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Health Care, Health Status and Labour Productivity in Nigeria

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Abstract. The debate on the role of health in productivity of labour is an age-long one. The health conditions of the workforce affect its level of productivity. This study examined health care, health status and productivity of labour in Nigeria in order to determine the direction of causality between them. Data were collected from the Central Bank of Nigeria (CBN) Statistical bulletin and World Bank Development Indicators. The ordinary least squares (OLS) method was used to estimate the model. The analysis indicates that government expenditure on health (GXH) and life expectancy (LXP) do not conform to theoretical expectations. This can be attributed to institutional corruption and poor government attention to the provision of health needs of the people that meet global best practices. On the other hand, prevalence of HIV and AIDS (HAD) and risk of catastrophic expenditure on surgical care (RCES) are consistent with theoretic expectations. The analysis also reveals that prevalence of HIV/AIDS is statistically significant. However, GXH, RCES and LXP are not statistically significant. Pairwise granger causality test indicates that government expenditure on health (GXH) and life expectancy (LXP) does not granger cause labour productivity (LPD). But prevalence of HIV/AIDS (HAD) and poor expenditure on surgical care (RCES) granger cause labour productivity (LPD) implying that poor health care delivery and status of health of the people adversely affect labour productivity in Nigeria. The study recommends that: the government should increase its expenditure on health care facilities and personnel development. This has the capacity of reducing the risk of catastrophic expenditure on surgical care, improve the health status of the active population, boost productivity level and encourage economic development in Nigeria.

Keywords: Health care, health status, catastrophic health expenditure, labour productivity.

1. Introduction

The productivity of labour as an active agent in the production process is not only determined by education, but also health care and health status. Health is an important component of human capital that plays a crucial role in economic growth (Strauss and Thomas, 1998; Weil, 2014). Poor health conditions could adversely affect labor productivity and, consequently, long run economic growth. Health is essential in labour supply decision, not only because health is a form of human capital, valued by both employers and employees (Grossman, 1972), but also because individuals' preferences between work and leisure may change following a health shock. For example, a deterioration of health may lead a person to value leisure more than work. In addition, changes in health may change

the time horizon over which labour supply decisions are made because life expectancy is determined by health (Chiricos, 1993). As a result, the impact of health on labour supply has been under extensive study particularly in industrialized countries (Currie and Madrian, 1999). Health is endogenous to labour supply. This is because employment or long working hours may have adverse impacts on an individual's health, or individuals may use health conditions to justify their labour force status.

According to Jack and Lewis (2009), healthier people are more likely to be richer than their sick counterparts because they have greater capacity to work harder, longer and more consistently. Poor health therefore generally affects productivity and output adversely, thereby debarring the sick from participating in productive activities due to decreased opportunity cost of leisure. Apart from reduced productivity, ill health may increase the utility derived from time spent away from market related activities given that seeking health care is time-consuming.

A nation's wealth and/or poverty have often been analyzed in terms of the state of health of its citizens. Health is fundamental to labour productivity, economic growth and development and is one of the key determinants of economic performance both at micro and macro levels. This is because health as a form of human capital increases an individual's capability (Bloom and Canning, 2003). The effect of health on worker's productivity suggests a strong relationship between health and aggregate output. Unhealthy workers lose much time from work due to ill- health and are less productive when working. Health gains had the economic consequences of widespread economic growth and an escape of ill-health traps in poverty (World Health Organization, 2010).

Developing nations including Nigeria are faced with the scourge of diseases such as HIV/AIDS, malaria, tuberculosis, high blood pressure, among others which hamper the productivity of labour and economic growth. Therefore, countries devote huge public funds to provision of health care, believing this would improve the health of the citizenry so that they can contribute meaningfully to economic growth and development. In Nigeria, for example, despite the huge government budgetary allocation to health provision, the health status of Nigerians is consistently ranked low. Nigeria ranked 74th out of 115 countries, based on the performance of some selected health indicators (World Bank, 1999).

Studies on the relationship between health and labour productivity did not use the appropriate measure for labour productivity such as gross domestic product (GDP) per labour hour. In view of the forgoing, this paper examines health care, health status and labour productivity in Nigeria using GDP per labour hour as measure of labour productivity. The paper is organized as follows: Section two discusses review of related literature, section three deals with model specification and estimation procedures. Sections four and five discuss the results and end the paper with conclusion and recommendations.

2. Review of Related Literature

2.1 Conceptual Literature

2.1.1 Health Care and Health Status

Healthcare is the diagnosis, treatment and prevention of disease, illness, injury and other physical and mental ailment in human beings. Healthcare is delivered by practitioners in allied health, dentistry, midwifery, medicine, nursing, and other health professions. It refers to the work done in providing primary, secondary and tertiary care as well as in public health. This is measured by government expenditure on health and the risk of catastrophic expenditure on surgical care (out of pockets expenditure on surgical care that exceeds a certain proportion of a household's income with the consequence that households suffer the burden of disease). In the view of World Health Organization (2005), health status is a state of complete physical, mental and social well-being. It is a state or ability of individual to live a socially and economically productive life. Health is a

somewhat nebulous condition, difficult to define and never in a state of perfection since one can be rarely sick, but never perfectly healthy. Health is a multi-dimensional concept that is usually measured in terms of absence of physical disability or a condition that is likely to cause death, emotional well-being and stationary social functioning. Health could be seen as physical and mental well-being of people which is measured using indicators such as life expectancy, adult mortality, child mortality rate, adult survival rate and so on (Aguayo-Rico, Guerra-turrubiates & Deoca-hernadez, 2005). Health in recent times has been considered to be very crucial in terms of how it affects productivity as well as other means of human capital formation. According to Bloom and Canning (2008), "health is a direct source of human welfare and also an instrument for raising income levels". The level of productivity and growth in an economy will be greatly hampered by ill-health or prevalence of diseases. This is because the likelihood exists that healthy individuals have the tendency to think rightly, be more efficient and obtain higher productivity (Bloom and Caning, 2000; Aguayo-Rico et al, 2005). This explanation shows that health and labour productivity are positively correlated.

2.1.2 Labour Productivity

Labour productivity measures the hourly output of a country's economy. Specifically, it charts the amount of real gross domestic product (GDP) produced by an hour of labor. Growth in labor productivity depends on three main factors: investment and saving in physical capital, new technology and human capital. Labour productivity, also known as workforce productivity, is defined as real economic output per labour hour. Growth in labour productivity is measured by the change in economic output per labour hour over a defined period. Labour productivity should not be confused with employee productivity, which is a measure of an individual worker's output. It is calculated by dividing a country's total output by the total number of labour hours. Growth in labor productivity is directly attributable to increase in physical capital, adoption of new technology and investment in human capital. If labor productivity is growing, it can be traced back to growth in one of these three areas. Physical capital is the amount of money that people have in savings and investments. New technologies are technological advancements, such as robots or assembly lines. Human capital represents the increase in health, education and specialization of the workforce (Will, 2019). Labour productivity is also an important measure of the short-term and cyclical changes in an economy. High-level labor productivity is a combination of total output and labor hours. Measuring labor productivity each quarter allows an economy to measure the change in its output in relation to the change in its labor hours. If the output is increasing while labour hours remain static, it could be a sign that the economy is advancing technologically and should continue to do so. Conversely, if labour hours increase in relation to flat output, it may be a sign that the economy needs to invest in education and health to increase the competence and productivity of its human capital.

2.2 Theoretical Literature

The paper is hinged on health production function. The modelling of the demand for "good health" was first introduced by Grossman (1972), in an explicit attempt to draw a distinction between health capital and human capital. Grossman opined that while the stock of human capital influences the wage rate of individuals, the stock of health determines the time that agents can devote to the production of money earnings as well as commodities and that, as such it is not accurate to consider health capital as an integrant part of human capital. Additionally, Grossman intended to highlight the fact that the demand for health care is a derived demand, since what consumers actually demand is the commodity "good health", which is jointly produced by medical services and by consumers themselves, who allocate some of their time to the production of good health. Besides the aforementioned inputs – medical services and consumers' time – the efficiency inherent to the production of "good health" is assumed to be influenced by the education level and age of individuals. Another building block of the Grossman model is the assumption that

individuals hand down an initial stock of health, which depreciates over time, but can be (partially) restored through investments in health capital. As the depreciation rate increases, namely due to the health deteriorating effect of ageing, it becomes increasingly costly to produce good health. Therefore, death occurs when the stock of health falls below a minimum threshold.

Notwithstanding the breakthrough brought about by Grossman, his model has not been immune to criticism. Usher (1975) maintains that the Grossman model fails to account for the impact that uncertainty, one's initial stock of health as well as history – namely of investments in health, wages and medical care prices - have on the decision to invest in health capital. In a similar tone, Case et al. (2005) recognize that the model is unable to take into consideration the socio-economic gradient in health, thereby precluding a faster decline in health for individuals in a lower socio-economic position. Also, Wagstaff (1986) criticizes Grossman model's prediction of a positive relation between investment in health and the stock of health. Eventually, the most concerning oversight of Grossman's model is its assumption of a health production function with constant returns to scale which, as stressed by Ehrlich (1990), gives rise to an indeterminacy problem concerning the optimal level of investment in health and, as a result, those of health, consumption and wealth. Inspite of the criticisms, Galama (2015) suggests slight extensions and modifications to the original Grossman model which reveal to be capable of handling the previously referred criticisms and, therefore, to reinforce Grossman's model position as the cornerstone to study health-demand related behaviours.

2.3 Empirical Literature

There are dearth of empirical studies on health and labour productivity. However, Combary (2016) examined the impacts of health services on agricultural labour productivity of rural households in Burkina Faso. The study used instrumental variable of health and social promotion centre (HSPC). The result revealed that that HSPC significantly improves farming labour productivity. The study recommended that quality HSPC services should be made available in the rural areas.

There is a few empirical evidence on health and labour productivity in Nigeria. For example, Oluwalana and Ogunsusi (2016) examined the impact of malaria on productivity and coping strategies among small -scale gari processors in Odeda Local Government Area of Ogun State, Nigeria. Regression analysis was used to identify variables affecting income. The Result of the analysis indicated that processing experience (α 0.01), prevalence of malaria (α 0.10), cost of tubers (α 0.01), cost of firewood used (α 0.10), and ownership of a cassava farm (α 0.01) were the significant factors affecting the income of the gari processors. The study also revealed that malaria attack has a significant effect on productivity, workers' output, income and work hours of gari processors. It recommended among others that provision of adequate health services with due accessibility, improve their health status, thereby reducing the poverty level among gari processors in line with United Nations Millennium Development Goals (MDGs) for health by 2015.

Boman (2014) investigated the relationship between government health care financing and workforce productivity in Nigeria. Using vector autoregressive (VAR) model, it was revealed that while government capital expenditure on health showed negative effect on workforce productivity, government recurrent expenditure on health showed positive effect on workforce productivity in Nigeria. It was recommended that government should provide qualitative health infrastructure to ensure greater workforce productivity in Nigeria.

Umoru and Yaqub (2013) investigated labour productivity and health capital in Nigeria. Adopting the GMM methods, the study found that health capital investment is a significant determinant of labour productivity. The study recommended that there is need to have healthier workforce in order to maximize productivity in Nigeria.

Agulanna, Ikpi, Okoruwa and Akinyosoye (2013) studied the effects of health and nutrition on agricultural productivity of farmers in South Western Nigeria. The study adopted survey method and descriptive statistics. It established a linkage between health, nutrition and labour productivity. The study recommended that there is need for more investment in human capital of health in order to enhance the productivity of labour.

Ajani and ugwu (2008) carried out a study on the impact of adverse health on agricultural productivity of farmers in Kainji Basin, North Central Nigeria. The study adopted stochastic frontier production model. It revealed that health has a greater share in the inefficiency of the farmers in the area.

A cursory look at these studies shows that none used the appropriate measure for labour productivity such as gross domestic product (GDP) per labour hour. Hence, this paper is motivated to fill the gap as it examines health care, health status and labour productivity in Nigeria: a granger causality approach using GDP per labour hour as measure of labour productivity.

3. Methodology

3.1 Model Specification

In line with health production function of Grossman (1972) and the empirical model of Oluwalana and Ogunsusi (2016), the present study's model is specified with some modifications as follows:

LPD $= f$(GXH, HAD, RCES, LXP) ……...……..…..……..……. ……..…...3.1

The OLS form of the equation is written as:

$LPD = a_0 + a_1GXH + a_2HAD + a_3RCES + a_4LXP + \mu$ ……..……3.2

$a_1>0; a_2<0; a_3<0; a_4>0$

Where: LPD = Labour productivity
GXH = Government expenditure on health, a proxy for health care
HAD = HIV/AIDS prevalence
RCES = Risk of catastrophic expenditure on surgical care
LXP = Life expectancy
a_o = Constant
a_1- a_4 = Coefficients of the explanatory variables
μ = Error term or stochastic variable

3.2 Estimation Procedure

This study employed quasi-experimental research design. This design is used to establish the causal relationship between the dependent variable and the independent variables in social sciences. The main sources of data include World Bank Development Indicators and the Central Bank of Nigeria. The estimation methods of ordinary least squares (OLS) estimation techniques of Augmented Dickey Fuller (ADF) unit root, Johansen cointegration, and the error correction mechanism (ECM) tests were used.

4. Results and Discussions

This section presents data and discussions on the results of the analysis. The time series data showing the trends of the variables of study are in table 4.5 in the appendix.

4.1 Augmented Dickey Fuller Unit Root Test

The results of the ADF unit root test are presented and discussed in table 4.1 as follows:

Table 4.1. A: Unit Root Stationary Test at Levels

Variables	ADF Stat. at levels	1% Critical value	5% Critical value	Order of Integration	Remarks
LPD	-2.334416	-3.752946	-2.998064	I(0)	NS
GXH	-1.023115	-3.752946	-2.998064	I(0)	NS
HAD	-1.170814	-3.752946	-2.998064	I(0)	NS
RCES	-1.268564	-3.699871	-2.976263	I(0)	NS
LXP	2.633921	-3.752946	-2.998064	I(0)	NS

Source: *Computed from E-view 8.0, Note: NS= Not Stationary*

Table 4.1B: Unit Root Stationary Test at 1st Difference

Variables	ADF Stat. at 1st Diff	1% Critical value	5% Critical value	Order of Integration	Remarks
LPD	-3.246645	-3.711457	-2.981038	I(1)	S
GXH	-6.131695	-3.711457	-2.981038	I(1)	S
HAD	-4.923460	-3.711457	-2.981038	I(1)	S
RCES	-4.939556	-3.711457	-2.981038	I(1)	S
LXP	-5.462622	-3.711457	-2.981038	I(1)	S

Source: *Computed from E-view 8.0, Note: S= Stationary*

The unit root test in the Table 4.1A above shows that at levels, the variables are not stationary at 1% and 5% significant levels. From the results in Table 4.1B, all the variables are stationary at first difference. Therefore, the time series data used in this study are stationary.

4.2 Johansen Test for Co-integration

The essence of co-integration test is to determine whether a long run equilibrium relationship exists between the dependent and independent variable. Given the condition of the unit root analysis, the Johansen cointegration test was carried out and presented in table 4.2 below.

Table 4.2: Johansen Co-integration Test

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.807472	92.25795	69.81889	0.0003
At most 1 *	0.648216	49.42253	47.85613	0.0354
At most 2	0.374706	22.25934	29.79707	0.2843
At most 3	0.289040	10.05148	15.49471	0.2768
At most 4	0.044438	1.181845	3.841466	0.2770

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.807472	42.83541	33.87687	0.0033
At most 1	0.648216	27.16319	27.58434	0.0565
At most 2	0.374706	12.20786	21.13162	0.5273
At most 3	0.289040	8.869635	14.26460	0.2972
At most 4	0.044438	1.181845	3.841466	0.2770

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Source: *Computed from E-view 8.0*

From Table 4.2, the Johansen co-integration test indicates that Trace Statistic show two (2) co-integrating equations at 5% level of significance. While Maximum Eigenvalue indicated one (1) co-integrating

equations at 5% level of significance. This shows that a long run relationship exists between the dependent and independent variables. This suggests for test of Error Correction Model (ECM).

4.3 Error Correction Mechanism (ECM)

The confirmation of the existence of a co-integration among variables gave rise to the conduct of test for short run adjustments. Therefore, the result of the error correction mechanism (ECM) is presented in Table 4.3.

Table 4.3 Parsimonious Error Correction Mechanism

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-34704.38	17044.46	-2.036109	0.0586
LPD(-1)	0.147278	0.103441	1.423785	0.1737
GXH	-163.0095	390.5369	-0.417398	0.6819
GXH(-1))	129.3473	407.9138	0.317095	0.7553
HAD	-6785.293	2978.197	-2.278322	0.0368
HAD(-1)	6358.507	2689.752	2.363975	0.0311
RCES	-5.273881	16.51508	-0.319337	0.7536
RCES(-1)	-1.129057	17.10678	-0.066001	0.9482
LXP	6.217118	434.5806	0.014306	0.9888
LXP(-1)	993.5653	546.9046	1.816707	0.0880
ECM(-1)	-0.493710	0.216896	-2.276252	0.0368

R-squared	0.973403	Mean dependent var	13471.38
Adjusted R-squared	0.956780	S.D. dependent var	3980.038
S.E. of regression	827.4226	Akaike info criterion	16.56607
Sum squared resid	10954050	Schwarz criterion	17.09401
Log likelihood	-212.6420	Hannan-Quinn criter.	16.72306
F-statistic	58.55795	Durbin-Watson stat	1.765904
Prob(F-statistic)	0.000000		

Source: *Computed from E-view 8.0*

From the results in Table 4.3, Adjusted R^2 is 0.956780. This means that about 95% of the variation in the dependent variable labour productivity (LPD) is as a result of the variations in the explanatory variables. The remaining 5% may be attributed to the variables that are not included in the model. The F-statistic of 58.55795 indicates that the overall model is statistically significant at 5 percent. The result of DW-statistic of 1.765904 shows absence of autocorrelation of the error term. This means that the estimates based on OLS is not spurious. The ECM coefficient of -0.493710 indicates a 49% speed of adjustment to the short run. Government expenditure on health (GXH) is negatively signed and contrary to theoretical expectations. Its contribution to productivity of labour is not statistically significant. That Government expenditure is negatively signed is due to institutional corruption and poor government attention to the provision of health care facilities that meet global best practices. On the other hand, prevalence of HIV and AIDS (HAD), risk of catastrophic expenditure on surgical care (RCES) and life expectancy (LXP) are properly signed as postulated by economic theory. The analysis also revealed that prevalence of HIV/AIDS (HAD) is statistically significant. But all the other variables are not statistically significant. The policy implication of these findings is that the Nigerian government must deal with the issue of corruption and step up its expenditure on the provision health care facilities to meet global best practices.

This will improve health status of the people and reduce related travels in Nigeria.

4.4 Granger Causality Test

In order confirm the direction of relationship between health care, health status and labour productivity, pair wise granger causality test was carried out. The result is presented in table 4.4.

Table 4.4 Pairwise Granger Causality Test

Null Hypothesis:	Obs	F-Statistic	Prob.
GXH does not Granger Cause LPD	26	0.73794	0.4901
LPD does not Granger Cause GXH		7.91543	0.0027
HAD does not Granger Cause LPD	26	4.35195	0.0262
LPD does not Granger Cause HAD		6.53020	0.0062
RCES does not Granger Cause LPD	26	6.75814	0.0054
LPD does not Granger Cause RCES		0.24285	0.7866
LXP does not Granger Cause LPD	26	0.93621	0.4079
LPD does not Granger Cause LXP		0.01967	0.9805

Source: *Computed from E-view 8.0*

From Table 4.4, the pairwise granger causality test indicates that government expenditure on health (GXH) and life expectancy (LXP) does not granger cause labour productivity (LPD). But prevalence of HIV/AIDS (HAD) and risk of catastrophic expenditure on surgical care (RCES) granger cause labour productivity (LPD).

Table 4.5: Trends of labour productivity (LPD), government expenditure on health (GXH), risk of catastrophic expenditure on surgical care (RCES), prevalence of HIV/AIDS (HAD) and life expectancy (LXP) in Nigeria, 1990-2017.

YEARS	LPD (Million Dollar)	GXH (Billion Naira)	RCES (%)	HAD (%)	LXP (Number of Years)
1990	0	822.7	0	1.2	46
1991	9934.06	771.3	0	1.4	46
1992	9723.35	397.2	0	1.7	46
1993	9698.8	2567.6	0	1.9	46
1994	9548.06	2843.1	0	2.2	46
1995	9254.78	2066	0	2.5	46
1996	9483.63	4834.9	0	2.8	46
1997	9506.28	7326.1	0	3	46
1998	9515.04	13640.8	0	3.3	46
1999	9307.77	16180	0	3.4	46
2000	9543.86	20445.2	61.7	3.6	47
2001	9733.16	44651.5	65.8	3.6	47
2002	9860.19	63171.2	64.9	3.7	47
2003	10616.24	39700	66.8	3.7	48
2004	13902.35	52400	55.7	3.6	48
2005	13994.32	77500	55.2	3.6	49
2006	14748.47	94500	51	3.5	49
2007	15324.7	131400	61.8	3.4	50
2008	15862.29	77546.9	70.9	3.4	50
2009	16572.96	80184.5	61.3	3.3	51
2010	17398.06	65907	67.7	3.2	51
2011	17765.53	382253	70.8	3.1	52
2012	18039.65	386345	71.4	3	52
2013	18507.98	179990	63.3	3	52
2014	19300.45	195980	64.6	2.9	52
2015	19438.73	257720	64.3	2.9	53

2016	18781.84	429083	67.7	2.8	54
2017	18364.66	418776	69.2	2.8	55

Source: *World Bank: World Development Indicators, 2018.*

5. Conclusion and Recommendations

This study examined health care, health status and labour productivity in Nigeria. Government expenditure on health and the risk of catastrophic expenditure on surgical care (out of pocket expenditure) measured health care, while prevalence of HIV/AIDS and life expectancy measured health status which were regressed on labour productivity in Nigeria. The analysis shows that government expenditure on health (GXH) is not in conformity with theoretical expectations. This is due to institutional corruption and poor government attention to the provision of health care facilities that meet global best practices. On the other hand, prevalence of HIV and AIDS (HAD), risk of catastrophic expenditure on surgical care (RCES) and life expectancy (LXP) are in agreement with economic theory. The analysis also reveals that prevalence of HIV/AIDS (HAD) is statistically significant. But all the other variables are not statistically significant.

The pairwise Granger Causality test indicates that government expenditure on health (GXH) and life expectancy (LXP) do not granger cause labour productivity (LPD). But prevalence of HIV/AIDS (HAD) and risk of catastrophic expenditure on surgical care (RCES) granger causes labour productivity (LPD). It is clear that poor health delivery and status of health of the people have adversely affected labour productivity and economic development in Nigeria. The Nigerian government must intensify its effort in the fight against corruption and step up its expenditure on the provision health care facilities to meet global best practices. This will improve the health status of the people and reduce health care related travels out of Nigeria.

In line with this, the following policy recommendations are made:

The government should increase its expenditure on health care facilities and personnel and also ensure that appropriated budgetary provision is effectively deployed to serve the planned objective. This has the capacity of reducing the risk of catastrophic expenditure on surgical care, improve the health status of the active population, boost labour productivity level and economic development in Nigeria.

The Economic and Financial Crimes Commission (EFCC) and Independent Corrupt Practices and other related offences Commission (ICPC) intensify its fight against corruption in a way that is clear and convincing to all. People must be made to face corruption charges preferred against them irrespective of party affiliation.

Health insurance policies and schemes should be reviewed to allow swift response to the health needs of the labour force and make accessibility to health care easy to the people through proper implementation of free medical services for middle and low income labour force. This will stabilize health care and health status, and improve labour productivity and rapid economic development in Nigeria.

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