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The Implications of healthcare expenditure on maternal mortality rate in Nigeria

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Abstract

The death of a woman during pregnancy and after delivery can best be described as an unfortunate contradiction and a tragic conflict of opposite in the 21st century, Nigeria. This is because being legitimately pregnant naturally evokes joy and celebration in any society. It is in the light of this that the study assessed the impact of the healthcare expenditure on the Maternal Mortality Rate (MMR) in Nigeria for the period of 16 years (2000-2015). The study made use of the time series data comprising the Maternal Mortality Rate (MMR), Private Health Expenditure (PRHEXP), public Health Recurrent Expenditure (HREXP) and public Health Capital Expenditure (HCEXP) obtained from the World Bank development reports and the Central Bank of Nigeria (CBN) annual statistical bulletin respectively. While the ex post facto research design was adopted for the study, Ordinary Least Square (OLS) was used to estimate the model with the aid of the E-views software, version 9. The results of the study showed that the health recurrent expenditure had the most positive significant impact on the maternal mortality rate. However, the impact of the private health expenditure on the maternal mortality was insignificant. Similarly, HCEXP had a long-run significant but negative effect on the maternal mortality. The study, therefore, recommended that the federal government of Nigeria should step up the recurrent component of the annual budgetary allocation to the health sector. This should also be intensely complemented by the state and local

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governments respectively. Moreover, there should be proper monitoring of the budgeted monies disbursed to the various tiers of the health care system in order to avoid diversion or misappropriation. In addition, governments at all levels should continue to widen access to the maternal health care services, especially among the indigent rural populace through subsidisation of health bills. As much as possible, maternal health care services should be made free throughout the country as it might reduce substantially the burden of maternal deaths.

Keywords: Maternal mortality; Health Expenditure, Health Finance; Impact.

Introduction

Mothers are naturally endowed with an unparalleled capacity to contribute socio-demographically to the economy of any nation. They do this grossly by nurturing and fostering new born children into maturity. It is on this premise that maternal and child health is considered as a very serious subject of discourse. The health of a mother is intricately linked to that of a new-born child at every given point in time. This is to the extent that exposure to either maternal or infant mortality affects the inseparable mother-child relationship. It is in recognition of this incontrovertible reality that the issue of maternal and child health was encapsulated in the Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs) respectively. For example, MDG 5 was articulated to reduce by three quarters, between 1990 and 2015, the maternal mortality ratio. As a proxy for the progress assessment of MDG 5, maternal mortality ratio was matched with proportion of births attended by skilled health

personnel[1];[2]. That notwithstanding, the government of Nigeria has not been able to achieve the MDG 5[3].

Pathetically, it has been noted across the world that approximately 536,000 girls and women die from pregnancy-induced causes annually, with one girl or woman dying every minute. Pregnancy should naturally evokes joy and celebration but in Nigeria, it seems to be a death warrant for most women[4]as a result of the less functional and responsive health care system characterised by perennial shortage of skilled manpower, dilapidated structures and equipment. This is not unconnected with the under-funding of the health sector by the government of Nigeria. The annual budgetary allocation of funds to the health sector over the years have been inconsistently staggered and far below the recommended benchmark[5]. The funding of the health care system in the country is not confined to the government alone as it involves other partners like the state and local governments, donor agencies, out-of-pocket expenditure among others. This study is empirically designed, therefore, to examine the cumulative effects of both the public and private health care spending on the maternal mortality rate in Nigeria.

In a broader sense, it is so worrisome to state that developing countries account for about 99% of the global maternal deaths,

[1]Africa Progress Panel, "Maternal Health: Investing in the lifeline of healthy societies & economies", Africa Progress Panel Policy Brief, September 2010, Geneva, Switzerland, (2010), P, 20.
[2]World Health Organisation, "World health statistics overview 2019: Monitoring health for the SDGs, sustainable development goals", Geneva: World Health Organization. (2019).
[3]Ochejele S, Musa J, Abdullahi MJ, Odusolu P, Attah DI and Alobo G, "Maternal death surveillance and response system in Northern Nigeria", *Trop J ObstetGynaecol*, 36, no. 2 (2019): PP 212-217.
[4]Owoseni JS, Eboh A and Akeredolu AY, "The Impact of Traditional Birth Attendants on Maternal and Child Health in Ikole LGA of Ekiti State, Nigeria", *Kogi Journal of Sociology (KOGJOURN)* 2, (2017): PP 137-157
[5]Eboh A, Abba JY and Fatoye HA, "Impact assessment of the public health expenditure on the health outcome in Nigeria", *International journal of social and administrati ve sciences* 3, no.2 (2018): PP 62-72. http://www.aessweb.com/journals/5051/info/ci.

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with almost half of these occurring in the Sub-Saharan Africa[6]. Maternal mortality according to the World Health Organization, is defined as a death of a pregnant woman or that which occur within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy but not death outside pregnancy-related issue[7].Although there is no statistical consensus, a couple of studies have indicated that Nigeria constituted one of the highest total global maternal deaths[8]; [9]; [10]. Specifically, the northern part of Nigeria has the worst mortality situation in the country[11]. Maternal mortality has a lot of widespread impacts on any society. Its impacts are noticeable on the economic, social, physical, mental and psychological domains of human life.

The death of a woman during pregnancy and after delivery can best be described as an unfortunate contradiction and a tragic conflict of opposite in the 21st century, Nigeria. This is because being legitimately pregnant naturally evokes joy and celebration in any society. However, grieves, pains and trauma are the consequential effects of a pregnancy that leads to the death of either the mother or the child. Unfortunately, most of the deaths of the pregnant women and their children in Nigeria are preventable if there is a functionally effective and accessible

[6]Africa Progress Panel, "Maternal Health: Investing in the lifeline of healthy societies & economies", Africa Progress Panel Policy Brief, September 2010, Geneva, Switzerland, (2010), P, 20

[7]Ezugwu EC, Agu PU, Nwoke MO and Ezugwu FO, "Reducing maternal deaths in a low resource setting in Nigeria", *Nigerian Journal of Clinical Practice* 17, no. 1 (2014): PP 62-66.

[8]Zozulya M, "Maternal Mortality in Nigeria: An Indicator of Women's Status". (2010).

[9]Sageer R, Kongnyuy E, Adebimpe WO, Omosehin O, Ogunsola EA and Sanni B, "Causes and contributory factors of maternal mortality: evidence from maternal and prenatal death surveillance and response in Ogun state, Southwest Nigeria", *BMC Pregnancy and Childbirth* 19, no. 63: PP *1-8*.

[10]Mojekwu JN and Ibekwe U, "Maternal Mortality in Nigeria: Examination of Intervention Methods", *International Journal of Humanities and Social Science* 2, no. 20 (2012): 135-149.

[11]Ochejele S, Musa J, Abdullahi MJ, Odusolu P, Attah DI and Alobo G, "Maternal death surveillance and response system in Northern Nigeria",PP 212-217.

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maternal health care service. The impacts of maternal deaths on society are quite colossal and and trans-generational. Bazile, Rigodon, Berman, Boulanger, Maistrellis, Kausiwa and Yamin[12] noted that maternal mortality compounds the bereaved children's vulnerabilities to long-term health and social challenges exacerbated by nutritional deficiency, interrupted education, employment, early partnership, pregnancy, and caretaking. Similarly, Miller and Belizán[13] documented some of the negative consequences of maternal deaths to entail missed economic opportunities, trans‐generational cycles of family and community poverty. It has also been noted that maternal deaths visibly endanger the health of the newborn and their chances of survival, including family functioning and economic degradation at the societal level.

Furthermore, it is opined that a child who experiences a maternal death within 42 days of its birth is confronted with 46 times greater risk of dying within one month when compared to a baby whose mother survived[14]. Also, Houle, Clark, Kahn, Tollman and Yamin[15] affirmed that children who are unfortunate products of early maternal deaths were 15 times at the risk of dying compared to children whose mother survived. In other words, children under 1 month whose mother died an early maternal death were at increased risk of dying compared to older

[12] [12]Bazile J, Rigodon J, Berman L, Boulanger VM, Maistrellis E, Kausiwa P and Yamin A E, "Intergenerational impacts of maternal mortality: Qualitative findings from rural Malawi", *Reproductive Health* 12, no.1(2015): PP1-10.
[13] Miller S and Belizán J M, "The true cost of maternal death: individual tragedy impacts family, community and nations", *Reproductive Health* 12, no. 56 (2015): PP 1-4
[14]Moucheraud C, Worku A, Molla M, Finlay JE, Leaning J and Yamin AE,"Consequences of maternal mortality on infant and child survival: A 25-year longitudinal analysis in Butajira Ethiopia (1987-2011)", *Reproductive Health* 12, no. 1 (2015): PP 1-8
[15]Houle B, Clark SJ, Kahn K, Tollman S and Yamin A E, "The impacts of maternal mortality and cause of death on children's risk of dying in rural South Africa: Evidence from a population based surveillance study (1992-2013)", *Reproductive Health* 12, no. 1 (2015): PP 1-9.

children[16]; [17].This justifies the fact that the health of a child and that of the mother is intricately connected.

The impact of maternal mortality could also be viewed from an economic standpoint. According to Kes, Ogwang, Pande, Douglas, Karuga, Odhiambo, Laserson and Schaffer.[18], some funeral costs of some deceased women are often higher than the healthcare spending which may invariably discourage household financial savings and asset mortgaging. In addition, the effects of maternal mortality on the economy include reduction in the quantity of labour force, loss of a strategic household caregiver or nurse, loss of care for the elderly, distortion of human capital creation process among others. The above factors interact and reinforce to reduce economic growth[19]. Apart from the proximate clinical and medical causes of maternal mortality[20], certain distal factors such as economic, institutional, political, social and cultural[21] combine to accentuate maternal deaths. This very study is concerned with non-medical factors[22] influencing maternal mortality in Nigeria. The aspect of the non-medical factors relating to maternal mortality is the health governance issue, which is the concern of this study.

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[16]Molla M, Mitiku I, Worku A and Yamin AE, "Impacts of maternal mortality on living children and families: A qualitative study from Butajira, Ethiopia", *Reproductive Health* 12, no.1 (2015): PP 1-9.
[17]Miller S and Belizán J M, "The true cost of maternal death: individual tragedy impacts family, community and nations", PP 1-4
[18]Kes A, Ogwang S, Pande RP, et al., "The economic burden of maternal mortality on households: Evidence from three sub-counties in rural western Kenya", *Reproductive Health* 12, no. 1 (2015): PP 1-11.
[19]Kirigia JM, Oluwole D, Mwabu GM, Gatwiri D and Kainyu LH, "Effects of maternal mortality on gross domestic product (GDP) in the WHO African region", *African Journal of Health Sciences* 13, (2006): PP 86-95
[20]Sageer R, Kongnyuy E, Adebimpe WO, et al., "Causes and contributory factors of maternal mortality: evidence from maternal and perinatal death surveillance and response in Ogun state, Southwest Nigeria", PP *1-8*.
[21]OndimuKN,"The Risk Factors of Maternal and Perinatal Health Problems in Kisumu District", (2000). Philosophy, Egerton University
[22]Azuh DE, Azuh AE, Iweala EJ, Adeloye D, Akanbi M and Mordi RC, "Factors influencing maternal mortality among rural communities in southwestern Nigeria", *International Journal of Women's Health* 9, (2017): PP 179–188.

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In the face of the abysmally persistent maternal deaths in Nigeria, there is a need to assess the impact of both private and public healthcare expenditure on the maternal mortality rate in the country for the period of 16 years (2000-2015). This is important because access to quality health care in Nigeria today depends largely on the Out-Of-Pocket (OOP) spending which is a function of an individual's socio-economic status per time[23-24].Besides the fact that income level and purchasing power are significant influencers of maternal mortality[25].As the main objective, this study is designed to critically assess the impact of the healthcare expenditure on the Maternal Mortality Rate (MMR) in Nigeria for the period of 16 years, coving 2000-2015. Meanwhile, the specific objectives are to: assess the impact of the Private Health Expenditure (PRHEXP) on Maternal Mortality Rate (MMR) in Nigeria for the period of 16 years (2000-2015); examine the effect of the public Health Recurrent Expenditure (HREXP) on MMR in the country for the period under review and, evaluate the effect of the public Health Capital Expenditure (HCEXP) on the rate of the maternal mortality in Nigeria.

Financing of the health care system is one of the critical roles and functions of any responsible government. In other words, the robustness and effective service delivery of any health care system is largely tied to its financing base. However, health system financing varies according to the available resources that are generated, pooled, and used in any country. The various known sources of health financing include but not limited to Out-Of-Pocket (OOP), medical saving account, community financing, private health insurance, social insurance and national health insurance [26-27]. The trajectory of increased financing of the health

[23]Eboh A, Akpata GO and Akintoye AE, "Health Care Financing in Nigeria: An Assessment of the National Health Insurance Scheme (NHIS)", *European Journal of Business and Management* 8, no.27 (2016): PP 24-34.
[24]Aregbeshola B S and Khan SM, "Out-of-pocket payments, catastrophic health expenditure and poverty among households in Nigeria", *Int J Health Policy Manag*.7, no.9 (2018): PP 798–806.
[25]Ibrahim DO, "Social-Economic Determinants of Maternal Mortality in Rural Communities of Oyo State, Nigeria", *International Journal of Scientific and Research Publications* 6, no.9 (2016): PP 280-285.
[26]Wang H, "Comparative Health Systems" International Encyclopedia of Public Health (2nd edition) 2, (2008): PP 799-806.

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system is such that it likely facilitates access to and utilisation of various maternal healthcare services, which in turn reduces poor maternal and child health outcomes[28]. Unfortunately, the Nigerian scenario is different as healthcare expenditure through out-of-pocket accounts for about 70% of the total health spending[29]. The perpetual dominance of the health system expenditure by the private and non-public actors and agencies in Nigeria necessitates an empirical review into the combined and cumulative effects of such on the maternal mortality rate in some selected countries.

Maruthappu, Williams, Atun, Agrawal and Zeltner[30] carried out a study to determine the association between reductions in government healthcare spending and maternal mortality in 24 countries of the European Union (EU) over a 30-year period, using retrospective study design. The results showed that an annual 1% decrease in government health expenditure was associated with significant rise in maternal mortality rates. Also, the associations remained significant after controlling for economic, infrastructure and hospital resource controls, in addition to out-of-pocket expenditure, private health spending and total fertility rate. The authors, therefore, concluded that reductions in government healthcare spending were significantly associated with increased maternal mortality rates, which may

[27]Novignon J, Olakojo SA and Nonvignon J, "The effects of public and private health care expenditure on health status in sub-Saharan Africa: new evidence from panel dataanalysis", *Health Economics Review* 20, no.122 (2012): P 22.

[28]Haruna U, Dandeebo G and Galaa SZ, "Improving Access and Utilization of Maternal Healthcare Services through Focused Antenatal Care in Rural Ghana: A Qualitative Study", *Advances in Public Health*, (2019): PP 1-11.

[29]Akubo D, Onoja EE, Eboh A and Attah JA, "Assessing Impact of Government Healthcare Expenditure on Nigerian Economic Growth", 1st International Conference on Emerging Issues in the Management of Resources in a
Democracy by Faculty of Management Sciences, *University of Jos and International Journal of Management Science Research (IJMSR)*, (2018), PP 734 -746, 8th-11th May, 2018.

[30]Maruthappu M, Williams C, Atun R, Agrawal P and Zeltner T, "The association between government healthcare spending and maternal mortality in the European Union, 1981–2010: A retrospective study", *BJOG* 122, (2015): PP 1216–1224

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occur through changes in the provision of skilled health professionals attending births. Moreover, Igbinedion and Olele[31] investigated the connection between public health expenditure and maternal mortality for the period covering 1981 to 2014 in Nigeria. The study employed co-integration and error correction modeling procedure to determine the long-run estimate. The results of the analysis revealed that maternal mortality rate declined as both public health spending and private health expenditure rose, suggesting that public health spending did not crowd out private health financing with reference to Nigerian case.

Furthermore, Nwankwo[32] examined the effects of public health spending on maternal mortality in Nigeria by adopting a panel data regression analysis ranging from years 2003 to 2015 involving 25 States in Nigeria. After controlling for other relevant covariates like female per capita income, female literacy rate, and urbanisation, it was realised that public health expenditure was a vital factor in reducing incidences of maternal mortality in Nigeria. In the same vein, Manyika, Gonah, Hanvongse, Shamu and January[33]examined the association between government health expenditure and maternal mortality. The authors combined survey and annual expenditure data from Zimbabwe between 1980 and 2011. The study used multiple regression analysis to find the association between government health expenditure and maternal mortality while controlling for potential confounding variables. It was discovered from the study that government health expenditure had a statistically significant association with maternal mortality, with less expenditure associated with high rates of maternal mortality. This substantiates the proposition that government health

[31]Igbinedion SO and Olele EH, "Does Public Health Expenditure promote Health Outcomes in Nigeria?", *Amity Journal of Healthcare Management* 3, no.1 (2018): 1–13.
[32]Nwankwo CE, "The Effects of Public Health Spending on Maternal Mortality in Nigeria", *Journal of Economics and Sustainable Development* 9, no.20 (2018): PP 141-152.
[33]Manyika, W., Gonah, L., Hanvongse, A., Shamu, S. & January, J. (2019). Health Financing: Relationship between Public Health expenditure and maternal mortality in Zimbabwe between the years 1980 to 2010. *Medical Journal of Zambia*, 46 (1), 61 – 70.

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expenditure is a major determinant of maternal mortality in Zimbabwe. The authors, therefore, affirmed that increase in government health expenditure would contribute to significant reduction in maternal mortality, while institutional delivery and the proportion of people living below the Total Consumption Poverty Line (TCPL) were negatively correlated with maternal mortality.

Rana, Alam and Gow[34] documented empirical evidence on the relationship between health expenditure and various health outcomes across countries at different income levels. The authors controlled for the heterogeneity and cross-section dependence in the panel data which comprised 161 countries over the period 1995–2014. Infant, under-five and maternal mortality along with life expectancy at birth were selected as health outcome measures. Cross-sectional augmented unit root, panel autoregressive distributed lag, Dumitrescu-Hurlin and Toda-Yamamoto approach to Granger causality tests were used to investigate the relationship across four income groups. The results indicated that the health expenditure and health outcome link was stronger for low-income as against high-income countries. Also, increasing health spending could reduce child mortality but had an insignificant relationship with maternal mortality at all income levels. It was further noted that lower-income countries were more at risk of adverse effect on health because of negative shocks to health expenditure. Variations in child mortality are better explained by rising health expenditure than maternal mortality. However, the estimated results showed dissimilarity when different assumptions and methods were used. It was concluded that the influence of health expenditure on health outcome varies significantly across different income levels except for maternal health. The study recommended that policymakers should recognise that increase in health expenditure had a small tendency to improve maternal health. Notwithstanding, the authors cautioned that findings of the cross-country panel studies should be interpreted with reservations due to some complexities.

[34]Rana RH, Alam K and Gow J, "Health expenditure, child and maternal mortality nexus: a comparative global analysis", *BMC International Health and Human Rights* 18, no. 29 (2018): PP 1-15.

In a different but related study, Akinci, Hamidi, Suvankulov & Akhmedjonov[35] examined the impact of health care expenditures on selected health outcomes for 19 countries in the Middle East and North Africa (MENA) region. The authors used panel data collected by the WHO and the World Bank for 1990-2010 to estimate the impact of both government and private health care expenditures on infant, under-five, and maternal mortality rates. Pooled ordinary least regression, random effects, and Hausman-Taylor instrumental variable models were used to examine the relationship between health care expenditures and selected health outcomes. After controlling for confounding variables, it was discovered that both government and private health care spending significantly improved infant, under-five, and maternal mortality in the MENA region. Specifically, a percentage increase in per capita government expenditure was likely to reduce maternal mortality by 26.0-26.3 deaths per 100000 live births ($p<0.01$). Similarly, a percentage increase in the log per capita private expenditure reduces the maternal mortality rate by 25.8-25.9 deaths per 100000 live births ($p<0.01$). In conclusion, it was noted that an improvement of the selected health outcomes in the MENA region from 1990 to 2010 mostly was due to government and private health spending on health care.

Drawing from the existing literature bordering on the effect of healthcare expenditure on maternal mortality rate, a couple of panel and time series studies[36]; [37]; [38];[39] have documented positive effects of health expenditure (both public and private) on

[35]Akinci F, Hamidi S, Suvankulov F and Akhmedjonov A, "Examining the Impact of Health Care Expenditures on Health Outcomes in the Middle East and North Africa(MENA) Region", *Journal of Health Care Finance*, (2014), PP 1-23

[36]Maruthappu M, Williams C, Atun R, Agrawal P and Zeltner T, "The association between government healthcare spending and maternal mortality in the European Union, 1981–2010: A retrospective study", PP 1216–1224

[37]Igbinedion SO and Olele EH, "Does Public Health Expenditure promote Health Outcomes in Nigeria?", PP 1–13

[38]Akinci F, Hamidi S, Suvankulov F and Akhmedjonov A, "Examining the Impact of Health Care Expenditures on Health Outcomes in the Middle East and North Africa(MENA) Region", PP 1-23.

[39]Nwankwo CE, "The Effects of Public Health Spending on Maternal Mortality in Nigeria", PP 141-152.

maternal mortality rate. Conversely, a study [40] averred that health expenditure did not significantly influence maternal mortality rate. Importantly, there is still a plausible gap in the literature that require further research involving the impacts of private health expenditure, public recurrent and public capital health expenditure on maternal mortality rate in Nigeria which this very study is conceived to address empirically.

Theoretical Explanations of Health care Expenditure and Maternal Mortality Rate

The authors of this study purposively triangulated two different but complementary theories, namely structural-functionalism and rational choice. Structural-functionalism is rooted in the classic works of Auguste Comte, Herbert spencer, Emile Durkheim and Talcott Parsons. But the theoretical posture of Talcott Parsons is relevant here. According to Parsons, there are basic conditions of existence known as functional prerequisites [41]. It is argued by Parsons that society is a system having four basic functional prerequisites, viz: adaptation, goal attainment, integration and pattern maintenance. Adaptation deals with adapting a system to cope with external environment realities of survival and vice versa. Similarly, goal attainment refers to setting some primary goals and tailoring activities and channeling resources to achieving them through proper prioritisation of resource distribution. Goal attainment corresponds to a political system where a government not only set goals but allocates resources in pursuit of those goals. For example, the budgetary allocation of resources to the health sector in order to guarantee affordable and accessible maternal health services approximates goal attainment. Also, through integration, a system regulates the interrelationship between and among its components in order to minimise conflicts. With respect to pattern maintenance, a system must generate, furnish, maintain and renew both the motivation of individuals and the cultural patterns that generate and maintain that drive. Institutions such as family, education and religion are said to play

[40] Rana RH, Alam K and Gow J, "Health expenditure, child and maternal mortality nexus: a comparative global analysis",PP 1-15.
[41] Haralambos M and Holborn M, "Sociology: *Themes and Perspectives (7th Ed.)*", London: HarperCollins Publishers Limited, (2007): P 250.

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the role of pattern maintenance[42]. Family plays a very crucial role in pattern maintenance, but not without the inputs of mothers who are naturally confronted with the challenge of child delivery in Nigeria. The death of the mother due to pregnancy comes with unfathomable social consequences to the family as well as the society at large. Therefore, the need to have a well-funded and efficient health care system cannot be over-emphasised.

In this study, there is a need to reiterate the importance of goal attainment with respect to resource allocation and the role of the political system. This is because every component of a social system competes intensely for the scarce resources hence the government ought to rationalise its spending to meet the various needs of the people, including health. It is at this point that rational choice theory comes handy. Rational choice is one of the contemporary sociological theories credited to James S. Coleman and George Homans[43] respectively. The theory has a historical root in classical economics, economics sociology and behavioural psychology as underscored by the ideals of utilitarianism and game theory.

It is a derivation of exchange theory which takes an individual actor as the focal point of analysis. The theory proposes that individuals are social actors endowed with the capacity to take goal-oriented rational action that involves "cost-benefit" principle. In this case, rational action entails a methodical evaluation of the various avenues of attaining a goal and the selection of the most suitable means of doing so[44]. The basic issue in the womb of the theory is how the actors co-ordinate their behaviour for the allocation of scarce resources in society. Furthermore, rational choice theory recognises an actor's purposes or intentions that influence his or her action. It also acknowledges the constraint of scarce resources as well as the idea of "opportunity cost" couple with institutional limitations.

[42]Ritzer G, "*Sociological Theory (7th Ed.)*", New York: McGraw-Hill. (2008): P 115.
[43]Ritzer G,P 115.
[44]Haralambos M and Holborn M, "Sociology: *Themes and Perspectives (7th Ed.)*", London: HarperCollins Publishers Limited, (2007): P 250.

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In terms of practical application, an "actor" as used in the rational choice theory connotes policy makers and leaders in charge of the health governance in Nigeria. These leaders or policy makers determine the annual budgetary allocations to the various sectors of the economy, including the health sector. Therefore, the amount of money that is allocated to the health sector annually is a function of the preferences and values of the leaders who are in the corridor of political and economic power. Because of the competing demands for the scarce resources, the leaders according the postulation of the rational choice theorists should apply the basic economic principle of opportunity cost with respect to the funding of the health sector. Since adequate funding of the health sector may implicitly scale up access to maternal health care services, it is expected that the policy makers and leaders in Nigeria should embrace the theoretical orientation of the rational choice theorists in order to stem the tragic tide of maternal mortality rate in the country.

Methodology

This study utilised an ex-post facto research design by relying substantially on secondary data while econometric statistical tools were engaged to assess the impact of health care expenditure (private, public recurrent and capital)on the health outcome denoted by maternal mortality rate in Nigeria. The study further utilised the time series form of secondary data for the period of 16 years, ranging from 2000 to 2015. The data contained private health care expenditure, public recurrent and capital health care expenditure, including maternal mortality rate accordingly. The time series data were obtained from the Central Bank of Nigeria's annual statistical bulletin 2015 and the World Bank reports respectively. To ascertain the time properties of the data, the unit root test was carried out using Augmented Dickey Fuller (ADF). Also, it was done to establish the reliability of the results obtained through the Ordinary Least Square (OLS). Similarly, the Johansen Co-integration test was conducted to determine the long-run relationship between the variables of the study. However, the analysis of the data was aided by the engagement of the Econometric Views (E-Views), version 9 software. Subsequently, Ordinary Least Square (OLS) technique

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was used to estimate the model and to also test the null hypotheses.

Model Specification

The dependent variable in this study is the health outcome denoted by Maternal Mortality Rate (MMR) while the independent or explanatory variable is the healthcare expenditure indicated by Private Health Expenditure (PRHEXP), Health Recurrent Expenditure (HREXP) and Health Capital Expenditure (HCEXP). The study objectives and the hypotheses have been stated earlier while OLS linear regression served as a tool for estimating the model.The application of the OLS statistical technique is based on the inherent strength of its property of Best Linear Unbiased Estimator (BLUE). In this case, the linear equation between the dependent and the independent variables is operationally presented below:

$$MMR = f(PRHEXP + HREXP + HCEXP)$$

$$MMR_t = \beta_o + \beta_1 PRHEXP_t + \beta_2 HREXP_t + \beta_3 HCEXP_t + \mu_t$$

.....*[Model]*

Where:

MMR_t= stands for dependent or outcome variable (Maternal Mortality Rate);

β_o= a constant;

$\beta_1 - \beta_3$= Coefficients of the Independent Variables;

$PRHEXP_t$ = represents independent or explanatory variable (Private Health Expenditure);

$HREXP_t$ = Stands for independent variable (Health Recurrent Expenditure);

$HCEXP_t$ = Stands for independentvariable (Health capital Expenditure);

f = Functional Relationship;

t = Time series and

μ_t = Residual.

Data Presentation

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The Central Bank of Nigeria's annual statistical bulletin contains among other things the country's annual budgetary allocations. Under the expenditure section, there is recurrent as well as capital components. Both the recurrent and capital expenditure on the country's healthcare have been separated for the purpose of this study as contained in table 1 below. In the same manner, the World Bank yearly report on human development index brings to the limelight the performance of the various countries, including Nigeria. In the same table, there is the account of the remodeled maternal mortality rate of Nigeria but this study confined itself to 16 years (2000-2015) because of the favourable results obtained from the diagnostic statistical pre-tests like the unit root, autocorrelation and co-integration.

Table 1: Maternal Mortality Rate (MMR) and Healthcare Expenditure

S/No	Year	MMR (per 1,000 live births)	PRHEXP (₦'Billion))	HREXP (₦'Billion)	HCEXP (₦'Billion)
1	2000	202	75.24243	15.22	27.97
2	2001	215	76.60387	24.52	53.34
3	2002	204	80.07905	40.62	32.47
4	2003	188	84.51541	33.27	55.74
5	2004	189	77.0678	34.2	30.03
6	2005	190	79.58511	55.66	71.36
7	2006	164	79.20033	62.25	78.68
8	2007	171	75.09884	81.91	150.9
9	2008	167	74.45003	98.22	152.17
10	2009	171	77.62708	90.2	144.93
11	2010	166	79.68793	99.1	151.77
12	2011	153	77.22768	231.8	92.85
13	2012	164	75.35071	197.9	97.4
14	2013	159	73.14585	179.99	154.71
15	2014	154	74.39285	195.98	111.29
16	2015	150	73.72928	257.72	82.98

Source: World Bank WDI and CBN annual statistical bulletin (2015).

The descriptive statistics bordering on the private, public recurrent and capital expenditure as juxtaposed with the maternal mortality rate in Nigeria for the period of 16 years are presented in table 2 below. According to the results, the average

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maternal mortality rate (remodeled estimates) stood at 175.4375 deaths per 1,000 women. Also, the maximum maternal deaths stood at 215 while the minimum recorded was 150 within the period under review. On the other hand, the average private healthcare expenditure within the same period was ₦77.06276. Similarly, the minimum and the maximum private health care expenditure accounted for ₦73.14585 billion and ₦84.51541billion respectively. According to table 2, the maximum health recurrent and health capital expenditure between 2000 and 2015 stood at ₦257.72 billion and ₦154.71 billion accordingly. Moreover, the minimum recurrent and capital expenditure by the successive governments of Nigeria stood cumulatively at ₦15.22 billion and ₦27.97 billion respectively while the corresponding average recorded ₦106.16 billion and ₦93.03688 billion for the same period. The findings above are in tandem with some studies that have identified the consistently skewed public health care expenditure in favour of the recurrent component over the years[45];[46]. In the view of Eboh, Akpata andAkintoye[47], private health care expenditure (i.e., out-of-pocket) has continued to dominate the total health care spending in Nigeria. Private health care spending accounts for about 70 % proportion of the country' total health expenditure.

Table 2: Descriptive Statistics on Health Expenditure and MMR

	MMR	PRHEXP	HREXP	HCEXP
Mean	175.4375	77.06276	106.16	93.03688
Median	169	76.83584	86.055	87.915
Maximum	215	84.51541	257.72	154.71
Minimum	150	73.14585	15.22	27.97
Std. Dev.	19.96987	2.983622	79.93599	46.73266
Observations	**16**	**16**	**16**	**16**

[45]Eboh A, Abba JY and Fatoye HA, "Impact assessment of the public health expenditure on the health outcome in Nigeria", PP 62-72

[46]Akubo D, Onoja EE, Eboh A and Attah JA, "Assessing Impact of Government Healthcare Expenditure on Nigerian Economic Growth", PP 734-746, 8th-11th May, 2018.

[47]Eboh A, Akpata GO and Akintoye AE, "Health Care Financing in Nigeria: An Assessment of the National Health Insurance Scheme (NHIS)", PP 24-34.

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Source: Researcher's Computation using E-View Software Version 9

The results in table 3 below using Augmented Dickey-Fuller (ADF) test combined with Akaike Info Criterion (AIC) indicated that the 4 variables (MMR, PRHEXP,HREXP and HCEXP) appeared to be stationary at I(1) accordingly. In other words, Maternal Mortality Rate (MMR), Private Health Expenditure (PRHEXP), Health Recurrent Expenditure (HREXP) and Health Capital Expenditure (HCEXP) became uniformly significant at 1st difference I(1) respectively. By these test results, the study's reliability and validity with respect to its assumptions, findings and conclusions have been established. Subsequently, the long-run relationship between the variables of the study is hereby determined using Johansen co-integration test since the series were integrated of the same order.

Table 3: The Application of Augmented Dickey-Fuller (ADF) Test for Unit Root using Akaike Info Criterion (AIC).

Unit Root Test Result

Variables	Augmented Dickey-Fuller (ADF)	
	Level	Difference
MMR	-	-4.688694**
PRHEXP	-	-4.130825 **
HREXP	-	-4.059120 **
HCEXP	-	-4.207812**

** Significant at first difference I (1).

Source: Researcher's Computation using E-Views software, version 9

Having established the time-series properties of the data in order to avoid unreliable regression results, the study went further to conduct the Johansen multivariate co-integration test in order to determine the co-integrating vector associated with the model. The application of the Johansen test became necessary since the series were integrated of the same order. The result of the Johansen's co-integration test containing the trace statistics as well as maximum Eigen value is presented in the table 4 below. The result from both Trace and Maximum eigen value statistics in the table shows done co-integrating equation as validated by the

probability value of less than 5% level of significance. In other words, it can be stated that there is a long-run equilibrium relationship among the variables.

Table 4: Johansen Co-integration Test
Date: 03/25/19 Time: 11:57
Sample (adjusted): 2002 2015
Included observations: 14 after adjustments
Trend assumption: Linear deterministic trend
Series: MMR PRHEXP HREXP HCEXP
Lags interval (in first differences): 1 to 1

Unrestricted Co-integration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigen value	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.978657	69.47525	47.85613	0.0001
At Most 1	0.473644	15.61706	29.79707	0.7389
At Most 2 *	0.369136	6.632164	15.49471	0.6208
At Most 3*	0.012976	0.182848	3.841466	0.6689
Trace test indicates 1 co-integrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
** Mackinnon-Haug-Michelis (1999) p-values				
Unrestricted Co-integration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen statistic	0.05 Critical Value	Prob.**
None *	0.978657	53.85819	27.58434	0.0000
At most 1	0.473644	8.984896	21.13162	0.8336
At most 2 *	0.369136	6.449317	14.26460	0.5562
At most 3*	0.012976	0.182848	3.841466	0.6689
Max-eigenvalue test indicates 1 co-integrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
** Mackinnon-Haug-Michelis (1999) p-values				

Source: Researcher' Computation using E-Views software version 9.0

Having established the time-series properties of the data in order to avoid unreliable regression results, the authors went further to conduct the Johansen multivariate co-integration test in order to determine the co-integrating vector associated with the model. The application of the Johansen test became necessary since the

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Table 5: Regression Result

Dependent Variable: MMR
Method: Least Squares
Date: 05/21/19 Time: 05:34
Sample: 2000 2015
Included observations: 16

Variable	Coefficient	Std. Error	t-Statistic	Prob.
PRHEXP	-0.977049	0.938978	-1.040545	0.3186
HREXP	-0.188165	0.036156	-5.204302	0.0002
HCEXP	-0.166585	0.056355	-2.955996	0.0120
C	286.2058	75.17856	3.807013	0.0025

R-squared	0.835061	Mean dependent var	175.4375
Adjusted R-squared	0.793826	S.D. dependent var	19.96987
S.E. of regression	9.067600	Akaike info criterion	7.459610
Sum squared resid	986.6564	Schwarz criterion	7.652757
Log likelihood	-55.67688	Hannan-Quinn criter.	7.469501
F-statistic	20.25135	Durbin-Watson stat	1.928157
Prob(F-statistic)	0.000055		

Source: Researcher's Computation using E-Views 9.0

Furthermore, the impact of the health expenditure on maternal mortality rate (remodeled estimates) was subjected to the Ordinary Least Square (OLS) regression test in table 5 above. The Adjusted R-squared (R-2) recorded the determination co-efficient value of 0.793826. The value of the Adjusted R-squared (R-2)

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connotes79% systemic variation of maternal mortality rate (dependent variable). Similarly, the F-statistic of 20.25135 and the statistically significant corresponding p-value of 0.000055clearly proved that the model meets the fitness test requirement and therefore, admissible for reliable conclusions and decision making. The F-statistic equally pointed out that the linear regression explains a significant level of variability between MMR(dependent variable and PRHEXP, HREXP and HCEXP (the independent variables) contained in this study. It could be equally deduced that the F-statistic of 266.5261 is to a large extent significant. Also, the Durbin-Watson statistic result of 1.928157 which could be approximated to 2.00 implied no problem of autocorrelation in the model.

Test of Hypotheses of the Study

In the course of this study, certain hypotheses have been formulated and are subsequently tested using Ordinary Least Square regression (OLS) technique. The hypotheses are stated below:

Ho1: Private Health Expenditure (PRHEXP) does not have any significant impact on Maternal Mortality Rate (MMR) in Nigeria for the period of 16 years (2000-2015).

Ho2: Health Recurrent Expenditure (HREXP) of the government does not impact significantly on MMR in the country for the period under review.

Ho3: Health Capital Expenditure (HCEXP) of the government does not have any significant effect on the rate of the maternal mortality in Nigeria.

The coefficient for the Private Health Expenditure (PRHEXP) and the corresponding probability value as shown in table 5 above are -0.977049 and 0.3186. It can be deduced that private health expenditure has no long-run significant impact on the maternal mortality rate in Nigeria for the period of 16 years being reviewed.On the strength of this result, therefore, the null hypothesis one is accepted or sustained.Also, Health Recurrent Expenditure (HREXP) has the coefficient of -0.188165 with the

probability value of 0.0002. This, however, revealed that health recurrent expenditure showed a long-run significant but negative impact on the maternal mortality rate in the country as validated by the p-value of 0.0002, which is less than 5% as a rule. Relying on this result, the null hypothesis two is rejected. Furthermore, Health Capital Expenditure (HCEXP) with the coefficient of -0.166585 and the P-value of 0.0120 in table 5 above revealed the presence of a long-run significant but negative effect on the maternal mortality rate in Nigeria. Premised on this result, the null hypothesis three is rejected.

Discussion of Findings

Maternal mortality issue in Nigeria has continued to generate serious concern in the population health discourse. Several suggestions have been offered as capable of stemming this negative tide. However, a special consideration is placed on the efficient health care delivery system with its associated funding. It is, therefore, important in this context to assess the impact of the combined impact of public and private health care expenditure on the maternal mortality rate in Nigeria, the very issue that this study has addressed. Specifically, it has been revealed in this study that Private Health Expenditure (PRHEXP) had no long run significant impact on the maternal mortality rate in Nigeria for the period of 16 years. In other words, when other factors that determine maternal mortality rate are held constant, a ₦1 increase in the private health expenditure will lead to -0.977049 increase in the maternal mortality rate for the period under consideration. This discovery sustains the finding from the panel study conducted by Rana, Alam and Gow[48] where increasing health spending had an insignificant relationship with maternal mortality. However, this finding is at variance with a couple of similar studies[49]; [50] where increased public and private health expenditure showed a decline in maternal mortality rate.

[48]Rana RH, Alam K and Gow J, "Health expenditure, child and maternal mortality nexus: a comparative global analysis", PP 1-15.
[49]Igbinedion SO and Olele EH, "Does Public Health Expenditure promote Health Outcomes in Nigeria?",1–13.
[50]Akinci F, Hamidi S, Suvankulov F and Akhmedjonov A, "Examining the Impact of Health Care Expenditures on Health Outcomes in the Middle East and North Africa (MENA) Region", PP 1-23.

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Specifically, Akinciet al.[51] revealed that both government and private health care spending significantly reduced maternal mortality in the MENA region.Also, this study has discovered that health recurrent expenditure had a long-run significant but negative impact on the maternal mortality rate in the country. This implies that a 1₦ increase in the health recurrent expenditure will reduce the rate of maternal mortality by 0.188165.The finding is in agreement with the works of the authors like Maruthappu, Williams, Atun, Agrawal and Zeltner[52]; Nwankwo[53]; Manyika, Gonah, Hanvongse, Shamu and January[54] respectively. For example, Maruthappu et al.[55] discovered in their study that an annual 1% reduction in government health expenditure was associated with significant rise in maternal mortality rates.In the same way, it has been revealed from this very study that health capital expenditure had a long-run significant but negative effect on the maternal mortality rate in Nigeria. That is, "other things being equal", a unit increase in the health care capital expenditure by the government will produce -0.166585reductions in the maternal mortality rate in the country. This sustains the empirical study finding of Manyika et al (2019)[56] where government health expenditure had a statistically significant association with maternal mortality, with the converse being the case.

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[51]Akinci F, Hamidi S, Suvankulov F and Akhmedjonov A, "Examining the Impact of Health Care Expenditures on Health Outcomes in the Middle East and North Africa (MENA) Region", PP 1-23.

[52]Maruthappu M, Williams C, Atun R, Agrawal P and Zeltner T, "The association between government healthcare spending and maternal mortality in the European Union, 1981–2010: A retrospective study", PP 1216–1224.

[53]Nwankwo CE, "The Effects of Public Health Spending on Maternal Mortality in Nigeria", PP 141-152.

[54]Manyika W., Gonah L, Hanvongse A, Shamu S and January J, (2019)."Health Financing: Relationship between Public Health expenditure and maternal mortality in Zimbabwe between the years 1980 to 2010", PP 61 – 70.

[55]Maruthappu M, Williams C, Atun R, Agrawal P and Zeltner T, "The association between government healthcare spending and maternal mortality in the European Union, 1981–2010: A retrospective study", PP 1216–1224.

[56]Manyika W., Gonah L, Hanvongse A, Shamu S and January J, (2019)."Health Financing: Relationship between Public Health expenditure and maternal mortality in Zimbabwe between the years 1980 to 2010", PP 61 – 70.

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Conclusions and Policy Implications

This study provides insightful findings and information about the cumulative and combined impact of the health expenditure on the maternal mortality rate in Nigeria. The interesting thing about this study is the fact that it has been able to break down health expenditure in Nigeria into private, public recurrent and public capital health spending components. Beyond the classification of the health care expenditure, the study was able to examine the effects of the health expenditure components on maternal mortality rate simultaneously. It is clearly revealed from the findings that the health recurrent expenditure had the most positive significant impact on the maternal mortality rate among the components. However, the impact of the private health expenditure on the maternal mortality was insignificant for the period under investigation.

Arising from the findings of this study, it is recommended that the federal government of Nigeria should step up the recurrent component of the annual budgetary allocation to the health sector. This should also be intensely complemented by the state and local governments respectively. Moreover, there should be proper monitoring of the budgeted monies disbursed to the various tiers of the health care system in order to avoid diversion or misappropriation. Ipso facto, the real impact of the health expenditure will be tangibly felt. Governments at all levels should continue to widen access to the maternal health care services, especially among the indigent rural populace. As much as possible, maternal health care services should be made free throughout the country as it might reduce substantially the burden of maternal deaths in Nigeria.

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