanzania. On a contrary, Riman and Akpan (2012) found that a rise in the incidence of out of pocket results in a rise in the level of infant mortality including wide disparity and inequality in income, while Rana et al. (2018) found that maternal mortality across 161 countries investigated is significantly affected by expenditure on health. Nikoloski and Amendah (2017) empirically affirmed that neonate and neonatal mortalities across 14 African countries are not significantly affected by private health spending. Other notable empirical results related to this study affirmed that expenditure on health from the public to health sector from oil export earnings in oil countries is frequently more than private health expenditure in identical developed countries and that environmental pollution and female participation in labour force had a negative impact on health outcomes (Fazaeli et al.,2016 & Kulkarni, 2016).

3. Research Methodology

This study relies on Grossman's (1972) theory on the basis that spending on medical care affects health outcomes through a household's

healthcare production function with an adaptation of modification from Rana et al.'s (2018) research. A variant of the health production function of the Grossman model is of the form:

$$H= f(M, Z) \quad (1)$$

Where H is assumed to represent outcome on health like life expectancy at birth, rate of mortalities on an under-five, maternal, infant, and neonatal, M is the medical care received and Z represents socioeconomic (income) and environmental factors (education and environmental pollution). In line with the Grossman model, medical care stands as one of the most important market goods of the health production function, therefore, Rana et al. (2018) corroborate this model by suggesting that medical care has its associated prices and costs. Hence, holding all other factors constant, higher utilization of medical services is related to financing healthcare through medical care and vice versa. Therefore the quantity and quality of medical care used that will yield health outcomes in equation (1) is a function of the sources of healthcare financing/ health expenditure (HE):

$$M= f(HE) \quad (2)$$

Health expenditure (HE) from the above function is noted to include government expenditure on health, out of pocket payments, private and external healthcare expenditures. Equation (3) is formed from equations (1) and (2):

$$H= f(HE, Z) \quad (3)$$

The main estimation model for this study is stated in functional form as equation (4):

$$H=f(PGDP, PGHE, PPHE , POOPHE, PEHE, ENV) \quad (4)$$

The left-hand side variable is the dependent variable as stated in equation 4, while the right-hand side variables are the independent variables. Where PGDP is gross domestic product per capita, PGHE represents per capita expenditure from the government on health, PPHE is per capita expenditure from private on health, POOPHE is the per capita expenditure from out of pocket on health, PEHE is the external expenditure

per capita and ENV is the environmental variable representing CO2 emissions.

The data for the study were spooled from Indicators available on the World Bank data archive site. Data for health outcomes include the rate of mortalities on maternal (per 100,000 live births), under-five, infant, neonatal measured in 1,000 live births, and life expectancy. The exogenous variables are gross domestic product per capita, government expenditure on health per capita, private expenditure on health per capita, out of pocket expenditure on health per capita, external expenditure per capita and the environmental variable representing CO2 emissions is the emissions from the combustion, transmission, handling and production of biofuels and fossil fuels.

The study uses fixed and random models because of the panel nature of the data as well Hausman test to determine the best model for each of the five models estimated. Based on the functional form model in equation 4, the underline econometric model for this study is specified as:

$$H_{it} = a_0 + b_1PGDP_{it} + b_2PGHE_{it} + b_3PPHE_{it} + b_4POOPHE_{it} + b_5PEHE_{it} + b_6ENV_{it} + \varepsilon it \quad (5)$$

Variable names are the same as stated in functional form. Constant is denoted by a_0, bs are the parameters for each independent variable used and ε is the error time. The time is represented with t and i denote countries involved.

3.1. Data

Extracted data for the analysis of this paper were gotten from the Indicators made available by the World Bank (WDI), which span from the period of 2000 to 2017. The selected periods are subjected to the availability of data. The crude health outcomes used in this paper are the rate of mortalities on maternal, neonatal, infant, under-five, and life expectancy. Other useful data are gross domestic product per capita, government expenditure on health per capita, private expenditure on health per capita, out of pocket expenditure on health per capita, external expenditure per capita and the environmental variable representing CO2 emissions. The gross domestic product per capita included here is the real GDP to capture the effect of income on health outcomes as suggested in the literature by Farag et al. (2013).

4. Presentation and discussion of empirical results

This section presents empirical outcomes from the models estimated. The results presented here are the descriptive and the fixed/ random-effects regressions adjudged from the Hausman test for each model. All data used are transformed to their natural log form before estimation. The minimum value, standard deviation, maximum value, and mean for the data used are presented in Table 3. below. The total observation among the 10 countries chosen is 180. On average, life expectancy among these countries shows approximately a unit higher than 60, which has a minimum of 46.27 and a maximum of 76.29. A mean value of 376.88 is recorded for maternal mortality, minimum and maximum value ranges between 6 and 1170. It is obvious that among the crude health outcomes selected, maternal mortality recorded the highest mean, follow by neonatal, while under-five mortality recorded the lowest mean among the selected countries. It is also the case that the average health expenditure from private is more than government health expenditure, which indicates that health spending from the private pocket is higher than government health spending. Additional information obvious from this table is that external health expenditure on average is very low compared to out of pocket expenditure from households.

Table 3. Descriptive Statistics

Variables	Obs.	Mean	Standard Deviation	Minimum	Maximum
Life expectancy at birth	180	61.29	8.11	46.27	76.29
Maternal mortality	180	376.88	305.35	6	1170
Infant mortality	180	55.66	29.44	10.6	122.60
Under five Mortality	180	26.78	11.36	6.50	50.70
Neonatal mortality	180	81.70	48.66	12.4	206.30
Real GDP (per capita)	180	5382.48	4546.28	276.25	20333.94
Per-capita government HE	180	75.57	77.14	0.18	325.17
Per-capita private HE	180	83.36	63.71	3.75	257.47
Per-capita out of pocket HE	180	62.48	48.72	3.21	240
Per-capita external HE	180	3.52	3.91	0	18.09
C02 emissions	180	11618.30	14107.92	0	45868.56

HE represents health expenditure

Source: computed by the authors.

A synopsis of results generated from regression analyses is presented in Table 4. The independent variables behave differently with respect to each dependent variable under each model. Closer scrutiny of table 4 depicts that for life expectancy as a dependent variable, three independent variables are statistically significant. Per capita expenditure from the government on health responds positively to life expectancy. This is

suggestive of the fact that an increase in life expectancy is possible if government health expenditure rises. Contrarily, out of pocket expenditure and C02 emissions have negative effects on life expectancy. The implication is that out of pocket payments on health create a burden on households. A clear understanding of C02 emissions having a negative effect on life expectancy is possible since emissions could degenerate into different life-threatening diseases. The result of the C02 and health outcome under life expectancy could be said to be affirmative as Fazaeli et al. (2016) and Kulkarni (2016) also confirm similar outcomes. A further examination of this table shows that for maternal mortality only per capita income is found statistically significant. This connotes that as income is increasing the incidence of mortality for mothers reduces by 0.22 percent. This is a plausible result as Grossman's (1972) theory suggests that spending on medical care affects health outcomes through a household's healthcare production function as spending also depends on income. Furthermore, all forms of health expenditure used for this analysis are found to be statistically insignificant. This suggests that health expenditure has no significant relationship with maternal mortality across the 10 counties involved. This is plausible as it was found in the study of Rana et al. (2018) across 161 countries investigated.

It is obvious from the table that only C02 emissions show no statistically significant relationship with infant mortality. Also, out of the four forms of expenditure that interacted with infant mortality, only out of pocket health expenditure shows a positive significant relationship with infant mortality and the other three forms of health expenditure show negative significant impacts. A percentage increase in expenditure from the government on health, expenditure from private on health and external sources will significantly reduce infant mortality by 0.99 percent, 0.39 percent and 0.02 percent respectively. The impact of income is reversed under infant mortality as compared to maternal mortality, which suggests that an increase in income will statistically increase infant mortality. A plausible reason for the reversed sign may be that parents working to generate income in order to cater for an infant may have their own cost on the infant's health through neglect as a result of time constraints. For the neonatal mortality rate as a dependent variable, all independent variables are statistically significant. The positive significant relationship that exists between infant mortality and income also exists with neonatal mortality. Expenditure from the government on health, expenditure from private on health, expenditure from external sources on health and the pollution variable have a negative significant relationship with neonatal mortality. On

a contrary, out of pocket health expenditure shows a positive relationship with neonatal mortality. This suggests that a percentage increase in out of pocket will increase neonatal mortality. The burden of expenditure on health from out of pocket on households may be the cause of the increase in neonatal mortality among the 10 countries investigated. The impact of environmental variables here could be negative since most under-aged are not too exposed to pollution or the exploration environment may be far from residential areas.

The under-five mortality rate as a dependent variable shows that health expenditure from out of pocket, external sources, government and private are found statistically significant. A percentage increase in either expenditure from the government on health, expenditure from private on health or expenditure from external sources on health will reduce the incidence of under-five mortality. On a contrary for expenditure on health from out of pocket, an increase in out of pocket leads to a 0.3 percent increase in under-five mortality. This implies that higher out of pocket health expenditure could be one of the major causes of an increase in under-five mortality in the selected area. Overall, it can be seen that the effect of health expenditure from out of pocket payments, private sources, external, and the government is similar for crude health outcomes that are based on mortalities, while the reverse is the case for life expectancy. It is also the case for C02 emissions that infant mortality, neonatal, life expectancy, and under-five mortalities demonstrate a similar effect on it, but with different meanings. This is because an increase in life expectancy is interpreted as a positive health outcome; while an increase in crude mortality rates is interpreted as a negative health outcome. For income, only maternal mortality shows a negative outcome, which means that an increase in income will result in a reduction in maternal mortality with a magnitude of 0.22 percent.

Table 4. Regression results on health outcomes and healthcare financing

Dependent variables	Life exp.	Maternalmrt	Infant mrt.	Neonatalmrt.	Under5mrt.
Independent Variables	(FE)	(RE)	(FE)	(FE)	(FE)
Real GDP (per capita)	0.0166	-0.2236**	0.1103**	0.1350**	0.0584
	(0.1857)	(0.0907)	(0.0486)	(0.0382)	(0.0572)
Per capita govt. HE	0.0330**	-0.0185	-0.9968**	-0.0809**	-0.1239**
	(0.0086)	(0.0433)	(0.0226)	(0.1776)	(0.0266)
Per capita private HE	0.0507	-0.2138	-0.3914**	-0.2851**	-0.3550**
	(0.0419)	(0.2080)	(0.1098)	(0.0862)	(0.1293)
Per capita OOP HE	-0.0611*	0.0873	0.3294**	0.2375**	0.3216**
	(0.0369)	(0.1832)	(0.0967)	(0.0760)	(0.1139)
Per-capita external HE	0.0153**	0.0222	-0.0290**	-0.0205**	-0.0367**
	(0.0046)	(0.0231)	(0.0120)	(0.0095)	(0.0142)
C02 emissions	-0.0626**	0.0775	-0.0871	-0.1952**	-0.0341
	(0.0286)	(0.1354)	(0.0749)	(0.0588)	(0.0881)

Source: computed by the authors.

Note that * and ** denote variables that are statistically significant at less than 10% and 5% respectively. Mrt. Implies mortality. Values in parentheses are the standard errors, FE means fixed effects and RE means random effects

5. Conclusion and Recommendation

One of the key ways of enhancing health outcomes in a country is to provide a strategic healthcare funding system in order to achieve equity and efficiency. Out of pocket healthcare expenses in Africa account for more than forty percent of overall health spending. The undoubted outcome of having out of pocket payments as the major means of channelling funds to the healthcare providers in any country is an irresistible huge burden on the household. Among the ten selected oil-producing countries, out of pocket healthcare payments still form a larger part of the total health expenditure as shown in the second section of this study. In this paper, about four major outcomes are discernible. One of the major results is that income plays an imperative role (negative/positive) on health outcomes and that is the reason why most health or health-related models have an income budget constraint attached to them to form a final decision. Secondly, high out of pocket payments shortening the expected life expectancy at birth, which could mean that the high out of pocket health expenditure may affect other livelihood consumption and may be detrimental to human life. Another obvious result is that health expenditure from external sources, private and government have a positive effect on health outcome. This is obvious from the result and should be increased to reduce the negative effect of out of pocket on the household. In addition, the role of the environment should be taken as important to health as the result on life expectancy at birth indicates

that a rise in C02 emissions lowers life expectancy. Conclusively, it should be noted that each crude health outcome behaves differently under the estimated outcomes; as such, each health outcome should be treated with different favourable policies. It is recommended that out of pocket payments on healthcare should be reduced and other forms of healthcare payments should be improved to reduce the burden of healthcare payments on households. It is also advisable to control emissions in the selected areas so as to ameliorate life expectancy at birth through government policies.

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Recommended citation:
Opeloyeru , O. S., Nurudeen Abiodun , L., & Kehinde , K. A. (2021). Healthcare Financing and Health Outcomes: Analysis of Oil-Producing Countries in Africa. *Management & Economics Research Journal, 3*(2), 88-103. https://doi.org/10.48100/merj.2021.158