Health Care Expenditure and Maternal Mortality in Nigeria (1991 – 2021)

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Abstract
Maternal mortality is still high in Nigeria, even though government has been spending over the years on health. Hence, this study examined the effect of health care expenditures on maternal mortality in Nigeria between 1991 and 2021.The study made use of secondary data sourced from World Development Indicators of the World Bank and the Statistical Bulletin of Central Bank of Nigeria. The data were analyzed using descriptive statistics and Autoregressive Distributed Lag (ARDL) model. This was adopted as the estimation technique because the variables were integrated with mixed order of integration I (0) and I(1). After controlling for relevant covariates like female literacy rate, female per capita income and poverty rate, the study revealed that health care expenditure plays a vital role in reducing incidences of maternal mortality in Nigeria both in the short-run and long-run periods. Therefore, the study recommends that governments at all levels in Nigeria should put more resources in the health care sector especially on the area of maternal health.

**Keywords:** Maternal Mortality, Healthcare expenditure, Female Literacy Rate, ARDL

1. Introduction

Women are part of the divine being that contribute to the continual existence of human beings through reproduction and contribute substantially to the socio-demographic growth of a country (Fatoye, 2021). Therefore, issues of maternal health are to be taken seriously, as the health of a mother is linked to that of the child and nation as a whole. It is essential for governments at all levels to invest wisely in the health sector, especially on reproductive and maternal health because it is through reproduction that human sustenance exists (Rahman, Khanam & Rahman, 2018).

Every year, at least half a million women and girls needlessly die because of complications during pregnancy, childbirth or the six weeks following delivery. Almost all (99%) of these deaths occur in developing countries (Fatoye, 2021). As indicated by Igbinedion and Olele (2018), one of the health status indicators of a nation is the state of the maternal health and this is measured through the maternal mortality ratio (MMR), that is the proportion of mothers that died while giving birth or generally through pregnancy-related causes (WHO, 2023). Globally the maternal mortality ratio has reduced drastically, even in the Middle East as seen in the reduction from 95 deaths per 100,000 in 1990 to 27 in 2015 in eastern Asia and 538 to 176 for Southern Asia. However, the story is different in sub-Saharan Africa where the decline was only from 987 to 546 (Igbinedion & Olele, 2018).

Recent data from a World Health Organization (WHO) factsheet released in March 2023 presents a bleak picture of maternal health outcomes in Nigeria. In 2017, the maternal mortality rate in Nigeria was 917 deaths per 100,000 live births. In just three years, this rate has risen by approximately 14%, reaching 1047 deaths per 100,000 live births in (WHO, 2023).

M M R   F i g u r e
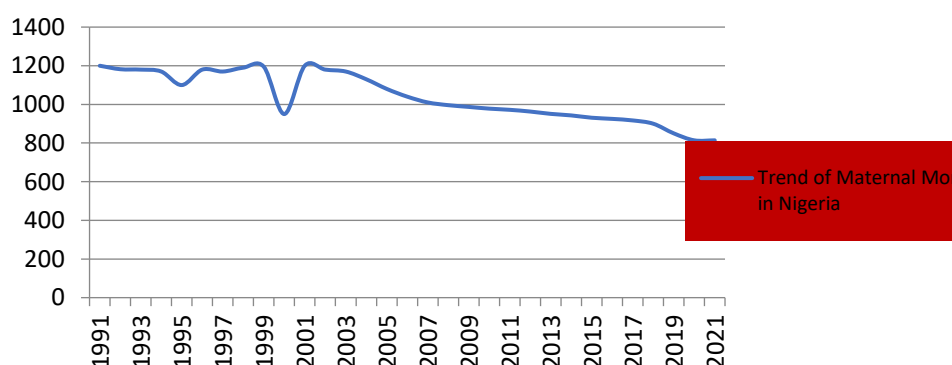
Source: Author's Computation, 2024. Trend of maternal

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The lifetime risk of a Nigerian woman dying during pregnancy, labour and postpartum is estimated to be 1 in 22, compared to that of developed nations which is estimated at 1 in 4900 (WHO, 2020). Evidence from literature showed that the high rate of maternal mortality in Nigeria is as a consequence of three delays (Okonofua et al, 2018). The three delays are delay in making decision to seek maternal health care services, delay in locating and arriving at a health Centre and delay in receiving skilled care by a skilled healthcare worker (Yaya et al, 2018), and directly, the deaths are due mainly to five major causes: hemorrhage, eclampsia, infection (sepsis), abortion complications and obstructed labour (Say et al, 2014).

However, Nigerian government expenditure on health has been on the rise. For instance, from 2000 to 2020, recurrent government spending on the health sector increased from 15.2 billion Naira, or less than 4 percent of the overall budget, to 369.4 billion naira, or less than 5 percent. However, the capital expenditure fluctuated and reached less than 195 billion Naira in 2020. Meaning that the Nigeria healthcare spending for 2020 was $70, a 0.12% increase from 2019. Nigeria healthcare spending for 2019 was $70, a 6.06% increase from 2018. Nigeria healthcare spending for 2018 was $66, a 9.72% decline from 2017. Nigeria healthcare spending for 2017 was $73, a 6.98% decline from 2016. But despite this public spending on health, health expenditure is yet to address the health challenges recorded in the maternal care in Nigeria despite the enormous funds being pumped into the sector. According to Onigbinde (2018), between 1999 and 2016, the federal government and the state governments had spent about N55.36tn on health, but still, Nigeria still represent one of the highest with maternal mortality, only second to India, despite this enormous spending. When expressed as a percentage of gross domestic product (GDP), the health expenditure in Nigeria is relatively low to other developing countries of Africa (Abdulahi & Adegbite, 2019). One of the major issues in the health and economy system of the country is poverty, as about 70% of Nigerians are living in poverty according to the World Bank (World Bank, 2020). Meanwhile public expenditure on health by government only account for 25%, leaving more than 70% of the population to pay out-of-pocket which may have severe consequences for health care utilization especially for the poor (Onigbinde, 2018; Onah & Govender, 2014).

Health outcomes in terms of maternal mortality rate has been improving over the years in developed countries alongside their health expenditure (Kilanko, 2019), between January 2020 and December 2021, life expectancy dropped in the U.S. and other countries and the U.S. has the lowest life expectancy at birth, however (Commonwealth fund, 2023), that of the developing nations such as Nigeria cannot be said. Also, there have been mixed results on the kind of relationship that exist between health care expenditure and maternal mortality. While studies like Aziz et al (2021) and Rana, Alam and Gow (2018) observed a positive relationship between health care expenditure and maternal mortality and in contrast, studies like Maruthappu et al (2014), Alves (2007) and Bokhari, Gai, and Gottret (2007) observed a negative relationship. Therefore, there is a need for a study like this in Nigeria to examine the relationship between government health care expenditure and maternal mortality. Hence, this study raised the followings questions; is there any relationship between health care expenditure and maternal mortality in Nigeria and if there is, is it positive or negative? These questions were answered by examining the trend of maternal mortality and investigated the nexus between health care expenditure and maternal mortality in Nigeria. The subsequent sections are organized as follows: section two represents literature review. Sections three and four are on research methodology and analysis of result and discussion respectively while section five focuses on conclusion and recommendation.

Literature Review
Some theories have established a link between health care expenditure and health outcomes. For instance, Grossman (1972) model of health capital is basically concerned with the way and manner an individual allocates his/her resources in order to produce health. This theoretical exposition follows the unconstrained utility maximization theory whereby the individual aims to maximize his utility with a given set of resources. Grossman posits that as the individual aims to maximize his health, he does so by investing in himself to produce the typical health status desired. Essentially, the theory largely explains the nexus between health care spending and health outcomes. Thus, the theory simply presents the individual as one whose demand for health inputs is a derived demand, not necessarily for consumption but to produce a typical health outcome. This individual does so by acquiring health inputs such as health care financing which is either public or private financed, dietary intake, exercise, environment, income, or time, to engage in some production process that yields typical health outcomes such as reduction in maternal mortality rates. The central proposition of the Grossman model is that health can be viewed as a durable capital stock that produces an output of healthy time. It is assumed that individuals inherit an initial stock of health that depreciates with age and can be increased by investment (Grossman, 1972).

The model specifies the gross investment in stock of health with the following equation:

$$I_t = I_t (M_t, TH_t, E_t) \text{ -- (1)}$$

Based on the above, M_t, TH_t, and E_t imply medical care, time input in gross investment function and stock of human capital, respectively. If any change occurs to any of these variable automatically it will affect the net investment in stock of health. Nevertheless, medical care considered as the most important market good component of the gross investment function has costs and prices implications associated with it (Grossman, 1972). It is believed as well that holding other things constant, higher utilization of medical care is related to higher health care expenditure and vice versa. Hence, by implication, the volume of medical care inputs used is a function of the level of health expenditure based on the earlier explanation given.

$$M_t = \int (HE_t)$$ --- (2)

Furthermore, Gender stratification theory refers to the unequal distribution of wealth, power, and privilege between the two sexes. Acker (1973) analyzed gender (in) equality on the bases of prestige, style of life, privileges, opportunities, association with social groups, income, education, occupation, and power. This theory was propounded by Collins Rogers in 1971 and can be used to support the argument that maternal mortality will be lower in societies in which their women have higher status and more autonomy (Jebbin 2020). Although this perspective has recently been given little attention due to the advent of **Modernization Theory** that assumes that enhanced women's status in general can be achieved through any nation's industrialization and modernization by providing labour participation opportunities, access to and control over any resources including improved healthcare expenditure and services. With this, maternal mortality is expected to decrease in step with decline in general mortality.

Lastly, Wagner's law of State, is known as the law of increasing State spending by expansion and intensification of government function which increases public expenditure and it is a principle named after the German great economist Adolph Wagner (1835–1917). The theory posits that public expenditure rises constantly as income growth expands for any country. The law predicts that the development of an industrial economy will be accompanied by an increased share of public expenditure in gross national product. Wagner's law suggests that a welfare state evolves from free-market capitalism due to the population voting for ever-increasing social services as general income levels grow across broad spectrums of the economy (Ibrahim *et al*., 2021). In spite of some ambiguity, Wagner's statement in formal terms has been interpreted by Richard Musgrave (1989); as progressive nations industrialize, the share of the public sector in the national economy grows continually. The increase in State expenditure is needed because of three main reasons. Wagner himself identified these as (i) social activities of the state, (ii) administrative and protective actions, and (iii) welfare functions which is of our concern here in relation to the current study.

With the above, Wagner (1883), argued in favour of government expenditure and posited that there are natural tendencies for government spending on investment to grow both intensively and extensively. One of the focal reasons for his argument for the increase in government expenditure laid emphasis on the need for the government to cater for and provide welfare services to people like public health through proper and adequate spending.

Review of Empirical Literature
This study reviewed some previous works on the effect of health care expenditure on maternal mortality. The subject matter is a global one, which has generated the interest of researchers globally, although, very few, based on the author's knowledge, have been conducted in Nigeria. Hence, the review will look into global space, then to continent/sub-Saharan level to Nigeria. This will help in ascertaining the effect and know the position of Nigeria in health financing and its outcome notably, maternal mortality indices.
Rana, Alam and Gow (2018) carried out a global analysis on health expenditure and its impact on child and maternal mortality among 161 countries within the period of 1995 to 2014 using IPS unit root, panel autoregressive lag and Granger causality tests. Results showed that health expenditure and health outcomes in terms of maternal and child health is stronger for low-income countries as opposed high-income countries. However, there was insignificant relationship between health expenditure and maternal mortality across all income levels of the world. Maruthappu et al (2014) conducted a wide retrospective study on the relationship between government healthcare spending in 24 European Union countries and maternal mortality between 1981 and 2010. The study utilized a multivariate regression analysis and revealed that after accounting for other co-founding variables, a 1% reduction in government health spending will cause a significant increase in maternal mortality rate (10.6% annually), that is, 89 maternal deaths in the European Union.

Furthermore, Aziz et al (2021) explored the role of health expenditures on maternal mortality in eight South Asian countries between 2000 and 2017 using fully modified ordinary least squares and dynamic ordinary least squares. The results revealed that that a 1% rise in health expenditure increased the maternal mortality rate by 1.95% in the case of FMOLS estimator and 0.16% in the case of DOLS estimator; showing that increase in current expenditure also causes in maternal mortality. Also, in a related study using ARDL

technique, Akintunde (2023) examined poverty-income inequality-maternal health nexus in Nigeria. The findings showed that public spending on health and GDP per capita had negative relationships with maternal mortality rate, while poverty, inequality, unemployment and carbon emissions had positive significant relationship with maternal mortality rate in the short run while all the variables significantly reduced mortality rate in the long run.

Bokhari, Gai, and Gottret (2007), using the instrumental variable approach, implied that economic growth and government health expenditure are important factors for boosting public health such as reduction in maternal mortality rate. Alves (2007), examined changes in levels and patterns of maternal mortality in Pernambuco, Brazil between 1994 and 2003. It was revealed that approximately 94% of the maternal deaths were judged to be avoidable with an improvement in health care expenditure.

Modelling the relationship of one of the government initiative of spending on health; the Janani Suraksha Yojana (JSY; a form of conditional cash transfer) between 2005 and 2010 in India against maternal mortality ratio using a Bayesian spatio-temporal model, Ng et al (2014) showed that despite the increase and wide support of the JSY programme, there is no association between the JSY and maternal mortality reduction in the study area. In the same vein, Gorter, Ir and Meessen (2013) conducted a wide review on the Results-Based Financing (incentives by government) of Maternal and Newborn Health Care in Low- and Lower-Middle-income countries. Most of the reviewed studies showed a positive effect of results-based financing on the utilization, satisfaction and subsequently outcome of maternal health care. In Nigeria, Onwujekwe et al (2020) conducted a study on the impact and sustainability of maternal health cash transfer on maternal health care indices. Result showed that introduction of conditional cash transfer was associated with increased utilization of public facilities for maternal health care and subsequent positive maternal health outcome.

Betran *et al.*, (2005) conducted a WHO systematic review study on the national estimates for maternal mortality and morbidity using regression model to ascertain relationship between variables. It was shown that part of the all country-specific variables that have relationship with maternal mortality rate is health expenditure per capita. Aldogan, Austill, and Kocakülâh (2014), observed prominent health outcomes such as infant, under-five, and maternal mortality rates due to government spending in the MENA region in Turkey from 1990 to 2010, by using pooled ordinary least regression, random effects, and Hausman–Taylor instrumental variable models. And the result clearly established a negative relationship for maternal mortality.

In Sub-Saharan Africa, Nketiah-Amponsah (2019) conducted a study on the impact of health expenditures on health outcomes in 46 countries between 2000 and 2015. It was shown that health expenditure has a positive and significant impact on maternal mortality as a health outcome. That is, a 1 percent increase in health expenditure per capita brings about a 0.35 percent fall in maternal mortality. Furthermore, Kilanko (2019) in the study of effects of health care expenditure on health outcomes in 14 West African countries from 2000 to 2018 using panel data estimation, revealed that a 1% increase in health expenditure will reduce maternal mortality by 4.9% indicating positive contribution of health expenditure to maternal mortality. Ashiabi (2016) in her own study argued that only public health care spending has a significant impact on health outcomes measured by under-five mortality and maternal mortality in Sub-Saharan Africa.

On a national level, Fatoye (2021) conducted a study on the implications of health care expenditure on maternal mortality rate in Nigeria between 2000-2015 using the time series data of maternal mortality rate, private health expenditure, public health recurrent expenditure and public capital expenditure. The study applied an ex-post facto research design and Johansen Co-integration test to determine the relationship between the variables. It was revealed that private health expenditure had no significant impact on maternal mortality rate while that of public recurrent and capital expenditure on health had long run significant negative effect on maternal mortality rate, that is, a one-naira increase spending on health by government will reduce maternal mortality by 0.188165 for recurrent spending and 0.166585 for capital expenditures. Another study was conducted by Igbinedion and Olele (2018) on the relationship between public health expenditure and health outcome (maternal mortality rate) using data from 1981 to 2014. The result from the long run model of the study revealed that government expenditure on health is statistically significant (though negatively) to maternal mortality rate; showing that increase in poverty rate is positively related to increase maternal mortality rate. Sanmi and Bakare (2011), examined the causal relationship between health care expenditure and maternal mortality in Nigeria and the results showed that there exist a significant and negative relationship between health care expenditure and maternal mortality in Nigeria.

Turning towards state level of health expenditure, Nwankwo (2018) conducted an empirical analysis on the effects of public health spending in 25 Nigerian states on maternal mortality ratio. The findings showed that a percentage increase in state health expenditure would reduce maternal mortality rate in Nigeria by about 6 deaths per 1000 live births, showing the significant effect of public health spending on maternal health. Likewise, Abdulahi and Adegbite (2019) conducted a study on the effect of Lagos state government

expenditure on maternal mortality ratio. Using regression analysis. The study observed that health care expenditure does not have a significant effect on maternal mortality.

Methodology
Model Specification
To examining the relationship between health care expenditure and maternal mortality in Nigeria over the period 1991-2020 and drawing from the previously reviewed theories, the study simplified and specified Maternal Mortality Rate as a function of Health care Expenditure as follows:

$$MMR_t = f\,(TGEH_t) \quad \text{------ - ----- -- (3)}$$

Incorporating set of control variables into this model. Equation (1) could be expressed as:
$$MMR_t = f\,(TGEH_t,\,FLR_t,\,POV_t,\,FPCI_t) \text{ --(4)}$$
Hence, the functional form of equation 2 is expressed below:
$$MMR_t = \beta_0 + \beta_1 TGEH_t + \beta_2 FLR_t + \beta_3 POV_t + \beta_4 FPCI_t + \mu_t \text{ -------------------------- (5)}$$
Where MMR is the Maternal Mortality Ratio, which is the dependent variable, TGEH represent the Total Government Expenditure on Health (proxy for health care expenditure), FLR is the Female Literacy Rate (proportion of women aged 15 years and more who can read, write and carry out simple arithmetic calculations), POV is the Poverty Rate and FPCI = Female per capita income (proxy for economic status of women), while μ_t is the stochastic error term.
Therefore, taking from the equation (3), the estimated autoregressive distributed lag model (ARDL) is formulated as follows:

$$MMR_t = \alpha + \sum_{i=1}^{\rho} \beta_i MMR_{t-1} + \sum_{j=1}^{k} \sum_{i=0}^{n_j} \theta_{j,i} InX_{j,t-1} + \mu_t \text{ ----------------------------- (6)}$$
MMR_t is the maternal mortality ratio. The vector X stands both the explanatory and control variables. P is the number of lags of both the dependent and the explanatory variables while k is the number of explanatory variables. The equation can be further expanded thus:

$$\begin{aligned}
\Delta MMR_t = \;&\beta_0 + \beta_1 MMR_{t-1} + \beta_2 TGEH_{t-1} + \beta_3 FLR_{t-1} + \beta_4 POV_{t-1} + \beta_5 FPCI_{t-1} \\
&+ \sum_{j=1}^{n} \partial_j \Delta MMR_{t-j} + \sum_{J=1}^{o} \alpha_j \Delta TGEH_{t-j} + \sum_{j=1}^{p} \theta_j \Delta FLR_{t-j} \\
&+ \sum_{j=1}^{q} \Omega_j \Delta POV_{t-j} + \sum_{j=1}^{r} \lambda_j \Delta FPCI_{t-j} + \mu_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.. (7)
\end{aligned}$$

The equation (7) expressed the ARDL (n, o, p, q, r) model that comprised both short and long run relationships among the variables. With an assumption of the existence of long run relationship among them. The model expressed in (7) reflects an assumption of existence of short and long run relationship between maternal mortality and total government expenditure on health; and other variables in the long run. From the model, Δ is differencing operator, the short run coefficients of speed of convergence of the model to equilibrium are $\partial_j, \alpha_j, \theta_j, \Omega_j$ and λ_j while $\beta_1, \beta_2, \beta_3, \beta_4$ and β_5 represents the long run relationship among the variables; μ_t is the error term at time t. ARDL Bound testing will be used to confirm the existence of long run relationship among the variables as it may be reported by cointegration test. And when cointegration test is established, then error correction model (ECM) with short-run is formulated as follows:

$$\begin{aligned}
\Delta POV_t = \;&\sum_{j=1}^{p} \partial_j \Delta MMR_{t-j} + \sum_{J=1}^{p} \alpha_j \Delta TGEH_{t-j} + \sum_{j=1}^{p} \theta_j \Delta FLR_{t-j} + \sum_{j=1}^{q} \Omega_j \Delta POV_{t-j} + \sum_{j=1}^{r} \lambda_j \Delta FPCI_{t-j} \\
&+ \gamma ECM_{t-j} + \mu_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (8)
\end{aligned}$$

The short-run coefficients are $\partial_j, \alpha_j, \theta_j, \Omega_j$ and λ_j. While the ECM_{t-j} is the error correction term which will confirm the long-run equilibrium and γ is the parameter that captures the speed of adjustment to equilibrium after a shock.

Data Description and Sources
This study analyzed annual time series data spanning 1991 -2021. So, the variables under consideration are total government expenditure on health (a proxy for health care expenditure), Maternal Mortality Ratio, Poverty Rate, female per capita income and Female Literacy Ratio, and the data for all these variables were sourced from World Development Indicators of the World Bank, National Bureau of Statistics, the Statistical Bulleting of Central Bank of Nigeria and other sundry sources.

Results and Discussion
Descriptive Statistics
This study conducted basic descriptive statistics of the time series data that provides necessary information about the sample statistics.

Table 1: Descriptive Statistics

	MMR	TGEH	FLR	POV	FPCI
Mean	455.43	1069093	65.30757	58.75	241387
Median	399.29	394616.2	64.386	61.03	210134.7
Maximum	700	50536063	74.5044	70.79	382537.5
Minimum	250	9636.5	57.95389	49.27	153185.1
Std. Dev.	123.31	1152361	32.456	7.50	56226.4
Jarque-Bera	2.56	9.39	3.46	2.05	5.57
Probability	0.23	0.01	0.01	0.35	0.05
Observations	31	31	31	31	31

Source: Author's Computation, 2024.

From the Table 1, it is observed that the mean and median fall within the maximum and minimum values of the series and this shows a high level of consistence. The Jarque-Bera statistics rejects the null hypothesis of normal distribution for total government expenditure on health while for the maternal mortality ratio and poverty rate, the null hypothesis of normal distribution is accepted.

Unit Root Test
Before carrying out the regression analysis, the stationarity properties of the variables were required to be checked. Most of time series have unit root as demonstrated by many studies including Nelson and Plosser (1982) and Campbell and Peron (1991).

Table 2: Unit Root Test

	Augmented Dickey Fuller (ADF) Test			Phillip-Peron (PP) Test		
	Level	1st Difference	Remark	Level	1st Difference	Remark
MMR	0.9203	-4.1564*	I(1)	-0.4055	-4.2256**	I(1)
TGEH	0.3605	-6.4437**	I(1)	-0.0608	-6.454**	I(1)
FLR	1.1340	-3.9476*	I(0)	-1.1052	-11.3764**	I(0)
POV	1.2361	-5.3705**	I(1)	-3.3195	12.6453**	I(1)
FPCI	-1.3240	-5.3265**	I(1)	-1.3052	-5.2137**	I(1)

Source: Author's Computation, 2024

In Table 2, the result shows that FLR is stationary at level I(0) while others are stationary at first difference I(1). Given this result, it clearly shows that the stationary result is of mixed order I(0) and I(1) and since not all the observed variables are integrated at level, an ARDL bound test was performed to check the long run relationship among the variables.

Autoregressive Distributed Lag (ARDL)
Table 3: ARDL bound test result for long-run relationship among the variables

F-Bounds Test		**Null Hypothesis: No Levels relationship**			
Test Statistics	**Value**	**Signif**	**I(0)**	**I(1)**	
F- statistic	3.975854	10%	1.92	2.85	
		5%	2.15	3.41	
K	4	2.5%	2.32	3.53	

Source: Author's Computation, 2024.

Form Table 3, it shows the F statistics value of 3.975854 and from it, we deduce the existence of long run relationship among the variables in the model. This is because the computed F statistic is greater than the 5% upper bound critical value of 3.41. The study can now proceed to determine the long run result.

Table 4: Long Run Coefficient Using ARDL Approach

Restricted Constant and No Trend				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
FLR	-7.04385	3.871759	-2.827427	0.0792
POV	15.45708	53270	2.610074	0.0185
FPCI	-5.78351	61.01325	3.417581	0.0012
TGEH	-11.525702	3.0312465	-2.792997	0.0014
C	4738.139	1730.42804	2.739294	0.0087

Source: Author's Computation, 2024.

As it is shown on the Table 4, the coefficient of TGEH has a negative impact on MMR and statistically significant. This implies that one percent increase in TGEH will bring about 11.5 percent decline in MMR in Nigeria. Simply put, an increase in health care expenditure will reduce proximity of death during childbirth, this negates the findings of Aziz *et al.,* (2021). Likewise, the coefficients of FLR and FPCI show a negative impact as well. This means that an increase in Female per capita income (FPCI) for instance, will lead to increase in per capital health expenditure due to more disposable income which will also have significant effect in reducing maternal mortality. But in contrast, in the long run as well, the coefficient of POV is positive and it is statistically significant given its probability value of 0.0185. A percentage increase in POV would on average lead to 15% increase in maternal mortality (MMR), ceteris paribus. This is in conformity with the a priori expectation, meaning that an increase in POV will lead to more increase in maternal mortality in Nigeria. This finding is in line with Akintunde (2023).

Table 5: Estimated Short-Run Regression Result

Variable	Coefficients	Std. Error	t-Statistics	Prob.
DTGEH	-158.6204	51.2605	-4.8866	0.0475
DFPCI	-37.6552	23.703251	-3.31537	0.011
DFLR	0.0013	0.0005	2.1575	0.0426
DPOV	54.3241	42.7953	1.0213	0.0159
CointEq (-1)	-0.7542	0.2355	-3.3771	0.0000

Source: Author's Computation, 2024.

As it is clearly shown on the Table 5 short run result, the error correction parameter appeared with the right sign negative (-) and it is statistically significant given its probability value of 0.0000. The coefficient of error correction term is -0.754 meaning that the speed of adjustment is 75% when the system is disturbed. Also, the adjusted R-squared value of 58% indicates that 58% of the changes in MMR is explained by the joint interactions of the variables in the model while the remaining 42% are exogenously accounted for by factors not included in the specified model. However, in the short run the coefficients of TGEH and FPCI are negative and significant at 5% significant level. Meaning that TGEH and FPCI has a negative significant effect on MMR in the short run. A 1% increase in TGEH and FPCI would on average reduce MMR by 158% and 37% respectively. This is in line with the findings of Igbinedion & Olele (2018) and Akintunde (2023).

Conclusion

This study examined the relationship between health care expenditure and maternal mortality in Nigeria for the period 1991-2021. The estimated results from the long run model revealed that total government expenditure on health and female literacy have statistically significant negative effect on maternal mortality ratio while the poverty rate on the other way round has a positive effect on maternal mortality rate. The effect

and implication of health care spending on maternal mortality as a potent reproductive health outcome has been reviewed and examined. Governments at all levels are employed to increase budgetary allocation to health and ensure its implementation as maternal health (key aspect of health outcome) helps in strengthening the economy of the nation through sustainability and survival in human race. Also, with the positive role that conditional cash transfer and incentives play in alleviating poverty among women, government should step up in giving more incentives to women through soft loans and empowerment too. The study however, recommends that governments at all levels in Nigeria should put more resources in the health care sector especially on the area of maternal health.

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