



## REPRODUCTIVE HEALTH MANAGEMENT AND MATERNAL MORTALITY IN NIGERIA

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### ABSTRACT

Pregnancy is a perilous journey for women of reproductive age in Nigeria, and socio-economic, cultural and health care factors, impose challenges for these pregnant women. Given, the constellation of these factors, maternal mortality is often the end result of pregnancy. Thus, this study examines the effect of reproductive health on maternal mortality in Nigeria. Time series data from 1985 through 2019 were obtained from the Central Bank Statistical Bulletin and World Bank data bank. Autoregressive Distributed Lag (ARDL) model was adopted as the estimation technique because the variables were integrated with mixed order of integration 1(0) and 1(1). The result established that female access to contraceptives, family planning, skilled birth attendant and patient per physician influence maternal mortality negatively both in the long-run and short-run periods. However, the above study concludes that reproductive health brings about decline in maternal mortality in Nigeria. Hence, the study recommends that antenatal and postnatal care be given freely without any user charge attach to pregnant women and nursing mothers.

**Keywords:** Maternal, Mortality, Reproductive, Health, Management, Nigeria.

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### INTRODUCTION

The issue of reproductive health emerged in development discourse following the International Conference on Population and Development (ICPD) held in Cairo, Egypt, in 1994. The conference (ICPD) also heralded women's sexual and reproductive rights, and instituted the framework for the development of the United Nations Millennium Development Goals (MDGs) in 2000. Several countries in Sub-Saharan Africa including Nigeria have been observed to be guilty of infringement on the sexual and reproductive rights of women. For example, unsafe motherhood, unsafe abortion, traditional harmful practices of early marriage, female genital mutilation and violence against women are notable areas of women's sexual and reproductive rights abuses in Africa and indeed in Nigeria. The matter is worse giving the incessant kidnapping of women, rape cases and attack by militia in the North. It is perhaps against this background that at least four of the eight MDGs have a direct connection with reproductive health which includes: to promote gender equality, empowerment of women, reduce child mortality by three quarter and improve maternal health. These goals represent well-designed reproductive health and rights' violation remedial measures for the women, a

response to improve reproductive health and reduce maternal mortality (Adinma & Adinma, 2011).

Following the global goals on the issue of health, reproductive or maternal health services became a fundamental right of every woman. As part of efforts to improve reproductive health and reduce maternal mortality, the Federal government in its health institutions has established free maternal health services for women in the areas of antenatal care, delivery, and family planning to all women of child bearing age, together with strengthening of immunization services for women and children to facilitate total immunization coverage as was recommended for all States in the federation (Nigeria). There is no gainsaying that low quality of health services, manifesting in inadequate funding, poorly motivated workforce, and lack of drugs and modern equipment may affect negatively the quality of life and rendered safe mother a wild goose chase.

To overcome the above it is imperative to improve the overall health care system, and services as to strengthen primary health care services, as well as re-position secondary and tertiary health care services to meet the challenges of reproductive health especially safe motherhood. In line with Adinma and Adinma (2011), Nigeria regrettably has one of the world's worst reproductive health indices. For example, Nigeria accounts for 10 % of the world's maternal deaths, next to India a figure that is disproportionate to the proportion of her ratio to the world's population.

Maternal mortality, also known as maternal death, continues to be the major cause of death among women of reproductive age in many countries and remains a serious public health issue especially in developing countries (WHO, 2007). Globally, the estimated number of maternal deaths worldwide in 2017 was 295,000 out of this Sub-Saharan Africa alone accounted for 196,000 (WHO, 2017). According to WHO Factsheet (2019), 801 women die from pregnancy or pregnancy-related complications every day. Most of these deaths occur in developing countries, and most are avoidable. Of all the health statistics compiled by the World Health Organization, the largest discrepancy between developed and developing countries occurred in maternal mortality. Ujah et al. (2005) noted that while 25 percent of females of reproductive age lived in developed countries, they contributed only 1 percent to maternal deaths worldwide. A total of 99 percent of all maternal deaths occur in developing countries. More than half of these deaths occur in sub-Saharan Africa and one third in South Asia. The maternal mortality ratio in developing countries is 450 maternal deaths per 100,000 live births versus 9 in developed countries.

In Nigeria for instance, maternal mortality accounts for 59,000 deaths of women annually. Arguably, Nigerian women are 500 times more probable to lose their lives in childbirth when compared to most advanced nations of the world and ranked second later. The prevalence of maternal mortality in Nigeria has become very disturbing as every birth procedure becomes a potential death threat to both the mother and the foetus. From the report above, there is at least one case of maternal mortality in every 20 live births.

Evidence suggests that most low and middle income countries (LMICs) including Nigeria were not able to meet the targets of the health-related MDGs of reducing the maternal mortality ratio (MMR) by 75% between 1990 and 2015 (WHO, 2015). Indeed, by 2015, the WHO reported an estimated decline in the global MMR of 45% in that period to 210 deaths per 100,000 live births, far short of the 75% reduction goal. Following the MDGs, the sustainable development goals (SDGs) set a target of lowering the MMR to 70 per 100,000 live births, as part of SDG 3's goal to 'Ensure healthy lives and promote wellbeing for all at all ages'. Shah and Say (2007) noted that the trend in developing countries is much worse, as studies from various countries of sub-Saharan Africa indicate that maternal mortality has not only continued to be high, but is indeed increasing. In fact, Nigeria has remained one of the

countries with poor reproductive health system and highest maternal mortality rates in the world after India.

Previous scholars Adinma and Adinma (2011), Akukokuwebe and Okafor (2017), and Felix (2018) examined the impact of reproductive health on socioeconomic development in Nigeria and also maternal health and implication for sustainable transformation in Nigeria. However, no study known to the researcher has examined the effect of reproductive health on maternal mortality in Nigeria. In view of the forgoing, this study examines the effect of reproductive health on maternal mortality in Nigeria.

## **CONCEPTUAL CLARIFICATIONS**

### **Reproductive Health**

This is defined as the state of complete physical, mental and social wellbeing and not the absence of disease or infirmity in all matters relating to the reproductive system and to its functions and process (World Bank, 2018). Reproductive health therefore implies that people are able to have satisfying and safe sex life and that they have the capability to reproduce and the freedom to decide if, when and how often to do so. Implicit in this last condition are the right of men and women to be informed and to have access to safe, effective, affordable and acceptable methods of family planning of their choice, as well as other methods of their choice for regulation of fertility which are not against the law, and the right of access to appropriate healthcare services that will enable women to go safely through pregnancy and childbirth and provide couples with the best chance of having a healthy infant. However, in this study we define reproductive health as the embodiment of all health care services provision that enhance safe motherhood and aid in preventing maternal mortality.

### **Maternal Mortality**

This is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and time of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes (Shah & Say, 2007). In this study maternal mortality simple mean the death of a woman emanating from pregnancy complications per 100,000 live births.

## **THEORETICAL FRAMEWORK**

### **Gender Stratification Theory**

Gender stratification theory was propounded by Collins Rogers in 1971. It attempts to explain gender linked differences in privilege and power in society. This theory “can be used to argue that societies in which women have higher status and more autonomy will generally be societies in which maternal mortality is lower. This perspective has been ignored by modernization theory. According to modernization theory, a nation's industrialization and modernization will enhance women's status in general by providing more labour participation opportunities, and increase women's access to and control over, any resources including health services and maternal mortality should decrease automatically in step with the decline in general mortality. This assumption has been challenged by the finding in developing countries that large numbers of women in these countries are victims of development because the products they are selling or the services they were performing are replaced by new alternatives.

Relevance of the theory to this study is that, women and medical practitioner now know that malnutrition among pregnant women is a major cause of maternal mortality in developing countries. Anemia increases women susceptibility to illness, pregnancy complications and maternal mortality. In some developing countries, where girls and women are inferior to boys and men, they are often given small amount of food, as well as less protein rich food than boys and men.

The “age of the pregnant women is a determining factor of maternal mortality. In societies where women have high social status, they usually start childbearing much later than in societies where women's social status is low. Teenage marriage and pregnancy is a demonstration of the low status of women and this play prominent role in maternal mortality because of the number of years of childbearing ahead for the woman and the risks with given birth before becoming physically fully developed. According to United Nations (2001) in developing countries 40 per cent of women give birth before reaching age 20 and adolescent girls have a 20-200 per cent higher risk. In fact early childbearing continues to impede advances for women's education and economic status, continuing the vicious cycle of disadvantaged mothers passing on their vulnerability to their daughters, and their” daughters to theirs.

## **EMPIRICAL LITERATURE REVIEW**

Okonofua, Abejide and Makanjuola (1992) examined the background factors that predisposed women to maternal mortality at the Obafemi Awolowo University hospital in Nigeria. The study investigated their socio-demographic characteristics, their use of prenatal care, and the incidence of delay in clinical management. The results showed that the maternal deaths involved women who were younger and of poorer socioeconomic status than the women in the control group. Both groups showed an equal lack of prenatal care. However, a higher incidence of delayed treatment was found in the management of the cases of maternal deaths. The study also found that maternal mortality in the study population can be reduced through improved transportation and institutional management, and, on a long-term basis, through the adoption of measures to improve the socioeconomic status of women.

Ni and Rossignol (1994) in a community-based maternal mortality surveillance study in Sichuan, China assessed the impact of family planning status on maternal mortality. They found that the leading causes of death for both planned and unplanned pregnancies were the same: hemorrhage, postpartum infection, pregnancy-induced hypertension, cardiac diseases, and pulmonary diseases. As among women with "planned" pregnancies, about 40% of maternal deaths among women with "unplanned" pregnancies occurred at home, and 20% occurred en route to a hospital. After controlling for the confounding effects of gravidity and education, with additional control for the effect of prenatal care visits the study indicates that women with "unplanned" pregnancies have a higher risk of maternal death, which is only partially attributed to less prenatal care.

Alves (2007) in a study titled *Maternal Mortality in Pernambuco, Brazil: What has changed in ten years?*, examined changes in levels and patterns of maternal mortality in Pernambuco, Brazil, in 1994 and 2003. The research was carried out in five sub-regions of Pernambuco using the Reproductive Age Mortality Survey (RAMOS) method. The study found that the illegal status of abortion in Brazil remains an important contributory factor for abortion-related deaths. Approximately 94% of the maternal deaths were judged to be avoidable with improvements in health care. Maternal mortality declined by 30% over the ten-year period.

Shah and Say (2007), reproductive health researchers with the WHO, produced a paper on *Maternal Mortality and maternity care*. The authors showed that gains in reducing

maternal mortality between 1990 and 2005 have been modest and uneven, and that countries with high maternal mortality ratios shared problems of high fertility and unplanned pregnancies, poor health infrastructure and low availability of health personnel.

Ibeh (2008) conducted a study in Anambra state of Nigeria on care utilization and poor mortality index. A multistage sampling technique was employed in a cross sectional study to assess the use of maternal services in Anambra state and found that the problem of maternal mortality in the country may not necessarily lie with utilization but with the quality of services. This finding tends to support Taiwo et al. in the view that the problem of maternal mortality in Nigeria may not necessarily lie with failure to utilize maternal care but that the health care system probably needs to be repositioned to meet the challenges of modern obstetric care.

Bakare and Sanmi (2018), investigated the causal “relationship between health care expenditure and maternal mortality in Nigeria. Established that a negative and significant relationship exist between health care expenditure and maternal mortality in Nigeria.

## **METHODS**

The study adopted an autoregressive distributed lag ( ARDL) model, the justification for this method of data analysis is because the variables are integrated of order zero  $i(0)$  and order one  $i(1)$ .ARDL test is more efficient in the case of small and finite sample data sizes while others require large data samples for validity. ARDL methodology yields estimates and valid  $t$ -statistics, even in the presence of autocorrelation and endogeneity.

A simple error correction (ECM) model provides short-run coefficients along with long-run equilibrium without losing valid long-run coefficients. The variables or data for the study are time series data sourced from World Bank data bank and Central Bank Statistical Bulletin various issues. These that were subjected to unit root testing using Augmented Dickey Fuller (ADF) test and the Philip-Peron (pp) to determine their stationarity.

### **Model Specification**

The model specification for the reproductive health-maternal mortality model is anchor on the gender stratification theory. The relevance of this theory to this study is in the sense that women subordination, lack of access to education and health and poverty are all products of gender relations in our society and these without mincing words have serious implication for maternal mortality”. Therefore the maternal mortality and reproductive health equation is stated thus:

### **Reproductive Health and Maternal mortality Model**

$$\text{MMR} = f(\text{SBA}, \text{PPP}, \text{ACC}, \text{PHE}, \text{AFP} \ \& \ \text{OPE}) \dots\dots\dots 1$$

Where:

- MMR = Maternal mortality rate to capture maternal mortality.
- ACC = Female access to contraceptive
- AFP= Female access to family planning
- SBA = Skilled birth attendant
- PHE = Public health care expenditure (control variable)
- PPP = Patients physician per
- OPE = Out of pocket health expenditure (control variable)

Note: ACC, AFP, SBA and PPP (Proxies measuring reproductive health).

Equation (1) above is estimated using annual time series data from 1980– 2019. For the sake of empirical verification, we transform equation (1) into an econometric equation.

$$MMR = a_0 + a_1 ACC + a_2 AFP + a_3 SBA + a_4 PPP + a_5 OPE + a_6 PHE + \mu$$

*A priori* =  $a_1, a_2, a_3, a_4, a_5, a_6 < 0$

$a_1 - a_7$  = Parameters to be estimated

$\mu$  = Error term

## Data Analysis and Discussion of Results

Table 1: Unit Root Test Result

ADF	Level		1 <sup>st</sup> Diff		PP		Level		1 <sup>st</sup> Diff	
	T-Stat	Sign	T-Stat	Prob.	T-Stat	Prob.	T-Stat	Sign		
<b>LOG(PCI)</b>	-3.6773 (0.0449)	**	-2.8825 (0.1863)	NO	-3.5230 (0.0555)	*	15.4490 (0.0000)	***		
<b>MMR</b>	-3.3016 (0.0859)	*	-5.8927 (0.0002)	-	-3.2017 (0.1038)	NO	-12.5221 (0.0000)	***		
<b>ACC</b>	-4.3862 (0.0084)	**	-	-	-5.4160 (0.0007)	***	-	-		
<b>AFP</b>	-1.0902 (0.9089)	no	-3.3852 (0.0781)	*	-0.4023 (0.9826)	NO	-5.3918 (0.0008)	***		
<b>FHV</b>	-6.4488 (0.0001)	***	-	-	-2.7295 (0.2330)	NO	-1.6800 (0.0333)	**		
<b>SBA</b>	-2.6650 (0.2574)	No	-0.1775 (0.9902)	No	-1.8391 (0.6594)	NO	-4.6844 (0.0043)	**		
<b>PPP</b>	-2.6474 (0.2647)	No	-0.9180 (0.9372)	NO	-1.8457 (0.6561)	NO	-2.7629 (0.0465)	**		
<b>LOG(GHE)</b>	-1.4413 (0.8246)	NO	-3.5922 (0.0540)	*	-1.2990 (0.8681)	NO	-7.1882 (0.0000)	***		
<b>LOG(OPH)</b>	-2.4751 (0.3369)	NO	-4.6714 (0.0058)	**	-2.3748 (0.3839)	NO	-16.3614 (0.0000)	***		

Source: Author's computation using E-view10, 2020.

The result of the unit root test shows that female access to contraceptive (ACC) is stationary at level  $i(0)$ , while the rest are stationary at first difference  $i(1)$ . Given that the stationarity result is of a mixed order  $i(0)$  and  $i(1)$  warrant the use of autoregressive distributed lag (ARDL) model as technique for data analysis.

## The F-Bounds Test

Table 2: The F-Bounds Test Result

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)

			Asymptotic: n=1000	
F-statistic	3.957874	10%	1.92	2.89
K	7	5%	2.17	3.21
		2.5%	2.43	3.51
		1%	2.73	3.9

Source: Author's computation using E-view10, 2020.

Table 2 depicts the bounds test result and from it we deduce that a long run relationship (co-integration) exist among the variables in the model, because the computed F, statistic is greater than the 5% upper bound critical value. Having established the existence of long run relationship among the variables, we proceed to determine the long run result.

Table3: Long Run Result

Levels Equation				
Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
ACC	-1.358963	0.653636	-2.079083	0.0033
AFP	-2.786376	0.799474	-3.485268	0.0021
FHV	20.05601	59989	2.688478	0.0161
SBA	-0.848026	0.345126	-2.457180	0.0027
PPP	-8.373808	3.225645	-2.596019	0.0073
LOG(GHE)	-8.733254	3.013444	-2.898097	0.0105
LOG(OPH)	-7.039385	3.871276	-1.818363	0.0878
C	4723.381	1690.759	2.793646	0.0130

Source: Author's computation using E-view10, 2020.

Table3 illustrates the long-run estimation of the parameters in the empirical examinations of the impact of reproductive health on maternal mortality in Nigeria. It can be inferred from the result that; in the long-run, the coefficient of ACC is negative -1.33 and it is statistically given its probability of -0.003. The coefficient of ACC is in conformity with the theoretical expectation, implying that increase in female access to contraceptive will bring about decline in maternal mortality in Nigeria, all things being equal. The implication of the above position is that as more women have access to contraceptive the frequency of getting pregnant will be reduced and proper child spacing can be observed which will reduce the rate of multiple pregnancy and by extension maternal mortality.

The coefficient of female access to family planning (AFP) has negative coefficient - 2.78 and it is statistically significant giving its probability value of 0.002. The negative coefficient of AFP conforms to theoretical expectation, given that an increase in female access to family planning programme is expected to reduce the proportion of women that may likely die during child birth in Nigeria, all things being equal, because pregnancy can be delayed or avoided through family planning method.

Female infested with HIV/AIDS or female HIV/AIDS status (FHV) has a positive coefficient 20.05 and it is statistically significant and it is in line with a-priori expectation. A percentage increase in FHV will result in 20 percent increase in maternal mortality (MMR), all things being equal. This implies that increase in the number of pregnant women with HIV and Aids will lead to more cases of death arising from health complication during child delivery on the average. This may be one of the reasons behind rising cases of maternal mortality in some states in Nigeria.

Skilled birth attendant (SBA) has a negative coefficient -0.84 and it is statistically significant at 5% level of significance. This is also in line with the theoretical expectation, depicting that a percentage increase in SBA will lead to 0.84 percent decline in maternal mortality rate in Nigeria all things being equal. The more birth attended to by skilled birth attendants the decline in maternal death. This is as a result of the training given to the skilled birth attendants patterning to delivery. This result is in line with Felix (2016) who established that an inverse relationship exists between skilled birth attendant and maternal mortality in Nigeria.

Patients per physician (PPP) has negative effect on maternal mortality, giving it is negative coefficient -8.3 and it is statistically significant at the 5 percent level of significance. This result is also in line with that of Felix (2016) who established patients per physician has a negative effect on maternal mortality in Nigeria. A percentage increase in female access to physician during pregnancy brings about a decline in maternal mortality in Nigeria by 8.3 percent. This because early sign can be quickly diagnosed and remedial measures adopted to avert it all things being equal.

In the long-run, the coefficient of government expenditure on health (GHE) a control variable has negative impact on MMR and statistically significant. One percent increase in GHE will bring 8.7 percent decline in maternal mortality (MMR) in Nigeria, all things being equal. The coefficient of GHE appeared with the normal sign, this means that increase in public expenditures on health infrastructure will reduce the proximity of death during child birth. The above result is in conformity with that of Bakare and Sanmi (2018). In the same manner, the coefficient of out of pocket expenditures on health ( OPH) has a negative coefficient but it is not statistically significant at the 5% level of significance.

### The Short Run Analysis

Table 4: Error Correction and Short-Run Result

ECM Regression				
Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(AFP)	-0.888347	0.202385	-4.389318	0.0066
D(PPP)	-202.1535	52.85405	-3.824749	0.0015
DLOG(GHE)	-23.33510	7.046827	-3.311437	0.0003
DLOG(OPH)	-208.1947	167.6383	-1.241928	0.2322
CointEq(-1)*	-0.833394	0.131884	-6.319122	0.0000
R-squared	0.589444	Mean dependent var		-25.86207
Adjusted R-squared	0.521019	S.D. dependent var		57.27610
S.E. of regression	39.63992	Akaike info criterion		10.35314
Sum squared resid	37711.76	Schwarz criterion		10.58888
Log likelihood	-145.1205	Hannan-Quinn criter.		10.42697
Durbin-Watson stat	2.015856			

**Source: Author's computation using E-view10, 2020.**

Table 4 shows the 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 the error correction term is -0.833 which implies that the speed of adjustment is 83%. The above shows that there is a speedy adjustment when the system is disturbed. The adjusted R-square value of 52% shows that 52% of the changes in MMR is explained by the joint actions of the variables in the model while the remaining 48% are exogenously determined by factors not included in the model specified above.



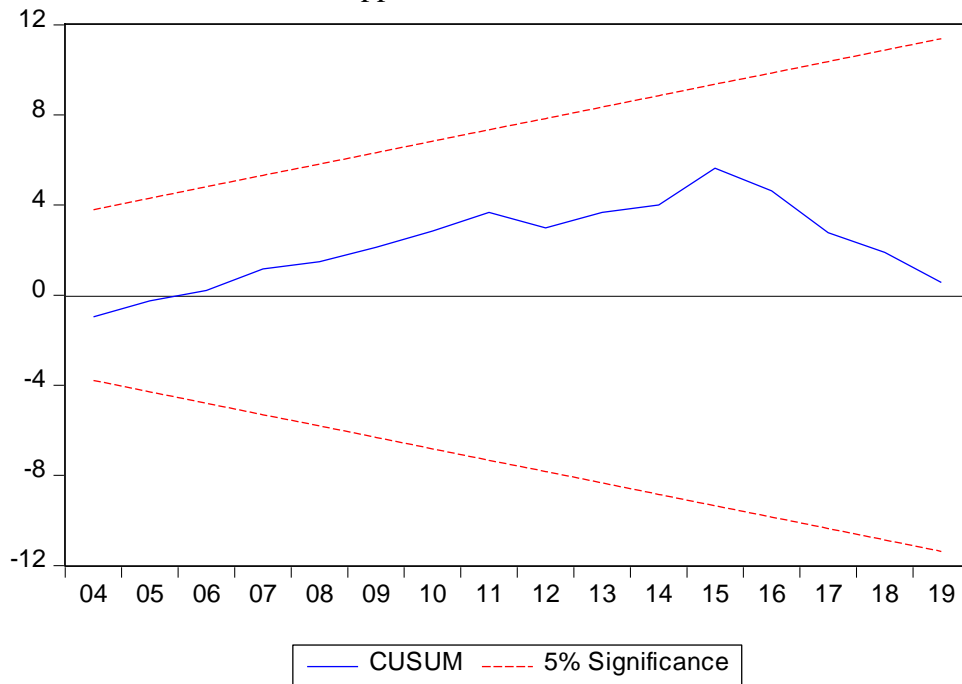
## Diagnostic Test

**Table 5: Diagnostic test Result**

Normality Test (JarqueBera)	2.834770	0.2423
Heteroskedasticity(BPG Test)	1.656316	0.1711
Breusch-Godfrey LM Test	0.530811	0.5995

*Source: Author's computation using E-view10, 2020.*

The result in table shows that the variables are normally distributed with no heteroscedasticity and no autocorrelation. The CUSUM graph depicts that the model is stable, because the graph falls within the lower and upper critical bounds.



## CONCLUSION AND RECOMMENDATIONS

Given the result of the data analysis, the study concludes that reproductive health proxies by female access to contraceptives, family planning, skilled birth attendant, and patients per physician bring about decline in maternal mortality rate in Nigeria. While women with HIV/AIDS infection increases the rate of maternal mortality in Nigeria. To reduce maternal mortality rate by three quarter, the study recommends that prenatal and postnatal care be giving freely to pregnant women and nursing mothers as this will help to reduce the incidence of maternal mortality in the country. More people should be encouraged to study medicine through award of scholarship as to abridge the patients-physician gap.

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