

Financial Cost of Hypertension in Urban and Rural Tertiary Health Facilities in Southwest, Nigeria: A Comparative Cross-Sectional Study

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Abstract

Background: The financial cost of hypertension could result in serious economic hardship for patients, their households, and the community. To assess and compare the direct and indirect cost of care for hypertension in urban and rural tertiary health facilities. **Material and Methods:** A comparative cross-sectional study was carried out in two tertiary health facilities which are located in urban and rural communities of the southwest, Nigeria. Four hundred and six (204 urban, 202 rural) hypertensive patients were selected from the health facilities using a systematic sampling technique. A pretested semi-structured, interviewer-administered questionnaire adapted from that used in a previous study was used for data collection. Information on biodata, and direct and indirect costs was collected. Data entry and analysis were done using IBM SPSS Statistics for Windows, Version 22.0. **Results:** More than half of the respondents were females (urban, 54.4%; rural, 53.5%) and in their middle age (45-64 years) (urban, 50.5%; rural, 51.0%). The monthly cost of care for hypertension was significantly higher in urban than in rural tertiary health facilities (urban, ₦19,703.26 [\$54.73]; rural, ₦18,448.58 [\$51.25]) ($P < 0.001$). There was a significant difference in the direct cost (urban, ₦15,835.54 [\$43.99]; rural, ₦14,531.68 [\$40.37]) ($P < 0.001$), although the indirect cost (urban, ₦3,867.72 [\$10.74]; rural, ₦3,916.91 [\$10.88]) ($P = 0.540$) did not show much difference between the groups. The cost of drugs/consumables and investigations contributed more than half (urban, 56.8%; rural, 58.8%) of the cost in both health facilities. **Conclusion:** The financial cost of hypertension was higher in the urban tertiary health facility; therefore, more government support is needed in this health facility to close the financial gap.

Keywords: Direct cost, health facilities, hypertension, indirect cost, Nigeria

INTRODUCTION

Hypertension is a common non-communicable disease,^[1,2] with serious economic, social, and health burdens.^[3] The economic burden of hypertension is not restricted to high-income countries, but is also perceived in middle- and low-income countries. It accounted for 57 million or 3.7% of the global total disability-adjusted life years loss.^[4] Indirect costs resulting from the disability and direct healthcare costs from lifelong treatment may contribute to this burden.

Globally, the high healthcare cost has left nothing less than 100 million people impoverished every year.^[5] A study in the United States (US) revealed an estimated annual per-patient disease-related costs (i.e costs directly related to the treatment) of hypertension as \$687 and estimated total annual cost per

patient (i.e the all-cause medical costs from any source) as \$21,557.^[6] The cost of treating hypertension in Kenya ranged from \$25.64 to \$987.17 per year, depending on the number of drugs taken by patients and the type of health facility.^[7] This cost may be as high as \$19,724.00 when there are complications such as chronic kidney disease where the renal transplant is required.^[7]

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In Nigeria, a study conducted in the northcentral region among rural populations using the Markov model revealed that screening and treatment for hypertension were potentially cost-effective and the cost per individual ranged from \$60.8 to \$99.6.^[8] Another study conducted in southwest Nigeria among hypertensive patients of an urban tertiary hospital revealed that the mean monthly cost of antihypertensive drugs and laboratory investigations were \$10.2 and \$42 respectively.^[9] A study done across selected urban and rural health facilities in the southwest, Nigeria revealed an average monthly direct cost of care of \$104.89 for hypertension.^[10]

These costs could cause serious economic and financial hardship to patients and their households, knowing that less than a third of these patients are registered under the national health insurance scheme (NHIS).^[11] This research would therefore identify the financial gap in the care of hypertension in the specialist centers in urban and rural areas as well as inform the development of appropriate social and financial policies that will improve access to essential health services. Also, the findings of this research will enrich the existing literature and provide information on the direct and indirect costs of care for hypertension in urban and rural tertiary health institutions in Nigeria. Unlike previous studies on the financial cost of hypertension in Nigeria that focused on direct cost,^[9,10] This study examined the indirect cost as well, giving a more comprehensive view of the financial implication of care for hypertension. This research, therefore, assessed and compared the direct and indirect cost of care for hypertension among hypertensive patients accessing health care in urban and rural tertiary hospitals in the southwest, Nigeria.

METHODS

This was a health facility-based comparative cross-sectional study carried out in 2019 in two tertiary health facilities located in urban and rural communities in the southwest, Nigeria. The urban tertiary health facility is located at the center of Ado-Ekiti, the state capital of Ekiti State, southwest, Nigeria. This hospital provides healthcare services to the people of Ado-Ekiti and the environs as well as takes referrals from other peripheral health institutions. The rural tertiary health facility is located in Ido-Ekiti, Ekiti State, southwest, Nigeria, a distance of about 35 km from Ado-Ekiti. The study was carried out at the hypertensive clinics of these health facilities.

The study population was hypertensive patients accessing healthcare in these urban and rural tertiary health facilities. The study included all hypertensive patients, who were at least 18 years of age and had been on treatment for a period of 3 months with or without BP control. The study excluded all pregnant hypertensive patients and those who have accessed care from the two tertiary health facilities within the period of the study (1 month).

A minimum sample size of 220 for each health facility was determined using the formula for calculating sample size when comparing two means.^[12] A 95% confidence interval, 80%

power, standard deviation of the cost of care of hypertension in the general population from a previous study,^[10] a cost of care hypothesized difference of 85^[13,14], and a 10% non-response was assumed.

The study was carried out using a systematic random sampling technique to select eligible hypertensive patients. The average number of hypertensive patients seen on a clinic day in each tertiary health facility was obtained from the clinic records. This average clinic attendance in each health facility multiplied by the number of research days (10 clinic days) was used as the sampling frame for the health facilities. The sampling frame for each health facility was divided by 220 to obtain the sampling intervals and these were used to select hypertensive patients at every research visit to the clinics. At the clinics, the patients were given consecutive numbers based on their arrival. The first patient was chosen by ballot, other patients were subsequently selected by adding the sampling interval until the needed sample size was gotten.

Selected patients were interviewed after their clinic consultations. They were informed about the study before consent was obtained, and patients that consented were then interviewed. A pretested semi-structured, interviewer-administered questionnaire adapted from that used in the study by Pavel *et al.*^[15] was used for data collection. Data on direct (medical and non-medical) costs, indirect costs, and socio-demographic characteristics were collected from the patients. Entries on direct costs were verified from patients' payment receipts.

Four research assistants were employed and trained on how to administer the questionnaires. They were medical students in the clinical stage of training and are fluent in the local dialect. They were supervised daily during data collection to ensure the completeness and accuracy of the data collected.

Measuring the cost of illness

Direct cost: Direct costs included medical and non-medical costs; medical costs included the cost of consultation/registration, medications in addition to other consumables, laboratory investigations and tests, and hospitalization (for those hospitalized in the last month); while non-medical costs comprised the costs of transport to the hospital and cost of food.

Indirect cost: The human capital approach that estimates the value of potential production losses or income loss as a consequence of illness was used in this study.^[15] Self-reported income loss forfeited salaries, and wages during the period of accessing healthcare was used to estimate indirect cost.

Statistical analysis

Data entry and analysis were carried out using IBM SPSS Statistics for Windows, Version 22.0 (IBM Corp., Armonk, N.Y., USA). Average/standard deviation was used to summarize the cost of care and household size while percentages/frequency were used to summarize age group, sex, and other socio-demographic characteristics. Costs were presented in Naira (₦) as well as in US dollars (\$) using the exchange rate that was obtained from the Central Bank of

Nigeria during the mid-point of the data collection year. The cost of care for hypertension was compared between urban and rural tertiary health facilities using Mann Whitney u-test while the distribution of qualitative variables between the two groups was compared using the Chi-square test.

Ethical consideration

Ethical approval (Protocol Number: ERC/2019/02/13/187A) for the study was obtained from the Ethics and Research Review Committee of the institutions where the work was carried out. The procedures followed were in accordance with the Helsinki Declaration.

RESULTS

More than half of the respondents were females (urban, 54.4%; rural, 53.5%) and in their middle age (45-64 years) (urban, 50.5%; rural, 51.0%). There was a statistically significant difference in the level of education ($P = 0.019$), mean household size ($P < 0.001$), occupation ($P < 0.001$), and socioeconomic status ($P < 0.001$) of respondents in urban and rural health facilities. However, there was no significant difference in their income ($P = 0.327$). The urban tertiary health facility had a higher proportion of respondents with at least secondary education (urban, 69.1%; rural, 57.9%), that are civil servants (urban, 33.8%; rural, 30.2%), and of higher socioeconomic status (urban, 23.0%; rural, 16.8% for richest) than the rural tertiary health facility. The mean household size of respondents was 3.7 ± 2.5 persons in the urban health facility and 4.6 ± 2.3 persons in the rural health facility. [Table 1]

The monthly cost of clinic of hypertension among the respondents was significantly higher in an urban tertiary health facilities than in rural tertiary health facilities (urban, ₦15,257.92 [\$42.38]; rural, ₦10,697.35 [\$29.71]) ($P < 0.001$). [Table 2] However, there was no significant difference between the monthly cost of admissions between the two health facilities (urban, ₦4,445.34 [\$12.35]; rural, ₦7,751.24 [\$21.53]) ($P = 0.523$). [Table 3]

Furthermore, the monthly cost of care for hypertension among respondents was significantly more in the urban tertiary health facility than in the rural tertiary health facility (urban, ₦19,703.26 [\$54.73]; rural, ₦18,448.58 [\$51.25]) ($P < 0.001$). There was a statistically significant difference in the direct cost of care (urban, ₦15,835.54 [\$43.99]; rural, ₦14,531.68 [\$40.37]) ($P < 0.001$), although the indirect cost of care (urban, ₦3,867.72 [\$10.74]; rural, ₦3,916.91 [\$10.88]) ($P = 0.540$) did not show any significant difference in both health facilities.

The direct cost of care contributed over three quarters (urban, 80.4%; rural, 78.8%) of the cost of care in both tertiary health facilities. The cost of drugs/consumables and the cost of investigation are components of the direct cost, contributing more than half (urban, 56.8%; rural, 58.8%) of the cost of care in both health facilities. The other components of the direct cost of care contributing to the cost of care of hypertension in the two health facilities included the cost of transportation (urban,

10.3%; rural, 7.1%), cost of bed/accommodation (urban, 4.2%; rural, 5.4%), cost of food (urban, 4.7%; rural, 5.0%) and cost of registration/consultation (urban, 4.4%; rural, 2.5%).

The patient income loss (urban, ₦2,980.96 [\$8.28]; rural, ₦2,332.75 [\$6.48]) was more than the caregiver income loss (urban, ₦886.76 [\$2.46]; rural, ₦1,584.16 [\$4.40]). These two components made up the indirect cost of care and accounted for less than one quarter (urban, 19.6%; rural, 21.2%) of the cost of care of hypertension in both tertiary health facilities. [Table 4]

DISCUSSION

The age groups of the respondents were equally distributed in both groups with a higher proportion of the respondents in their middle age. This is consistent with the age distribution from other studies.^[1,9] This shows that hypertension affects the middle and productive age and could have a serious economic impact on the community. Also, the urban than rural health facilities had patients with a higher levels of education, smaller household sizes, employed in formal occupations, and of higher socioeconomic status. These findings suggest that health facilities draw their patients from their area of locations.

The average monthly cost of care was significantly higher in urban than in rural health facilities and these costs represent about 66% and 61% of the minimum wage (₦30,000; US\$83)^[16] respectively. In addition, about one-third of the patients in both health facilities earn less than ₦20,000 monthly. These costs in low-income patients may impede healthcare access considering that the majority of hypertensive patients in Nigeria pay out-of-pocket.^[11] The costs in this study are lower than that of studies conducted in Nigeria and the US.^[6,17,18] However, it is higher than that of other studies conducted in other tertiary health facilities in Nigeria.^[9,19] The later studies did not measure the indirect cost and some components of the direct cost such as consultation, transportation, food, and admission as parts of their cost of care. This would lead to underestimating the cost of care and may explain the difference in findings.

Furthermore, the direct costs make up over three-quarters of the costs of care in both health facilities and urban than rural health facilities hypertensive patients were significantly paying higher. The cost of living including that of food, transportation, and other essential products in urban areas in Nigeria is much higher than that of the rural areas^[20,21] and this may affect the logistics of running the health facilities, thus raising the cost of care in urban facilities. The findings on indirect costs show that it is less than one-quarter of the cost of care in both groups. This is different from the results obtained in Bangladesh.^[15] Generally, indirect costs are usually predominant and greater than direct costs due to the cost of loss of productivity.^[15] However, for non-communicable diseases which affect a sizeable number of elderly including retired persons, and for patients with high health resource use, such as stroke and cancer patients, the high use of healthcare services and the

Table 1: Socio-demographic Characteristics of the Respondents

Variables	Health Facility		χ^2	P	OR	95% CI: LB-UB
	Urban (%) n=204	Rural (%) n=202				
Age groups (years)			0.013	0.994		
≤44	33 (16.2)	32 (15.8)			1.016	0.562-1.836
45-64	103 (50.5)	103 (51.0)			0.985	0.638-1.521
≥65 ^{REF}	68 (33.3)	67 (33.2)			1.000	
Sex			0.037	0.848		
Male	93 (45.6)	94 (46.5)			0.963	0.652-1.422
Female ^{REF}	111 (54.4)	108 (53.5)			1.000	
Level of Education			5.493	0.019		
At most primary	63 (30.9)	85 (42.1)			0.615	0.409-0.925
At least secondary ^{REF}	141 (69.1)	117 (57.9)			1.000	
Mean household size±SD	3.7±2.5	4.6±2.3	-3.770*	<0.001		
Religion			1.099 ^f	0.686		
Christianity	184 (90.2)	179 (88.6)			1.131	0.597-2.144
Islam ^{REF}	20 (9.8)	22 (10.9)			1.000	
Traditional	0 (0.0)	1 (0.5)			0.000	-1.000-1.00
Tribe			0.886	0.829		
Yoruba	178 (87.3)	180 (89.0)			1.130	0.401-3.183
Hausa	6 (2.9)	5 (2.5)			1.371	0.288-6.535
Igbo	13 (6.4)	9 (4.5)			1.651	0.440-6.201
Others (Ebira, Tiv, Ijaw) ^{REF}	7 (3.4)	8 (4.0)			1.000	
Occupation			25.713	<0.001		
Trader	36 (17.6)	59 (29.1)			0.417	0.221-0.786
Farmer	11 (5.4)	22 (10.9)			0.342	0.143-0.814
Artisan	10 (4.9)	12 (5.9)			0.569	0.216-1.497
Civil servants	69 (33.8)	61 (30.2)			0.773	0.428-1.400
Unemployed	24 (11.8)	20 (9.9)			0.820	0.382-1.759
Retired ^{REF}	41 (20.1)	28 (13.9)			1.000	
Others (Entrepreneurs)	13 (6.4)	0 (0.0)				
Monthly Income (₦)			0.963	0.327		
<20,000	73 (35.8)	63 (31.2)			1.230	0.814-1.858
≥20,000 ^{REF}	131 (64.2)	139 (68.8)			1.000	
Socioeconomic Status			40.732	<0.001		
Poorest	31 (15.2)	50 (24.8)			0.449	0.239-0.841
Poor	41 (20.1)	41 (20.3)			0.723	0.390-1.342
Average	24 (11.8)	57 (28.2)			0.305	0.159-0.583
Rich	61 (29.9)	20 (9.9)			2.206	1.128-4.315
Richest ^{REF}	47 (23.0)	34 (16.8)			1.000	

χ^2 - Chi-square test, *t-test, ^fFischer's exact test, ^MMann-Whitney U test, SD - Standard deviation, IQR - Interquartile Range, ^{REF} - Reference category, OR-Odds Ratio, 95% C: LB-UB - 95% Confidence Interval: Lower border - Upper border

resulting direct costs may be of greater concern to the health system. The proportion of indirect cost may be high in the Bangladesh study because the minimum wage/salary which was used to estimate the indirect cost of care was higher in Bangladesh than in Nigeria.

Another finding in this study is that the cost of drugs, consumables, and investigation contributed almost two-thirds of the cost of care. This is similar to findings from studies in Nigeria^[10,18] and the US.^[17] However, it contrasts the findings in Lagos, southwest, Nigeria where the cost of laboratory investigation was about four times the cost of drugs.^[9] While only a few of the respondents had to pay for food, transportation, bed/accommodation, and some other components of the costs

of care, the majority had to pay for drugs and investigations which are essential parts of the care for hypertension.^[22] Apart from the cost of drugs/consumables and investigation being incurred by the majority of the patients, they also contributed about two-thirds of the total care expenditure. Therefore, reducing the cost of these components will go a long way in reducing the financial cost of hypertension.

The human capital approach that estimates the market value of an individual contribution to production in society if s/he had continued to work in full health^[10,23,24] was adopted in this study to estimate the indirect cost of hypertension. This method is usually adopted by most researchers but it's limited by its tendency to overestimate the value of forgone production

Table 2: Monthly Cost of Care (Cost of Clinics) of Hypertension among Respondents

Cost of Clinics	Health Facility						M-W U	P
	Urban (n=204)			Rural (n=202)				
	Average Cost ₦ [\$]	SD ₦ [\$]	POTC (%)	Average Cost ₦ [\$]	SD ₦ [\$]	POTC (%)		
Registration/Consultation	579.90 [1.61]	465.35 [1.29]	3.80	228.86 [0.64]	204.28 [0.57]	2.14	8784.5	<0.001
Drugs/Consumables	5,265.20 [14.63]	3,924.80 [10.90]	34.51	4,758.51 [13.22]	5,645.33 [15.68]	44.48	16214.5	<0.001
Investigations	4,042.40 [11.23]	6,197.96 [17.22]	26.49	2,030.69 [5.64]	4,438.94 [12.33]	18.98	16597.5	<0.001
Transportation	1,921.57 [5.34]	4,655.70 [12.93]	12.59	1,164.60 [3.24]	1,254.74 [3.49]	10.89	19976.5	0.594
Food	499.02 [1.39]	1,029.37 [2.86]	3.27	256.19 [0.71]	312.94 [0.87]	2.40	20242.0	0.743
Direct Cost of Clinics	12,308.09 [34.19]	10,227.04 [28.41]	80.66	8,438.86 [23.44]	10,014.70 [27.82]	78.89	13520.5	<0.001
Patients Income loss	2,460.12 [6.83]	3,164.91 [8.79]	16.12	1,478.79 [4.11]	1,338.91 [3.72]	13.82	18579.0	0.085
Caregivers Income loss	489.71 [1.36]	1,041.19 [2.89]	3.22	779.70 [2.17]	1,952.73 [5.42]	7.29	20335.5	0.784
Indirect Cost of Clinics	2,949.83 [8.19]	3,310.70 [9.20]	19.34	2,258.49 [6.27]	2,348.64 [6.52]	21.11	19730.0	0.459
Cost of Clinics	15,257.92 [42.38]	12,356.79 [34.32]	100.00	10,697.35 [29.71]	10,483.65 [29.12]	100.00	14449.0	<0.001

SD - Standard deviation, POTC - Proportion of total cost, M-W U - Mann-Whitney U test

Table 3: Monthly Cost of Care (Cost of Admissions) of Hypertension among Respondents

Cost of Admissions	Health Facility						M-W U	P
	Urban (n=204)			Rural (n=202)				
	Average Cost ₦ [\$]	SD ₦ [\$]	POTC (%)	Average Cost ₦ [\$]	SD ₦ [\$]	POTC (%)		
Registration/Consultation	279.41 [0.78]	1,009.98 [2.81]	6.29	235.15 [0.65]	1,201.33 [3.34]	3.03	19641.5	0.073
Drugs/Consumables	1,004.90 [2.79]	3,919.76 [10.89]	22.60	3,017.33 [8.38]	11,116.34 [30.88]	38.93	20256.0	0.545
Investigations	877.45 [2.44]	5,451.41 [15.14]	19.74	1,035.89 [2.88]	4,869.08 [13.53]	13.36	20488.0	0.789
Bed/Accommodation	833.33 [2.31]	3,522.16 [9.78]	18.75	1,002.48 [2.78]	4,772.56 [13.26]	12.93	19680.0	0.085
Transportation	105.88 [0.29]	323.41 [0.90]	2.38	142.57 [0.40]	550.14 [1.53]	1.84	20220.0	0.505
Food	426.47 [1.18]	2,007.25 [5.58]	9.59	659.41 [1.83]	2,623.42 [7.29]	8.51	20215.0	0.499
Direct Cost of Admissions	3,527.45 [9.80]	15,724.22 [43.68]	79.35	6,092.82 [16.92]	23,553.55 [65.43]	78.60	20220.0	0.505
Patients Income loss	520.83 [1.45]	1,915.68 [5.32]	11.72	853.96 [2.37]	3,254.50 [9.04]	11.02	20219.0	0.503
Caregivers Income loss	397.06 [1.10]	1,360.31 [3.78]	8.93	804.46 [2.23]	3,357.27 [9.33]	10.38	20234.0	0.520
Indirect Cost of Admissions	917.89 [2.55]	2,957.28 [8.21]	20.65	1,658.42 [4.61]	6,200.20 [17.22]	21.40	20264.0	0.555
Cost of Admissions	4,445.34 [12.35]	17,885.43 [49.68]	100.00	7,751.24 [21.53]	28,893.04 [80.26]	100.00	20236.0	0.523

SD - Standard deviation, POTC - Proportion of total cost, M-W U - Mann-Whitney U test

Table 4: Monthly Cost of Care of Hypertension among Respondents

Cost of Clinic and Admission	Health Facility						M-W U	P
	Urban (n=204)			Rural (n=202)				
	Average Cost ₦ [\$]	SD ₦ [\$]	POTC (%)	Average Cost ₦ [\$]	SD ₦ [\$]	POTC (%)		
Registration/Consultation	859.31 [2.39]	1,114.00 [3.09]	4.36	464.01 [1.29]	1,222.67 [3.40]	2.52	10087.0	<0.001
Drugs/Consumables	6,270.10 [17.42]	5,560.81 [15.45]	31.82	7,775.84 [21.60]	12,751.56 [35.42]	42.15	16912.5	0.002
Investigations	4,919.85 [13.67]	8,779.28 [24.39]	24.97	3,066.58 [8.52]	6,776.97 [18.82]	16.62	17019.5	0.002
Bed/Accommodation	833.33 [2.31]	3,522.16 [9.78]	4.23	1,002.48 [2.78]	4,772.56 [13.26]	5.43	19680.0	0.085
Transportation	2,027.45 [5.63]	4,639.84 [12.89]	10.29	1,307.18 [3.63]	1,389.46 [3.86]	7.09	20252.0	0.765
Food	925.49 [2.57]	2,246.14 [6.24]	4.70	915.59 [2.54]	2,618.33 [7.27]	4.96	20060.0	0.626
Direct Cost of Care	15,835.54 [43.99]	19,044.80 [52.90]	80.37	14,531.68 [40.37]	26,227.83 [72.86]	78.77	14419.5	<0.001
Patients Income loss	2,980.96 [8.28]	3,702.43 [10.28]	15.13	2,332.75 [6.48]	3,672.94 [10.20]	12.64	18781.0	0.122
Caregivers Income loss	886.76 [2.46]	2,029.31 [5.64]	4.50	1,584.16 [4.40]	3,722.71 [10.34]	8.59	20347.0	0.804
Indirect Cost of Care	3,867.72 [10.74]	4,607.13 [12.80]	19.63	3,916.91 [10.88]	6,495.11 [18.04]	21.23	19881.0	0.540
Cost of Care	19,703.26 [54.73]	22,080.49 [61.33]	100.00	18,448.58 [51.25]	31,150.19 [86.53]	100.00	15062.0	<0.001

SD - Standard deviation, POTC - Proportion of total cost, M-W U - Mann-Whitney U test

because it disregards potential work replacement.^[23,24] Also, this study did not assess the affordability of care in relation to healthcare costs, further studies should be carried out to assess this.

In conclusion, the financial cost of hypertension was higher in urban than in rural tertiary health facilities. Also, the cost of drugs, consumables, and investigation contributed to almost two-thirds of the financial cost in both health facilities. Based on these findings, the government needs to support urban tertiary health facilities to reduce the financial gap. Moreover, policies on cost reduction of drugs, consumables, and investigations will significantly reduce the economic cost of hypertension in both health facilities.

Contribution of authors

All co-authors took part in the research process and their inclusion in the publication has been gained.

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Conflicts of interest

There are no conflicts of interest.

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