



## Determinants of catastrophic health spending among rural households in Nigeria

<sup>1</sup>Paul O. Ajayi, <sup>2</sup>Tope M. Ipinnimo, <sup>3</sup>Deborah T. Esan, <sup>1</sup>Oluremi O. Solomon, <sup>4</sup>Moronkeji T. Olanrewaju

<sup>1</sup>Department of Community Medicine, Faculty of Clinical Sciences, Ekiti State University, Ado-Ekiti, Ekiti State, Nigeria

<sup>2</sup>Department of Community Medicine, Federal Teaching Hospital, Ido-Ekiti, Ekiti State, Nigeria.

<sup>3</sup>Department of Nursing Science, Afe Babalola University Ado Ekiti, Ekiti State, Nigeria.

<sup>4</sup>Department of Family Medicine, Federal Teaching Hospital, Ido-Ekiti, Ekiti State, Nigeria.

**Corresponding author: Paul O. Ajayi**, Department of Community Medicine, Faculty of Clinical Sciences, Ekiti State University, Ado-Ekiti, Ekiti State, Nigeria; paulajayi123@gmail.com; +2348034892087

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### Abstract

**Background:** Globally, over “150 million individuals” suffer annually from catastrophic health spending mainly as a result of direct spending on healthcare services. According to the World Health Organization, “household catastrophic health spending is health spending greater than or equal to 40% of the household’s non-subsistence income”. Little is known about the determinants of household catastrophic health spending in developing countries.

**Objectives:** The study aims to find the determinants of household catastrophic health spending in rural Nigeria.

**Methods:** The study used a cross-sectional survey design to recruit 496 rural households within selected communities in Gbonyin Local government Area of Ekiti State, Nigeria. Data was collected using a pretested, interviewer-administered, and semi-structured questionnaire from 496 household heads. A multistage sampling technique was used over a period of 4 months. Data analysis conducted includes univariate analysis, bivariate analysis (chi-square), and binary logistic regression analysis using STATA 12 software package and principal component analysis done to derive the wealth quartiles. Statistical significance level was set at  $p \leq 0.05$  and 95%CI calculated for the adjusted OR.

**Results:** The factors associated with household catastrophic spending include the presence of a hospitalized household member (OR=50.38, 95%CI: 7.11 – 59.62;  $p=0.042$ ) and the number of employed household members less than 3 which will give a positive value (OR=0.001, 95%CI:0.00-0.15;  $p=0.009$ ).

**Conclusion:** The predictors of household catastrophic spending in the rural areas were the presence of hospitalized household members and the presence of employed household member(s). Informed targeted intervention could help reduce the burden of financial catastrophe among rural households.

### Keywords

Determinant, household, catastrophic health spending, rural, Nigeria

### Introduction

Catastrophic health expenditure (CHE) occurs when the cost of out-of-pocket health spending has attained a critical level where a household must forego the expenditure on other basic needs of life to meet the health expenses of another family member(s)<sup>1</sup>. The World Health Organization (WHO) defines “household catastrophic health expenditure (HCHE) as health expenditure (HE) greater than or equal to 40% of the household’s non-subsistence income”<sup>2</sup>. Health spending

is catastrophic if the family’s financial contribution to the health system exceeds 40% of the household income remaining after subsistence needs have been met<sup>2,3</sup>.

Around 400 million individuals globally do not have access to basic healthcare services mainly due to lack or poor funding mechanisms<sup>4,5</sup>. Annually, 25 million households globally are pushed into poverty from trying to get critical healthcare service, while over 150 million people are burdened annually from financial catastrophe





due to Out-of-Pocket (OOP) spending on healthcare services<sup>6-8</sup>.

Yet, OOP payments for healthcare services occur worldwide, and it is still the commonest healthcare financing option in developing countries, especially in Africa<sup>9</sup>. About 32% of global healthcare spending is from OOP spending<sup>6</sup>. Due to the poor funding of the health sector by the government, OOP payment remains the primary source of healthcare financing for most African countries like Nigeria, and this serves as a precursor to having HCHE<sup>9</sup>.

The prevalence of HCHE in Nigeria varies between 2.5% and 44%<sup>10,11</sup>. Globally in most developed countries, several factors determine the presence or absence of HCHE, and these included insurance protection, presence of elderly in the household (HH), presence of household members with chronic disease, household socioeconomic status (income, occupation), utilization of healthcare facility by the household<sup>3,12</sup>.

However, there is paucity of knowledge of the existence and determinants of HCHE in low and middle-income countries (LMIC), especially in Nigeria<sup>3</sup>. Adequate knowledge of the predictors of HCHE is required to guide policymaker in enacting laws and policies that will reduce the effect of HCHE on the populace. The study assessed the predictors of household catastrophic health spending among the selected rural localities of Ekiti State, Nigeria.

## Methodology

**Study design and setting:** This cross-sectional study was conducted in selected rural communities in Gbonyin Local government Area (LGA) of Ekiti State, Nigeria. Gbonyin (LGA) comprises (8) eight towns, namely Ijan-Ekiti, Ilumoba-Ekiti, Iro-Ekiti, Agbado-Ekiti, Aisegba-Ekiti, Egbe-Ekiti, Imesin-Ekiti, and Ode-Ekiti<sup>13</sup>. It is one of the 16 LGAs of the State with the headquarters in Ode-Ekiti. It has an area of 391 km<sup>2</sup> and a population of 148,193 at the 2006 census (National Population Commission, Nigeria)<sup>13</sup>. The study involved selected households within selected localities in Gbonyin LGA of Ekiti State, Nigeria. According to the Nigeria Demographic Health Survey 2013 (NDHS 2013), “a household is defined as a person or group of persons, related or unrelated, who usually lives together in the same dwelling unit; have common cooking and eating arrangement, and acknowledge one adult member as the head of the household”<sup>14</sup>. The selected household is the sampling unit of the study. Food expenditure was used to measure subsistence expenditure because food expenditure is the best measure for both the rich and the poor<sup>9</sup>. The direct cost of OOP payment will be estimated to be the cost of illness<sup>15</sup>.

**Study Participants:** The study included all household heads who were more than 18 years of age for a household residing within the selected community within one year. All household heads that were registered with any health insurance scheme; and those who were visitors to the localities were excluded. A multistage sampling technique was carried out in the rural areas of Ekiti State, Nigeria. It started with randomly picking one rural district/local government areas from four, after which the wards, enumeration areas, and lastly the households were selected respectively. The household head was selected after a mini census was carried out to list the houses, households, and household heads in the selected rural areas.

### Study Variables:

**(a) Dependent Variable:** Household catastrophic health expenditure; HCHE methodological calculations used the operational definition of HCHE; the proportion of the direct health cost to the non-food income over a one-year period  $\geq 40\%$  (in percentages)<sup>15</sup>.

**(b) Independent Variable:** (i). Demographic variable: Age, gender, marital status, religion, household size, presence of children fewer than 5 years in the household, presence of elderly or older persons in the household; (ii). Socio-economic: Income, wealth status, occupation, level of education of the respondent, and (iii). Other predictors

**Study size:** The determination of the sample size was done using the Fisher's formula for the population  $>10,000$ <sup>16</sup>.

$$n = Z^2 (pq) / e^2$$

n = desired sample when population is  $>10,000$

Z = standard normal deviate set at 1.96

p = Proportion of rural household facing HCHE (24%)<sup>17</sup>

$$q = 1 - P = 0.76$$

e = degree of desired accuracy 0.05

$$n = Z^2 (pq) / e^2 = (1.96)^2 (0.24) (0.76) / 0.05^2$$

$$= 0.70070784 / 0.0025$$

$$= 281$$

To compensate for non-response, assume 10% non-response. The sample size would be calculated using the following formulae<sup>16</sup>

$$n_n = n / 1 - n_{nr}$$

n = calculated minimum supply size for the respondent

n<sub>nr</sub> = sample size; compensated for non-response rate

n<sub>n</sub> = compensated sample for respondent<sup>16</sup>

$$n_n = n / 1 - n_{nr}$$

$$281 / 1 - 0.1$$

$$= 281 / 0.9$$

$$= 312$$

This was approximated to 500 household heads.

**Data Collection:** A pretested, semi-structured, interviewer-administered questionnaire was used. The questionnaire contents were adapted from several studies<sup>10,18-20</sup>. Data were collected from selected household heads in the selected rural areas. Face and content validity was done by an expert and, reliability test (Cronbach's alpha test) the alpha coefficient was 0.887 for 23 items suggesting the items have a high internal consistency (An alpha coefficient value of  $\geq 0.7$  is considered high and acceptable in most research)<sup>21</sup>.

**Data management Plan:** All the administered questionnaires were collated and checked daily for errors and completeness, and appropriate corrections were made. The data obtained were then entered using the IBM SPSS version 20. The household socio-economic status was estimated using household wealth scores, based on household ownership of some asset using principal component analysis. The households were divided into five different quintiles based on their wealth scores at one end "the poorest" and at the other end "the richest"<sup>22</sup>.

**Data analysis:** Univariate, bivariate and binary logistic regression analysis were conducted using STATA 12 Software Package. Frequency Tables, summary statistics such as mean, and standard deviation were used to describe the population in relation to the relevant variable described. Bivariate analysis (Chi-square test) was performed. Binary logistic regression analysis was used to identify the significant factors. Statistical significance level was set at  $p \leq 0.05$  and 95%CI calculated for the adjusted OR.

**Ethics:** Research approval was received from the Ethics and Research Review Committee of the institution (ERC/2017/04/03/47A). A written informed consent for the interview was obtained from each household after debriefing on the study's aims, nature and benefits.

## Results

### Preamble

The household heads were four hundred and ninety-six (496) of the 500 respondents (99.2% response rate). The total number of rural household members were 2,119, while HH size in the rural areas was  $4.8 \pm 1.3$ .

**Table 1.** Socio-demographic profiles of the household heads in the rural areas of Ekiti State, Nigeria

Socio-demographic variables	N = 496 (%)
Age groups of Household Head (in years)	
<40	264(53.2)
40 - 59	132(26.6)
$\geq 60$	100(20.2)

Mean Age of Household Head(in years)	42.4 $\pm$ 16.8
Gender of Household Head	
<b>Male</b>	155(31.2)
<b>Female</b>	341(68.8)
Religion of Household Head	
<b>Christianity</b>	428(86.3)
<b>Islam</b>	58(11.7)
<b>Others*</b>	10(2.0)
Education of Household Head	
<b>No Formal Education</b>	73(14.7)
<b>Primary</b>	95(19.2)
<b>Secondary</b>	252(50.8)
<b>Tertiary</b>	76(15.3)
Occupation of Household Head	
<b>Informal</b>	422(85.1)
<b>Formal</b>	74(14.9)
Marital Status of Household Head	
<b>Single</b>	22(4.4)
<b>Married /Co-habiting</b>	403(81.3)
<b>Separated/Divorced/Widow/Widower</b>	71(14.3)
Tribe of Household Head	
<b>Yoruba</b>	452(91.1)
<b>Ibo</b>	16(3.2)
<b>Others**</b>	28(5.7)
Wealth Status of Household	
<b>Poorest</b>	200(40.3)
<b>Poor</b>	82(16.5)
<b>Average</b>	72(14.5)
<b>Rich</b>	85(17.2)
<b>Richest</b>	57(11.5)
Household Income(naira)	
<b><math>\leq 20,000</math></b>	236(47.6)
<b><math>&gt;20,000 - 50,000</math></b>	200(40.3)
<b><math>&gt;50,000 - 150,000</math></b>	58(11.7)
<b><math>\geq 150,000</math></b>	2(0.4)
Median income	20,000
Have Elderly Person in the HH	
<b>Yes</b>	100(20.2)
<b>No</b>	396(79.8)
Have children < 5 years in the HH	
<b>Yes</b>	182 (36.7)
<b>No</b>	314 (63.3)
Total HH expenditure (naira)	
<b>&lt;50000</b>	336(67.7)
<b>50000-100000</b>	111(22.4)
<b>&gt;100000</b>	49(9.9)
Median HH spending	34925
Household Health expenditures(naira)	
<b>&lt;5000</b>	424(89.3)
<b>&gt;5000- &lt;10000</b>	24(5.0)
<b>&gt;10000-&lt;15000</b>	13(2.7)
<b>&gt;15000</b>	14(3.0)
Median HH health expenditure	3550



Others\* includes traditional worshippers \*\*Others include Hausa, Igbo and others, HH: Household

Table 1 shows that more than half of the respondents were aged < 40 years (53.2%=264). The mean age was 42.4±16.8years. The majority of the household heads were females (68.8%=341). The predominant religion was Christianity (86.3%=428), and about half of the household heads (50.8%=252) had secondary education. The majority of the (81.3%=403) respondents were married. In addition, the major tribe (91.1%=425) was Yoruba. Also Table 1 revealed that two-fifths of the rural respondents (40.3%=200) were among the poorest wealth quintile while about one-tenth (11.5%=57) of the respondents were among the richest wealth quintile. The rural household heads had about one-fifth (20.2%=100) of the respondent as the elderly persons above 65years of age. The median HH health expenditure in the rural areas (34,925naira; 114USD) (One USD=306naira at 2018)<sup>23</sup>. The median household health expenditure is 3,550naira (11.6USD).

**Table 2.** The prevalence of catastrophic health spending within households in the rural areas of Ekiti State, Nigeria

Catastrophic Health Expenditure	N = 496(%)
Yes	41(8.3)
No	455(91.7)

The prevalence of HCHE was 8.3% (41) (as showed by table 2).

**Table 3.** Relationship between socio-demographic factors and catastrophic health spending among rural household in Ekiti State, Nigeria

Socio-demographic Factors	HCHE			Statistical Indices
	No Freq (%) (n=455)	Yes Freq (%) (n=41)	Total Freq (%) (n=496)	
<b>Age(yrs)</b>				
<40	237(90.1)	26(9.9)	263	LR= 11.039
40-59	130(97.7)	3(2.3)	133	df = 2
≥60	88(88.0)	12(12.0)	100	p = 0.004
<b>Gender</b>				
Male	144(92.9)	11(7.1)	155	df = 1
Female	311(91.2)	30(8.8)	341	p = 0.518
<b>Religion of HH***</b>				
Christianity	388(90.9)	39(9.1)	427	LR= 4.353
Islam	56(96.5)	2(3.5)	58	df = 2
Others*	11(100.0)	0(0.0)	11	p = 0.113
<b>Education of HHH*</b>				
No formal ed.	66(90.4)	7(9.6)	73	χ <sup>2</sup> =10.649
Primary	89(93.7)	6(6.3)	95	df = 3
Secondary	237(94.0)	15(6.0)	252	p = 0.031
Tertiary	63(82.9)	13(17.1)	76	
<b>Occupation</b>				
Informal	391(92.7)	31(7.3)	422	χ <sup>2</sup> =3.158
Formal	64(86.5)	10(13.5)	74	df = 1
<b>Marital status</b>				
Single	21(95.5)	1(4.5)	22	LR= 1.295
Married*	371(92.0)	32(8.0)	403	df = 2
Divorce *	63(91.7)	8(8.3)	71	p = 0.522
<b>Tribe of HHH*</b>				
Yoruba	413(91.6)	38(8.4)	451	LR=6.602
Igbo	13(81.3)	3(18.7)	16	df = 2
Other**	29(100.0)	0(0.0)	29	p = 0.037
<b>Income of HH***</b>				
≤20000	214(90.7)	22(9.3)	236	LR=0.990
>20000-50000	184(92.5)	15(7.5)	199	df = 3
>50000-150000	54(93.1)	4(6.9)	58	p = 0.804
>150000	3(100.0)	0(0)	3	

χ<sup>2</sup>: chi-square, LR:Likelihood ratio, P: level of significance (< 0.05), df - degree of freedom, \*\*Others include Hausa, Igboand others, \*HHH household head,\*\*\* HH Household, HHM household member, Married\* and cohabiting, Divorce\*/separated/widow/widower, Others\*includes traditional worshipper

Table 3 reveals: Bivariate analysis of the relationship between socio-demographic factors and HCHE revealed that the age group of the respondents (P 0.004), educational status of respondents (P 0.031), and the tribe of the respondents (P 0.037) were statistically significant

factors associated with HCHE. Also, HCHE was commoner among the older age group  $\geq 60$  years of age (12.0%=12) compared to the younger age group  $>40$  years (9.9%=26). Also, HCHE is commoner among the more educated rural dwellers (17.1%=13) compared

to those without formal education (9.6%=7), while HCHE is commoner amongst the Igbo tribe (18.7%=3) than other tribes.

**Table 4.** Relationship between other predictors and catastrophic health spending among rural areas of Ekiti State, Nigeria

Other predictors of HCHE	HCHE			Statistical indices
	No Freq (%) (n=455)	Yes Freq (%) (n=41)	Total Freq (%) (n=496)	
<b>Presence of PwD*</b>				
No	450(91.6)	41(8.4)	491	LR= 0.3642
Yes	5(100.0)	0(0.0)	5	df = 1 p = 0.546
<b>Presence of hospitalized HHM*</b>				
No				LR=36.072
Yes	455(93.0)	34(7.0)	489	df = 1 <b>p = 0.001</b>
	0(0.0)	7(100.0)	7	
<b>Presence of chronically-ill member</b>				
No				$\chi^2= 45.276$
Yes	449(92.9)	33(7.1)	482	df = 1 <b>p = 0.001</b>
	6(42.9)	8(57.1)	14	
<b>HH* size&gt;4</b>				
No	243(88.0)	33(12.0)	276	$\chi^2=11.254$
Yes	212(96.4)	8(3.6)	220	df = 1 <b>p = 0.001</b>
<b>Presence of aged HHM*</b>				
No	368(92.9)	28(7.1)	396	$\chi^2= 3.702$
Yes	87(87.0)	13(13.0)	100	df = 1 p = 0.054
<b>Presence of near HF*(&lt;30min)</b>				
No				$\chi^2=0.0286$
Yes	72(92.3)	6(7.7)	78	df = 1 p = 0.865
	383(91.6)	35(8.4)	418	LR=2.0641
<b>Dental service usage</b>				
No	433(92.1)	37(7.9)	470	df = 1
Yes	22(84.6)	4(15.4)	26	p = 0.151
<b>Presence of under 5 in HH*</b>				
No	293(93.3)	22(6.7)	314	$\chi^2=1.8418$
Yes	162(89.5)	19(10.5)	181	df = 1 p = 0.175
<b>Presence of nursing women</b>				
No	375(91.9)	33(8.1)	408	$\chi^2=0.1157$
Yes	80(90.9)	8(9.1)	88	df = 1 p = 0.734
<b>Number of employed HHM*</b>				
No member	13(86.7)	2(13.3)	15	
1 member	96(80.7)	23(19.3)	119	$\chi^2=23.798$
2 members	345(95.8)	16(4.2)	361	df = 1
>3 members	1(100.0)	0(0.0)	1	<b>p = 0.001</b>
<b>Presence of pregnant women</b>				
No	434(91.6)	40(8.4)	474	$\chi^2=0.4233$
Yes	21(95.5)	1(4.5)	22	df = 1



Other predictors of HCHE	HCHE			Statistical indices
	No Freq (%) (n=455)	Yes Freq (%) (n=41)	Total Freq (%) (n=496)	
				p=0.515
<b>Presence of regular salary</b>				$\chi^2=0.2310$
No	26(89.7)	3(10.3)	29	df = 1
Yes	429(91.9)	38(8.1)	467	p=0.631
<b>Public hospital usage by HH</b>				$LR=2.7665$
No	80(96.4)	3(3.6)	83	df=1
Yes	372(90.8)	38(9.2)	413	p=0.096
<b>Private hospital usage by HH</b>				$\chi^2=4.7962$
No	290(93.9)	19(6.1)	309	df = 1
Yes	165(88.2)	22(11.8)	187	<b>p = 0.029</b>
<b>Used HCS* in the last 4wks</b>				$\chi^2= 11.646$
No	191(97.0)	6(3.0)	197(100)	df = 1
Yes	264(88.3)	35(11.7)	299(100)	<b>p = 0.001</b>
<b>Type of HF* used</b>				$\chi^2=6.732$
Public	272(89.2)	33(10.8)	305(100)	df = 1
Private	183(95.8)	8(4.2)	191(100)	<b>p = 0.001</b>
<b>Hospital admission in the last 12month</b>				$\chi^2=14.116$
No	368(94.1)	23(5.9)	391(100)	df = 1
Yes	87(82.9)	18(17.1)	105(100)	<b>p = 0.001</b>

$\chi^2$ : chi-square, LR:Likelihood ratio  $\chi^2$ , P: Significance level ( $\leq 0.05$ ), df: degree of freedom, \*HCS healthcare service, HH\* Household, HHM\* household member, HF\* health facility, \*PwD People with disability,\*HHH household head.

Bivariate analysis (shown in table 4) of the known predictors of HCHE and its relationship with HCHE revealed that the presence of hospitalized HHM (100.0%) was associated with HCHE than HH without hospitalized HHM (7.0%), which was statistically significant ( $p=0.001$ ). Similarly, the presence of chronically ill HHM (57.1%) was associated with HCHE than those without a chronically ill HHM (7.1%), which was statistically significant ( $p=0.001$ ). The presence of HH size > four (3.6%) was associated with a lower prevalence of HCHE than those without (12.0%), which was statistically significant ( $p=0.001$ ). In the rural area, the presence of employed HHM (with one employed (19.3%)) is associated with HCHE than those without.

**Table 5.** Binary logistic regression analysis of the determinants of catastrophic health spending in rural households in Ekiti State, Nigeria

Catastrophic Health Expenditure	Adjusted Odds Ratio (95% Confidence Interval)	P-Value
<b>Age groups of HHH (in years)</b>		
<40	1	
40 - 59	6.50(0.00 – 0.00)	0.880
≥60	3.73 (0.00 - 0.00)	0.915
<b>Tribe of HHH*</b>		
Yoruba	1	
Igbo	0.08(0.01-1.15)	0.099
Other**	0.02(0.05-1.09)	0.107
<b>Education of HHH*</b>		
No formal education	1	
Primary	0.00(0.01-1.00)	0.994
Secondary	1.02(0.02-2.13)	0.341
Tertiary	1.33(0.85-5.01)	0.401
<b>Presence of Hospitalized Member</b>		



Catastrophic Health Expenditure	Adjusted Ratio	Odds (95% Confidence Interval)	P-Value
Yes	50.38	(7.11 - 59.62)	0.042
No	1		
<b>Presence of Chronically Ill Member</b>			
Yes	2.60	(0.50 - 12.92)	0.296
No	1		
<b>Household Size Above 4</b>			
Yes	1.93	(0.13 - 28.18)	0.631
No	1		
<b>Private hospital usage by Household</b>			
Yes	1.81	(0.15 - 21.47)	0.638
No	1		
<b>Number of Employed Members in Household</b>			
No Member	1		
One Member	0.07	(0.002-2.74)	0.153
Two Members	0.00	(0.00- 0.00)	0.990
Three Members or More	0.001	(0.00 -0.15)	0.009
<b>Healthcare service usage in the last 4wks</b>			
Yes	0.00	(0.00 - 0.00)	0.999
No	1		
<b>Healthcare service usage in the last 12mths</b>			
Yes	0.008	(0.00-0.290)	0.058
No	1		
<b>Type of healthcare service usage</b>			
Public	3.644	(0.00 - 0.00)	1.000
Private	1		

HHH: household heads employed HHM (13.3%), which was statistically significant ( $p=0.001$ ), presence of private hospital usage (11.8%) is associated with HCHE than those without (6.1%) which is statistically significant ( $p=0.029$ ). Bivariate analysis of the relationship between healthcare service utilization and HCHE revealed that factors like usage of HCS in the last four weeks ( $p=0.001$ ), hospital admission in the HH in the previous twelve months ( $p=0.001$ ), type of Health facility used ( $p=0.001$ ) were all significantly associated with HCHE. The usage of

healthcare service in the last four weeks (11.7%) was associated with HCHE than those who didn't utilize the service (3.0%), which was statistically significant ( $p=0.001$ ). Equally, hospital admission within the last twelve months (17.1%) was associated with HCHE than those HHs which didn't have any hospital admission in the last twelve months (5.9%); this was statistically significant ( $p=0.001$ ). The type of health facility used (public) 10.8%) is associated with HCHE than those HH which used private health facility (4.2%), this was statistically significant ( $p=0.001$ ) (as shown above by table 4).

After binary logistic regression analysis, the significant predictors associated with HCHE include the presence of hospitalized HHM (OR=50.38, 95%CI: 7.11-59.62;  $p=0.042$ ) and the number of employed HHM greater than three (OR=0.001 95%CI: 0.00-0.15;  $p=0.009$ ) which were statistically significant. A household with a hospitalized HHM was 50.4times more likely to experience HCHE than those without hospitalized HHM. A Household with three or more employed HHMs where 99.999% protected from developing HCHE than those without three or more employed HHM (as shown by table 5)

## Discussion

This study has assessed the determinants of catastrophic health spending among the rural household of Ekiti state Nigeria. It investigated the different factors; socio-demographic factor, socio-economic factor and all other predictors of HCHE.

The factors predicting the occurrence of HCHE include the number of employed HHM (three or more) and presence of hospitalized HHM after controlling for other factors.

The study predicts that a household with a hospitalized HHM was 50.4times more likely to experience HCHE than those without hospitalized HHM; (OR=50.38 95%CI: 7.11-59.62;  $p=0.042$ ), this is comparable to a study by Ghiasvand et al<sup>24</sup>, which revealed that HHM with increasing hospitalized days increase the likelihood of experiencing HCHE (OR=1.03, 95%CI: 1.01-1.04;  $p<0.001$ ).<sup>24</sup> In China, a study by Li et al<sup>25</sup>, also revealed an increase in the frequency of hospitalization in a year increases the likelihood of incurring HCHE (for one admission (OR=4.38 95%CI: 3.65-5.24;  $p<0.000$ ), (two admissions OR=4.54 95%CI:2.59-7.96;  $p<0.001$ ), (for three admission OR=25.71,95%CI: 8.11-81.53;  $p<0.001$ ). Hospitalization usually increases the cost of healthcare (transportation cost of the patient, consultation cost, laboratory investigation cost, drug cost and admission cost, feeding cost and other costs); hence, it can push the HH into HCHE. The study



location of Li et al study<sup>25</sup> was in China, which is a more developed country compared to this study location (Ekiti State, Nigeria; a developing country), where the health system is less developed and has a poorer support system that may account for the difference in the level of association. Another study by Kavosi et al<sup>26</sup> in Iran showed in-patient service usage by HH was significantly associated with CHE (OR=11.55 95%CI: 1.61-7.69;  $p < 0.001$ ), also Yang et al<sup>27</sup> revealed  $\geq 1$  elderly member hospitalized among empty-nest-single (OR=4.35,95%CI: 2.05-9.22;  $p < 0.001$ , empty-nest-couple (OR=2.84, 95%CI: 1.75-3.51;  $p < 0.001$ , non-empty nest elderly (OR=4.9,95%CI:3.20-7.17; $p < 0.001$  all increase the chance of incurring HCHE.

Also from this study, a higher number of employed HHM three or more (OR=0.001 95%CI: 0.00-0.15;  $p = 0.009$ ) was significantly associated with HCHE, which is similar to a study in Kenya revealed that an increase in working adults reduces the odd of HCHE by 1.2times<sup>28</sup>. The similarity may be that as employed HHM increases, the household capacity to pay increases, thereby reducing the likelihood of incurring HCHE.

### Limitation

Recall bias was minimized by obtaining information (one month prior to the study) for outpatient cases, while in-patient recall of twelve months prior to the survey was taken. Self-reporting was done for questioning on household income to prevent social desirability bias

Public health significance and implications: The findings revealed a high prevalence of HCHE. This might indicate the need for an increase in the prepayment method of healthcare financing to eliminate or reduce direct out-of-pocket spending<sup>29,30</sup>. The identified factors causing the the high prevalence in the rural areas should be tackled; hence the targeted approach and intervention towards these identified factors will increase the effectiveness and efficiency of the health system. Rural dwellers were more prone to HCHE; accordingly, more policy should be directed at rural dwellers and hospitalized rural dwellers to reduce the impact of healthcare costs.

### Implications of the findings

Based on the findings of this study, the following recommendations are made as the implications of the findings for policy, practice and future studies

For policy: The policymaker should adopt and expand the coverage of healthcare insurance, especially to the rural areas to reduce HCHE.

For practise: the government should consider subsidizing the care of those hospitalized in the rural areas to increase financial access to the needed healthcare services and prevent HCHE. Hospital

communities should have a good social support department to create a safety net for the rural poor and those on prolonged hospitalized stay for various illnesses, hence preventing some households from incurring catastrophic expenses.

Further studies: qualitative studies on other factors associated HCHE might help policymakers.

### Conclusion

The study concluded that the prevalence of HCHE was high in the rural areas of Ekiti state Nigeria. The predictors of HCHE in the rural area includes the presence of hospitalized HHM and the presence of employed HHM ( $\geq 3$ ).

### Authors' contribution

Paul O. Ajayi, Tope M. Ipinnimo, Deborah T. Esan, Oluremi O. Solomon, Temitope M. Olanrewaju participated in conceptualization, planning, data collection, interpretation of the result, manuscript preparation, proofreading, and approval of the final manuscript.

### Conflict of Interest

No conflict of interest

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