Reproductive Health and National Output in Nigeria

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Abstract

The study investigates the effect of reproductive health on national output from 1990 to 2021. Reproductive health is proxied by access to contraceptive, access to family planning, skilled birth attendant, patient per physician ratio. While gross domestic product is used as proxied for national output. Maternal mortality, out of pocket expenditure on health and government expenditure on health are control variables. The variables were sourced from Central Bank Statistical Bulletin, National Bureau of Statistics and Federal Ministry of Health. The variables were subjected to unit root test using the Augmented Dickey Fuller (ADF) test and the result shows that they were integrated of a mixed order 1(1) and 1(0). This justify the used of autoregressive distributed lagged technique in analyzing the data. The finding established that long-run relationship exist among the variables. Access to family planning, skilled attendant and patient per physician ratio contributed to increase in national output. However, access to contraceptive and maternal mortality contributed to decline in national output. The study concluded that reproductive health is a major determinant of national output. Thus, the study recommended that government should create awareness on the use of contraceptive and pregnant women should be encourage to see medical personnel through free antenatal and postnatal care.

Key Words: national Output and Reproductive Health, Family Planning, Maternal Mortality, medical Personnel

Introduction

Evidence from recent empirical exposition has identified the significance of reproductive health in promoting national development in developing and more developed countries. This exposition is evidence in the famous Sustainable Development Goal (SDG, 3) report

which has it that women reproductive health status is fundamental to sustainable development. Attaining the basic sustainable development goal (SDG, 3, 5, 8) requires that women health, time and resources be giving adequate attention. In view of the above, the world health organization defined the term reproductive health (RH) as the ability and capability of woman to have safe sex life and the ability to take independent decision that has to do with their ability to reproducing themselves. Hence, women need to have safe sex and independent decision to be able to make children which in the long-run when gainful employ increase national output. Though the health of both men and women are of importance to the world but the health of women is of great importance because they are more vulnerable than men owing to gender imbalance in decision making across the world (Shaw, 2004). Mishra et al (1998); was of the view that reproductive health among women in developing countries hasn't been effectively or realistically pursued despite the many policies and programmes that have been put in place. Adjudicating on the world health organization (WHO, 1999) report, morbidity, sexually transmitted infection (STI) and HIV contributes to about 20 percent of death among women in the world (Pillai & Maleku, 2013). The reproductive health gap between the developed countries and developing countries has remained very high. The World Bank report (2001) has it that the lifetime risk of maternal mortality is about one in thirteen in sub-Saharan African and as low as one in two thousand in United State of America. The global perception on the link between reproductive health and national output become lucid following the international conference on population and development (ICPD) which was held in Cairo, Egypt in 1994 Agan et al., (2018).

The reproductive health status in Nigeria is worrisome and undoubtedly constitute an un-spoken assault on women with it attendant consequences given the patrimonial nature of the country and its traumatized economy. The Nigeria economy is said to be characterized by an inherent infringement of the sexual and reproductive right of women resulting in unsaved motherhood; unsafe abortion; traditional harmful practices as amplified by early marriage, widowhood rites, female disinheritance, and female genital cutting; gender inequality; and violence against women, sexual and reproductive right abuses (MDG, 2009).

Notwithstanding the multitude of reproductive health programmes and policies that are in place in developing countries, reproductive health gains among women have remained poor during the last three decades (Mishra et al., 1998; Miller & Rosenfield, 1996). Each year, an estimated 585,000 women worldwide die from unsafe abortion, pregnancy complications and risky childbirth and more than 50 million women worldwide also suffer

from the long-term effects of ill health during the course of family building (Ransjo-Arvidson et al., 1998; Sai & Nassim, 1989).

Regardless of the implementation of the various health care policies and programmes heralding the improvement in reproductive health of women, the national output has remained low when compared with those of other nations in developed countries. Hence, this paper examined the effect of reproductive health on national output in Nigeria.

The rest of the paper is divided into six sections, after the introduction is the conceptual clarifications in section two, which is followed by theoretical literature in section three and empirical literature in section four. Section five is the method of study, followed by data analysis and discussion of result in section six. Section seven is conclusion and recommendations.

2. Conceptual Clarifications

2.1 Reproductive Health

Reproductive health is more than just the absence of disease or infirmity; it is a state of total physical, mental, and social well-being (World Bank, 2018). Reproductive health implies that people are able to have a enjoyable and safe sex life, as well as the ability to reproduce and the freedom to choose if, when, and how frequently to do so. However, in this study we adopted Felix (2020) definition of reproductive health, which is an embodiment of all health care services provision (access to contraceptive prevalence, access to family planning, skilled birth attendant, and patient- physician ratio) that enhances safe motherhood, and aid in preventing maternal death,

2.1.2 National Output

National output as used in this paper refers to the Naira value of final goods and services produced within the country and sold within one year. As the national output increases, it implies the particular economy is growing. There various ways of measuring national output, but that is the main thrust of this paper.

Theoretical Literature

Grossman Model of Health Demand

The **Grossman model of health demand** is a model for studying the demand for health and medical care outlined by Michael Grossman in a monograph in 1972 entitled: *The Demand for Health: A Theoretical and Empirical Investigation*. The model based demand for medical care on the interaction of a health demand function and a health production

function. Andrew Jones, Nigel Rice, and Paul Contoyannis call the model the "founding father of demand for health models, (Jones, et al., 2012).

In this model, health is a durable capital good that is inherited and depreciates over time. Investment in health takes the form of medical care purchases and other inputs, and depreciation is interpreted as a natural deterioration of health over time Grossman (1972). In the model, health enters the utility function directly as a good people derive pleasure from and indirectly as an investment that makes more healthy time available for market and non-market activities. Jones, Rice, Nigel, and Contoyannis (2012) asserted that the model creates a dynamic system of equations which can be cast as an optimization problem where utility is optimised over gross investment in health in each period, consumption of medical care, and time inputs in the gross investment function in each period. In this way, the length of life of the agent is partially endogenous to the model.

The Grossman model was extended in a number of directions. Among the first to include uncertainty in the model were Charles Phelps and Maureen Cropper (Phelps, 1976; Cropper, 1977). The relationship between education and health was expanded in the model by Isaac Ehrlich. Regarding the relationship between education and medical care demand, one important question is whether the marginal efficiency of capital elasticity with respect to education is less than or greater than one. If the curve is elastic (elasticity greater than one), education will increase medical care demand. On the other hand, if the curve is inelastic, education will decrease medical care demand, according to Jones, Rice, Nigel, and Contoyannis (2012).

Empirical Literature

Götmark and Andersson (2020) examined the effect of fertility on social-economic factors such as; education (mean school years for females), economy (Gross Domestic Product, GDP, per capita), religiosity, contraceptive prevalence rate (CPR), and strength of family planning programs. The study revealed that fertility (TFR) correlates negatively with education, CPR, and GDP per capita, and positively with religiosity. Also, total fertility (TFR) increases with education and decreases with religiosity in Europe. TFR decreases with increasing strength of family planning programs in three regions, but only weakly in the fourth, Sub-Saharan Africa (the two European regions lacked such programs). Hence, the study concludes that most factors that are correlated with TFR are also correlated with each other and helps to identify factors of likely importance for TFR in global regions and countries. More work is needed to establish the causality and relative importance of the factors.

Bomela (2020) examined the relationship between maternal mortality and sociodemographic factors in South Africa. Data were obtained from the vital registration database of Statistics South Africa. About 14,892 maternal deaths of women from 9 to 55 years of age were analysed using frequency tables, crosstabulations, and logistic regression. Maternal mortality ratio (MMR), by year, age group, and province for the years 2007–2015 was calculated. The result shows that in 2007–2015 MMR was 139.3 deaths per 100,000 live births (10,687,687 total live births). The year 2009 had the highest MMR during this period. Specific province MMR for three triennia (2007–2009; 2010–2012; 2013– 2015) shows that the free state province had the highest MMR (297.9/100000 live births; 214.6/100000 live births; 159/100000 live births) throughout this period. MMR increased with age. Although the contribution of the direct causes of death (10603) was more than double the contribution of indirect causes (4289) maternal mortality showed a steady decline during this period. Conclusively, variations in the causes of death among different socio-demographic subgroups. These variations indicate that more attention has to be given to the role played by socio-demographic factors in maternal mortality.

Kuhn and Prettner (2018) explore mortality reductions' impact on consumption growth as a demand-side driver. In overlapping generations economies, a reduction in the average death rate leads to greater consumption growth if the average consumption of those who die exceeds per capita consumption across the population. This condition is typically satisfied if consumption increases with age up to age groups that exhibit significant mortality. The study employs data from the National Transfer Accounts to show that this holds for countries such as Finland, Germany, Japan, and the United States. Models of learning-by-doing spill overs or human capital accumulation as exclusive drivers of long-run growth do not leave room for technological progress to explain economic growth.

Prettner (2013) introduces an overlapping generations structure with age-independent mortality into the research and development (R&D)-driven (semi-)endogenous. His finding showed that increasing life expectancy has an unambiguously positive effect on technological progress and long-run economic growth in the cases of both endogenous and semi-endogenous growth. The central mechanism is that increasing life expectancy results in higher aggregate savings, which puts downward pressure on the equilibrium interest rate. This in turn raises the discounted stream of income derived by investing in successful R&D projects. Consequently, the incentive to carry out R&D increases, which boosts technological progress and long-run economic growth.

Rosendo et al., (2017) examined the prevalence of maternal morbidity and its association with socioeconomic factors, using a cross-sectional study conducted based on a multi-stage

complex sampling. The finding shows that the prevalence of maternal morbidity was estimated at 21.2 per, cent and that socioeconomic status remained significant in maternal mortality and that women in a worse socioeconomic situation had a higher prevalence of maternal morbidity.

Onarheim et al., (2016) investigate the economic benefits of investing in women's health using the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines, the study systematically reviewed health, gender, and economic literature to identify studies that investigate the impact of women's health on micro-and macroeconomic outcomes. A total of 10 unique databases spanning the timeframe 01/01/1970 to 01/04/2013 were used. The study revealed that healthier women and their children contribute to more productive and better-educated societies. In summary, the study documents extensive literature confirming that women's health is tied to long-term productivity: the development and economic performance of nations depends, in part, upon how each country protects and promotes the health of women. Hence, it was recommended that the government should provide opportunities for deliberate family planning, health, and productivity of subsequent generations to boost societal development.

Ukegbu,(2014) explored the pattern of maternal health (MH) services utilization and the socio-demographic factors influencing it in Anambra State, southeast Nigeria. A total of 310 women of reproductive age with a previous history of gestation attending ANC services between September 2007 and August 2008 in selected Primary Health Centers in Anambra State were studied. Responses were elicited from the study participants using a pre-tested, semi-structured interviewer-administered questionnaire. Data collected were analyzed using Statistical Package for Social Sciences (SPSS) version 17 (SPSS Inc, Chicago Illinois, USA). Association between socio-demographic characteristics and pattern of utilization of ANC and delivery services was measured using $\chi 2$-test, Regression analysis revealed that factors associated with utilization of MH services used of health facility were 293 (97.0%) and 277 (92,7%) out 302 women for ANC and delivery services respectively. Also, most women attended their first ANC consultation during the preceding pregnancy was after the first trimester and about 31% (94/298) of them had <4 ANC visits before delivery. Socio-demographic factors were found to be significantly associated with places where MH care services are accessed. Parity was found to be associated with the timing of ANC booking and the number of ANC attendant ($\chi 2 = 9.49$, $P = 0.05$).

Model Specification

This paper adopts the modified version of Peter and Ahuru (2017) model. Their study examined the socioeconomic effect of reproductive health and health outcomes in Nigeria. Their study used under-five death count, maternal death count, per capita income, malaria widespread rate, Gini index, and corruption perception index in estimating a VAR model of the form below:

$Vt= \alpha + \sum AiVt\text{-}I + Ut$

Vt = (U-5 MR, MMR, MPR, GINI, CPI)

Where:

Vt = the vector of the logarithm of Under-five death rate, maternal death rate, per capita income, malaria prevalent rate, Gini index, and corruption perception index).

α = Intercepts of autonomous variables

Ai = Matrix of coefficients of all the variables in the model

Ut = Vector of the stochastic error terms

But the model specification of this paper is express in the functional form as follows:

GDI= f(ACC, AFP, SBA, MMR, GHE, OPH, PPP)

The econometric form of the above expression is estimated as thus:

$lnGDP= \alpha 0+\beta_1 ACC\ t+\beta_2 AFP\ t+\beta_3 SBA\ t+\beta_4 MMR\ t+\beta_{5ln} GHE\ t+\beta_{6ln} OPHt+\ \beta_7 PPP\ t+\ \mu t$

GDP = Gross Domestic Product as proxy for National Output

ACC = Female Access to Contraceptive

AFP = Female Access to Family Planning

SBA = Skilled Births Attendant

MMR = Maternal Mortality Ratio

lnGHE = Government Expenditure on Health

InOPH = Out of Pocket Expenditure on Health

PPP = Patience Per Physicians Rate

3.3.1 Description/Measurement of Variables in the Model

3.3.1.1 Dependent Variable

National Output: National output is the total market value of all final goods and services produced and sold during a particular year. When we measure national output, we add together the naira selling amounts of all the things that we have sold. In this study, national output is measured with the annual gross domestic product.

Independent Variables

Female Access to Contraceptive: This refers to number of women that have access to contraceptive drugs. Its expected that increase in female access to contraceptives will reduce national output in Nigeria.

Female Access to family planning: This measures female access to safe and voluntary family planning. When women and couples are empowered to plan whether and when to have children, and how many, women are better enabled to complete their education; women's autonomy within their households is increased; and their earning power is improved. A positive relationship exist between access to family planning and National Output.

Skilled Birth Attendant: Births attended by skilled health staff are the percentage of deliveries attended by personnel trained to give the necessary supervision, care, and advice to women during pregnancy, labour, and the postpartum period; to conduct deliveries on their own; and to care for new born. It's expected that, skilled birth attended will have a positive effect on national output.

Maternal mortality ratio: The maternal mortality ratio (MMR) is defined as the number of maternal deaths during a given time period per 100,000 live births during the same time period. Its expected to have a native effect on national output.

Government Expenditure on Health: Public expenditure on health refers to *expenditure on health care incurred by public funds. Increase in government expenditure will increase national output.*

Out of pocket Expenditure on Health: This are expenses for medical care that aren't reimbursed by insurance. Out-of-pocket costs include deductibles, coinsurance, and co-payments for covered services plus all costs for services that aren't covered. Its expected to increase national output in the long run.

Patience per Physicians Rate: Physician to patient ratio is one of the important normative population-based indicators to measure this imbalance. It equals to the entire number of physicians in a healthcare organization dividing its patient volume within a certain period (e.g., a year). Its expected to increase national output.

Sources of Data Collection

The data for this paper is sourced from the Central Bank of Nigeria statistical bulletin (several years), National Health Insurance Scheme, National Bureau of Statistics, and Federal Ministry of Health annual release for the period covering 1980 to 2021.

Method of Data Analysis

The augment dickey fuller unit (ADF)root test is used for the pre-estimation test. The autoregressive distributed lagged technique is adopted in analysing the data, given that the unit root result of mixed order.

Empirical Analysis

Table 1: Stationarity Test (Unit Root Test)

S/N	Variables	Level		First Diff.		Order of Integration
		T-Stat.	Critical Value	T-Stat.	Crit. Value	
1.	ACC	4.915588	-3.568379	-	-	1(0)
2.	AFP	-2.254775	-3.568379	-5.472527	-3.574244	1(1)
3.	MMR	-2.761198	-3.568379	-5.452028	-3.632896	1(1)
4.	SBA	-1.789500	-3.568379	-4.625761	-3.574244	1(1)
5.	PPP	-2.425865	-3.574244	-5.888860	-3.632896	1(1)
6.	OPH	-2.549745	-3.568379	-6.773852	-3.574244	1(1)
7.	LOG(GDP)	0.417294	-3.568379	-3.674744	-3.574244	1(1)
8.	LOG(GHE)	-1.289842	-3.568379	-6.437352	-3.580623	1(1)

Source: Author's compilation from Eview10.

Table 1 illustrates the summary of the stationarity test conducted with the Augmented Dickey Fuller (ADF) unit root testing approach for the effect of reproductive health on national output in Nigeria. According to the result, all the variables in the model became stationary after first differencing, except female access to contraceptives (ACC). This means that ACC was stationary at level or is mean reverting. Given, the above result the researchers adopt the autoregressive distributed lag (ARDL) model of Pesaran, Shin, and Smith (2001).

Test for Cointegration

Table 2: ARDL Bounds Cointegration Result

Null Hypothesis: No long-run relationships exist

Test Statistic	Value	K
F-statistic	19.18939	7
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.03	3.13
5%	2.32	3.5
2.5%	2.6	3.84
1%	2.96	4.26

Table 2 illustrates the ARDL bound cointegration result for the empirical examination of the effect of reproductive health on national output in Nigeria for the period spanning 1990–2021. A critical look at the table shows that the f-statistic is 19.18939, while the upper bound of the critical limit is 3.5. Therefore, the null hypothesis, which states that there is no long-run relationship among the variables in the model, is hereby rejected, while the alternative hypothesis is accepted. There is a long-run relationship among the variables in the model, or there is convergence in the future. Since there is a long-run relationship, we proceed to estimate the ARDL long run and the error correction or short run regression.

Table 3: Long-Run Result

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ACC	-0.133382	0.036252	3.679321	0.0103
AFP	0.044158	0.025702	1.718060	0.1366
MMR	-0.002151	0.001033	-2.082300	0.0825
SBA	0.006950	0.001750	3.971818	0.0074
PPP	0.068380	0.137612	0.496901	0.6369
LOG(GHE)	0.974523	0.076674	12.710037	0.0000
LOG(OPH)	-0.065441	0.939198	-0.069678	0.9467
C	-1.613045	3.367734	-0.478971	0.6489

4 : Error Correction Result

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLOG(GDP(-1))	1.456176	0.199761	7.289577	0.0003
D(ACC)	-0.014843	0.021967	-0.675710	0.5244
D(ACC(-1))	0.207607	0.033419	6.212237	0.0008
D(AFP)	0.080008	0.021187	3.776233	0.0092
D(AFP(-1))	0.015269	0.009347	1.633527	0.1535
D(MMR)	-0.001418	0.000422	-3.360426	0.0152
D(MMR(-1))	-0.000390	0.000300	-1.298272	0.2419
D(SBA)	0.000732	0.000648	1.129368	0.3019
D(SBA(-1))	0.008261	0.001807	4.570266	0.0038
D(PPP)	0.449464	0.112808	3.984325	0.0072
DLOG(GHE)	0.426449	0.059093	7.216625	0.0004
DLOG(GHE(-1))	-0.118496	0.038421	-3.084113	0.0215
DLOG(OPH)	0.247642	0.354950	0.697682	0.5115
DLOG(OPH(-1))	1.705983	0.387345	4.404297	0.0045
CointEq(-1)	-0.799870	0.116846	-6.845486	0.0005

R-squared	0.899825	Mean dependent var	9.915094
Adjusted R-squared	0.899185	S.D. dependent var	1.525940
S.E. of regression	0.043554	Akaike info criterion	-3.418945
Sum squared resid	0.011382	Schwarz criterion	-2.334538
Log likelihood	72.57470	Hannan-Quinn criter.	-3.079322
F-statistic	1561.968	Durbin-Watson stat	2.225714
Prob(F-statistic)	0.000000		

Discussion of Short-Run and Long-Run Results

Table 4 illustrates the error correction regression or the short-run link among the dependent variable (GDP) and the independent variables (reproductive health indices).

Statistically, the coefficient of determination, or the adjusted R^2 is 0.899185. Meaning approximately that 90% of the variation in national output is caused by the interplay of

variables in the model, while the remaining 10% was externally determined or captured in the error term. The f-statistic value of 1561 and its significant probability value of 0.00000 indicate that the entire model has a good fit. Akaike's information criterion of -3.418945 is the best information criterion for the model. The error correction term appeared with the normal sign, and it is statistically significant at 5%. Therefore, the past disequilibrium will herald a long-run equilibrium at an annual speed of 80%, given the error term value of 0.799870.

Drawing from the long-run output in table 3, female access to contraceptives (ACC) has a reducing effect on national output proxied by gross domestic product (GDP), whereas its one-year lag-value causes an increase in national output in the short-run in table 4. Therefore, we assert that female access to contraceptive usage in Nigeria has an unstable impact on national output, but its greatest impact is on the short-run (temporal) effect of 0.207607 (21% growth) in the presence of government expenditure and personal health expenses. Therefore, for access to reproductive health to have stable effect on national output, there should be an impulse or touch from the government and individual users of the health facilities. On the side of the government, they are to provide the required health facilities, like medical equipment and regulations, and work incentives and motivation, while the individual consumers of the health care system pay for medical services. This can be traced to the Grossman health demand and consumption hypothesis. Hence, the null hypothesis is rejected while the alternative hypothesis is accepted. This is consistent with the work of Ukegbu (2014) but contradicts the views of Mishal (2016)

Inferences drawn from the long-run estimated equation show that female access to family planning has an insignificant effect on national output, while in the short-run it causes an increase of 8%. This means that access to family planning has a temporal effect on national output, thereby conforming to theoretical expectation, and the possible reason one can give could be that as more women have access to family planning the rate of maternal mortality decline and the number of maternity leaves reduce thereby increasing national outputs in Nigeria, this findings is in line with Thomas (2017) Therefore, the null hypothesis, which states that there is no statistically significant relationship between access to family planning and national output, is rejected while the alternative hypothesis is accepted. Access to family planning increases national output by 8% in the short run.

Drawing from the long-run, output, maternal mortality rate (MMR) has an insignificant declining effect on national output, but in the short-run, it decreases national output by 0.001418 and it is statistically significant. Therefore, an increase in maternal mortality rate (MMR) will, all things being equal, decrease national output by 0.001418 (0.1%) in the short

run. This temporal negative disposition is consistent with theoretical or priori expectation, the implication is that as more women died through child bearing her contribution to national output is loss, hence the decrease in national output. On the other hand as more women died through child bearing no one to cater for the children so they are forced out of school, and this truncated their human capital development. Hence the end result is a decrease in national output, because their own contribution to the economy is loss. This finding supports that of Felix (2020) who stipulated that an inverse relationship exist between maternal mortality and gross domestic product in Nigeria.

Inferences drawn from the long-run ARDL output show that patient per physician ratio affects national output positively but not significant, while in the short-run a positive and significant relationship exist between patient per physician ratio and national output by 0.449464. Therefore, an increase in the patient per physician ratio in Nigeria will, all things being equal, result in a 44% increase in national output as the patient per physician ratio expands, this is in line with theoretical underpinning. The reason for this is that as more women deliver safely in health facility, the rate of maternal mortality decline, and also the rate infant mortality also decline, providing us with more hand to work. The end result is increase in national output all thing being equal.

Therefore, the null hypothesis, which states that patient per physician ratio has no statistically significant link with national output, is hereby rejected while the alternative hypothesis is accepted. PPP has a positive or increasing impact on national output in the short run.

A critical look at the long-run output indicated that an increase in skilled birth attendant promotes national output by 0.006950, in the long run and its lag value increased national output by 0.008261 in the short run. The implication is that as more women delivered in the hands of trained nurses and midwife the rate of maternal mortality and infant mortality decline. This declined in maternal and infant mortality will boost national output both in the long run and short run as it help to increase the volume of human capital in the country.

In the long run, government expenditure on health (GHE) increases national output by 0.974523, while in the short run it has an unstable impact on it. This implies that government health expenditure improves reproductive health and contributes in boosting national output. Hence, the null hypothesis is hereby rejected while the alternative hypothesis is accepted. Government health expenditure has an impact on national output used although it is used as a control variable in the reproductive health equation. Hence, the null hypothesis of no statistically significant relationship is hereby rejected, while the

alternative hypothesis is accepted. Government health expenditure is a determinant of national output.

Finally, out-of-pocket expenditure on health (OPH) at lagged period one also a control variable has a positive effect on national output in the short run. That is a per centage increase in OPH will increase national output by 1.705983 in the short run all things being equal.

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