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# The Prevalence of Household Catastrophic Health Expenditure in Nigeria: A Rural-Urban Comparison

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## Abstract

Background: Catastrophic health expenditure occurs when the burden of Out-of-pocket health expenditure has reached a certain level that a household must forego the expenditure on other basic needs of life to meet the health expenses of its member(s) of the household. Worldwide, over 44 million households suffer annually from financial catastrophe. This study intends to determine the prevalence of household catastrophic health expenditure amongst rural and urban communities in Ekiti, Nigeria. Methodology: This is a comparative cross-sectional study of households within selected rural and urban communities in Ekiti State, Nigeria. A pre-tested interviewer-administered semi-structured questionnaire was used to collect data over a period of 4 months from a sample of 1,000 household heads, using a multistage sampling technique. Data obtained were then entered using the SPSS version 20 and analysed with STATA 12. Two different methodologies were used to calculate household catastrophic health expenditure, with sensitivity analysis done. Univariate analysis were used to describe the population in relation to relevant variables. Result: The prevalence of household catastrophic health expenditure is high using the two methodological calculations. It was significantly higher in the rural areas, 18.5% than the urban areas, 12.8% ( $p=0.015$ ) for first method; it was also higher in the rural areas, 8.3% compared to the urban areas, 2.5% ( $p<0.001$ ) for the second method. Conclusion: Prevalence of household catastrophic health expenditure is high in Nigeria, but worse in the rural areas. It's therefore vital to establish financial and social intervention mechanisms that can protect households from incurring catastrophic health expenditure.

**Keywords:** Household Catastrophic Health Expenditure, Out of Pocket Payments, Nigeria

## 1. INTRODUCTION

A departure from health can lead to illnesses, diseases, disability and eventually death (Gordis, 2004). Every person is at risk of falling ill at one point or the other in their lifetime. Also illnesses or diseases are usually

unpredictable necessitating a health-seeking behavior in the individuals or by the household with varied treatment provider options: local dispensary, drug store, pharmacy, alternative healer or spiritualist, traditional birth attendant or herbalist, health centers, clinics, hospitals and other places (Onwujekwe, Chukwogo, Ezeoke, Uzochukwu, 2010). In the health facilities, payment for healthcare services can either be direct or indirect; examples of the payment options includes direct out-of-pocket (OOP) payment, government subsidies, taxation, private and social health insurance schemes, donation and other means (Buiquit, Ettarh, Amenda, 2015). It is the direct out-of-pocket (OOP) payment and other direct payments that may lead to catastrophic health expenditure (CHE), (Buiquit et al. 2015).

Catastrophic health expenditure occurs when the burden of out-of-pocket health expenditure has reached a certain level that a household must forego the expenditure on other basic needs of life to meet the health expenses of one or more member(s) of the household (Olatunya et al., 2015). 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. ( Ke, David, Guy, Ana, 2005 and Xu, Evans, Kawabata, Zeramdini, Klavus , Murray, 2003).

Despite the increase in the amount spent on health globally, the prevalence of HCHE is increasing especially in the developing countries (Arce 2019 and World Health Organization 2016). The global average health expenditure per person is 948USD (WHO 2012) while that of Nigeria is about one-eighth of the global average; 118USD (WHO 2016). Also, the Nigerian population (World Bank, 2016) was about 182.2million in 2015 with a gross domestic product (GDP) of 481.1billionUSD (World Bank, 2016) and per capita GDP of 2,640USD (World Bank, 2016). In Nigeria, the private expenditure on health accounts for about 70% of total health expenditure with out-of-pocket payment on health, making up 90-96% of the private expenditure on health, (Onwujekwe, Uzochukwu, Onoka, 2011 and Adisa, 2015).

Low and middle income countries have about 84% of the world's population, also they have 90% of the world's disease burden but they account for only 12% of the world resources spent on health (Brinda, Andres, Enemark, 2014). Most of the governments in the developing countries failed to spend adequately on health, spending less than 9% of their budget on health,(Brinda et al., 2014) which is not in line with the Abuja declaration(WHO, 2011). This, therefore push the majority of the populace to spend a larger part of their income on health (Brinda et al., 2014). The lack of adequate prepayment or health insurance system in many developing countries has allowed members of households with illnesses or diseases to experience CHE, and in the worst cases, they experience poverty and impoverishment (Rashad and Sharaf, 2015). There have been several definitions of household catastrophic health expenditure (HCHE) in the past; Wagstaff and Doorslear, in a World Bank study described CHE as an overshoot of healthcare expenditure, beyond a critical threshold of 10% of a household's total expenditure (Aditi, 2014). World Health Organization's (WHO) multi-country study described HCHE using the household's capacity to pay for healthcare rather than on total income. Capacity to pay was described as income left after removing food consumption. The critical threshold was set at 40% or more of the non-food consumption or non-discretionary income (Xu et al., 2003).

This study's operational definition of HCHE is the percentage of direct health cost exceeding 10% of the household expenditure of the income over a one year period (CHE<sub>1</sub>); and CHE<sub>2</sub>: the percentage of the direct health cost greater than or equals to 40% of the non-food income over a one year period (Knaul, Wong, Arreola-ornelas, Mendez, 2011).

According to a multi-country WHO study in 2003, HCHE<sub>2</sub> prevalence ranges from 0.01% to 10.5% (Xu et al., 2003). It was observed that most of the developed countries had advanced health system that protects the household from CHE<sub>2</sub> (Xu et al., 2003). A comparative analysis among 12 Latin American and Caribbean countries revealed a prevalence ranging between 0.4% to 11 %, ( Knaul et al., 2011) also CHE<sub>2</sub> prevalence among older people in six low and middle-income (LMIC) countries ranges on average between 3.2% in Mexico to 15% in China (Brinda, Altermann, Kowal, Enemark, 2014). In Turkey, a study revealed only 0.6% developed CHE<sub>2</sub> (Yardim MS, Cilingiroglu N, Yardim N, 2010). Not much is known about the prevalence of HCHE however, in the developing countries (Xu et al., 2003 and Adisa, 2015). The prevalence of HCHE within the African region reported by Buiquit in Kenya's slum ranges between <1.52% for CHE<sub>2</sub> to 22.80% for CHE<sub>1</sub>

(Buiquet et al., 2015) and likewise Brinda reported the HCHE<sub>2</sub> prevalence of 18% among people in a study in Tanzania (Brinda et al., 2014). In the southern part of Africa, a study in Botswana and Lesotho revealed the percentage of people with household CHE<sub>2</sub> was 7% and 1.25% respectively (Akinkugbe, Chama-Chiliba, Tlotlego, 2012). In Burkina Faso in the western part of Africa, study there revealed 8.66% of the people had CHE<sub>2</sub> (Su, Kouyate, Flessa, 2006).

The prevalence of household CHE<sub>2</sub> in Nigeria from a study in Anambra and Enugu reveals a prevalence of 27% (Onwujekwe, et al., 2011 and Onwujekwe, Hanson, Uzochukwu, 2012). In 2010, also in Anambra and Enugu States of Nigeria, another study by Onoka revealed household CHE<sub>2</sub> prevalence was 15% (Onoka, Onwujekwe, Hanson, Uzochukwu, 2010). A study by Ilesanmi et al. revealed that HCHE<sub>2</sub> prevalence ranges between 2.5%-10.9% among urban resident of Oyo state Nigeria (Ilesanmi, Adebisi, Fatiregun, 2014). Another study revealed CHE<sub>1</sub> prevalence of 9.6% among elderly household in Nigeria (Adisa, 2015). Amakon revealed a prevalence of HCHE<sub>2</sub> to be 27% in Nigeria (Amakon, and Ezenekwe, 2012). Among TB patient, 44% of them experienced HCHE<sub>2</sub> in a study by Ukwaja (Ukwaja, Alobu, Abimbola, Hopewell, 2013). The only study in Ekiti state was by Olatunya et al. which studied the financial impact of Sickle cell disease on household; CHE was 20.7% (Olatunya et al., 2015).

Over 150 million people or 44 million households suffer annually from financial catastrophe mainly because of OOP expenditure of healthcare services (World Health Organization 2016, World Health Organization, 2016 and Bennett, Ozawa, Rao, 2010). Worldwide, 32% of total healthcare expenditure is derived from OOP payments (WHO, 2016). Also, monitoring of HCHE is one of the key indicators for measuring Universal Health Coverage (UHC), and National Health Insurance Scheme (NHIS) coverage; high level of it can serve as a strong reason for the policymakers to embark on a wider coverage of universal healthcare and NHIS; whose primary aim is to reduce HCHE (Ilesanmi, et al., 2014 and WHO, 2016). There is an urgent need to have a healthcare financing policy guide in Ekiti state to help protect indigenes from the financial hardship caused by the cost of seeking healthcare. Policymakers in Ekiti state and Nigeria at large equally need adequate data to take action and informed decisions. Hence, this study intends to determine the prevalence of HCHE amongst rural and urban communities in Ekiti. It is hoped that the findings of this research will add to the existing body of knowledge on HCHE in Ekiti state, Nigeria, which will assist policymakers in identifying and targeting vulnerable groups with appropriate and evidence-based interventions.

## 2. METHODS AND MATERIALS

This is a comparative cross-sectional study design that involved both rural and urban households within selected communities in Ekiti State, in the southwestern region of Nigeria. Nigeria is the largest country in Africa by population, accounting for 47% of the entire West African population (World Bank, 2016) with a poverty rate of 62.6%, human development index (HDI) of 0.47 and per capita income of 1,280USD (United Nations Development Programme, 2016). Household head living in the community within the last 12 months and who were more than 18 years of age were included in the study. All household heads that were already enrolled in health insurance schemes and those who were visitors to the selected communities were excluded.

The sample size for the study was determined for each group (rural/urban) by using the Fisher's formula for calculating the sample size of comparison of two proportions (Jekel, Katz, Elmore, 2001), using a proportion of urban household facing HCHE (33.1%) (Ilesanmi, Adebisi, Fatiregun, 2017), and a proportion of rural household facing HCHE (24.4%) (Ilesanmi, et al., 2017). After compensating for 10% non-response, the calculated sample size was 467. This was rounded up to 500 household heads per group, and a total of 1000 household heads were interviewed in the study. A multistage sampling technique was used to select respondents, starting with the selection of the local government areas, then the wards, then the enumeration areas and finally the households.

The data was collected from July 2018 to October 2018 in the selected communities. A pre-tested interviewer-administered semi-structured questionnaire was used to collect data. The contents of the questionnaire were adapted from several studies including the World Health Survey 2002 (household questionnaire) by the WHO (Ilesanmi et al., 2014, Onwujekwe et al., 2010, WHO, 2002, World Bank, 1996). Face and content validity was

assured by an expert in the field of health economics. Cronbach's alpha test was done, and the alpha coefficient for 19 items is 0.728, suggesting the items have a high internal consistency (Douglas and Thomas, 2014).

The data obtained were then entered using the IBM SPSS version 20. Data cleaning was done for missing data to improve data quality, and data was analyzed with STATA 12. HCHE<sub>1</sub> was calculated by using a ratio (at a threshold of) health expenditure (>10%) to total household expenditure, while HCHE<sub>2</sub> was calculated by using a ratio of household health expenditure (greater than or equal to 40%) to the non-food household expenditure. Sensitivity analysis of the threshold of HCHE was done to improve the robustness of the study (for HCHE<sub>1</sub> the range of thresholds was set at 5%, 10%, 15%, and 20%; while for HCHE<sub>2</sub> it was set at 20%, 30%, and 40%). The household socio-economic status was determined through the household wealth scores, based on the ownership of some household asset using Principal Component Analysis; households were then divided into five quintiles based on their wealth scores, at one end 'the poorest' and at the other end "the richest." (Vyas, and Kumaranayake, 2006)

Data analysis was conducted using univariate analysis involving frequency tables, graphs, figures and texts and summary statistics such as mean, standard deviation and simple percentages to describe the population in relation to the relevant variable.

Operational definition for HCHE<sub>1</sub> and HCHE<sub>2</sub> were used<sup>18</sup> and calculated as follows.

A. Firstly, using the methodology of Xu: HCHE<sub>2</sub> occurs when the expenditure on healthcare is greater than or equals to 40% of the household's capacity to pay (CTP). CTP is the difference between total expenditure and subsistence expenditure (SE). Subsistence expenditure was calculated using the following method (Rezapour et al, 2013)

1) The food expenditure share (FoodExp<sub>h</sub>) (Joglekar, 2008) for each household was generated by dividing the household's food expenditure by its total expenditure.

$$\text{FoodExp}_h = \text{Food}_h / \text{Exp}_h \dots\dots\dots 1$$

2) The equivalent household size for each household was generated as:

$$\text{Eqsize}_h = \text{hsize}_h^\beta \dots\dots\dots 2$$

Eqsize<sub>h</sub> = equivalent household size

hsize<sub>h</sub><sup>β</sup> is the actual household size; beta β reflect the economics of scale effect of large household; β=0.56

3) Equalized food expenditures for each household was obtained from the following

Formula:  $\text{Eqfood}_h = \text{food}_h / \text{eqsize}_h \dots\dots\dots 3$

Food<sub>h</sub> = Food expenditure of the household

eqsize<sub>h</sub> = equivalent household size

4) The studied households were sorted according to the food expenditure share of the total household expenditure, and divided into one hundred equal parts. The fiftieth percentile across the whole sample is selected.

5) The calculating mean of the food expenditure in the fiftieth percentile gives the subsistence expenditure per capita, which is also the poverty line (PL).

6) The subsistence expenditure for each household was, separately, computed as:

$$\text{Se}_h = \text{pl} * \text{eqsize}_h \dots\dots\dots 4$$

7) A household was regarded as poor (=1) when its total household expenditure was smaller than its subsistence spending, otherwise, it was considered as comfortable (=0).

$$\text{If Exp}_h < \text{Se}_h \rightarrow \text{Poor}_h = 1 \dots\dots\dots 5$$

$$\text{If Exp}_h \geq \text{Se}_h \rightarrow \text{Poor}_h = 0 \dots\dots\dots 6$$

8) At this stage, those households that fall below the poverty line only because of the health expenditures were counted.

$$\text{If Exp}_h \geq \text{Se}_h, (\text{Exp}_h - \text{oop}_h) < \text{Se}_h \rightarrow \text{impoverish}_h = 1 \dots\dots 7$$

$$\text{If Exp}_h \geq \text{Se}_h, (\text{Exp}_h - \text{oop}_h) \geq \text{Se}_h \rightarrow \text{imPoverish}_h = 0 \dots\dots 8$$

9) Household CTP: Household non-subsistence or household capacity to pay

$$\text{CTP} = \text{exp} - \text{SE}_h \quad \text{if } \text{SE}_h \leq \text{food}_h \dots\dots\dots 9$$

$$\text{CTP} = \text{exp} - \text{food}_h \quad \text{if } \text{SE}_h > \text{food}_h \dots\dots\dots 10$$

The ratio of OOP<sub>h</sub> to CTP = OOP<sub>h</sub>/CTP = health expenditure/Household CTP

Cata <sub>h</sub> =1 if OOP <sub>h</sub> /CTP ≥ 0.4.....	11
Cata <sub>h</sub> =0 if OOP <sub>h</sub> /CTP < 0.4.....	12

B. For the second definition of HCHE (HCHE<sub>2</sub>) it is a ratio of household expenditure on health to total household expenditure; greater than 10% was considered catastrophic.

Cata <sub>h</sub> =1 health exp <sub>h</sub> /total household expenditure >10%.....	13
Cata <sub>h</sub> =0 health exp <sub>h</sub> /total household expenditure <10% (Joglekar, 2008).....	14

Research approval for the study was obtained from the Ethics and Research Review Committee of the Federal Teaching Hospital Ido-Ekiti (ERC/2017/04/03/47A). A written consent for the interview was obtained from each respondent after giving them an explanation of the nature, purpose, and benefit of the study. Also, confidentiality and autonomy of respondents were maintained.

### 3. RESULTS

The total number of the household (HH) heads was nine hundred and seventy-one (971) out of the one thousand (1000) respondents interviewed giving a response rate of 97.1% (figure 1); 496 (51%) of the respondents were in the rural areas while 475 (49%) were in the urban areas. The household size in the rural area was 4.8±1.3 while the urban area was 3.4±1.1, averagely 4.2 ±1.2 (SD) for this study.

Table 1: Socio-demographic characteristics of the household heads in the rural and urban communities of Ekiti State, Nigeria

Socio-demographic variables	Location		Statistical indices
	Rural n = 496 Freq. (%)	Urban n = 475 Freq. (%)	
<b>Age groups of Household Head (in years)</b>			
<40	264(53.2)	281(59.2)	$\chi^2= 17.434$
40 - 59	132(26.6)	148(31.1)	df = 2
≥60	100(20.2)	46(9.7)	<b>p = 0.001</b>
			z = 5.051
<b>Mean Age of Household Head (in years)</b>	42.4 ± 16.8	38.5 ± 13.7	<b>p &lt; 0.001</b>
<b>Gender of Household Head</b>			$\chi^2= 3.399$
Male	155(31.2)	166(34.9)	df = 1
Female	341(68.8)	309(65.1)	p = 0.065
<b>Religion of Household Head</b>			
Christianity	428(86.3)	412(86.7)	$\chi^2= 2.867$
Islam	58(11.7)	57(12.0)	df = 2
Others*	10(2.0)	6(1.3)	p = 0.239
<b>Education of Household Head</b>			
No Formal Education	73(14.7)	62(13.1)	
Primary	95(19.2)	42(8.8)	$\chi^2= 3.616$
Secondary	252(50.8)	214(45.1)	df = 3
Tertiary	76(15.3)	157(33.0)	p = 0.460
<b>Occupation of Household Head</b>			$\chi^2=15.060$
Informal	422(85.1)	357 (75.2)	df = 1
Formal	74(14.9)	118 (24.8)	<b>p &lt; 0.001</b>
<b>Marital Status of Household Head</b>			
Single	22(4.4.)	31(6.5)	$\chi^2=22.235$
Married /Co-habiting	403(81.3)	418(88.0)	df = 2
Separated/Divorced/Widow/Widower	71(14.3)	26(5.5)	<b>p &lt; 0.001</b>

<b>Tribe of Household Head</b>			
<b>Yoruba</b>	452(91.1)	444(93.5)	$\chi^2=6.277$
<b>Ibo</b>	16(3.2)	19(4.0)	df = 2
<b>Others**</b>	28(5.7)	12(2.5)	<b>p = 0.043</b>
<b>Presence of Elderly Person in the HH</b>			
			$\chi^2=10.450$
<b>Yes</b>	100(20.2)	49(10.3)	df = 1
<b>No</b>	396(79.8)	426(89.7)	<b>p = 0.001</b>
<b>Presence of Children less than five years in the HH</b>			
			$\chi^2=3.600$
<b>Yes</b>	182 (36.7)	181(38.1)	df = 1
<b>No</b>	314 (63.3)	294(61.9)	p = 0.058

$\chi^2$  – chi-square, p- level of significance (< 0.05), df - degree of freedom, Others\*includes traditional worshipper (Ifa, Ogun), Grail messengers \*\*Others include Hausa, Igbo, Delta, Ebira, Nupe, Fulani, Igede, etc, Freq-frequency

Household heads who were aged less than 40 years were more in the urban areas (59.2%=281) than the rural areas (53.2%=264), while household heads aged  $\geq 60$  years were more in the rural areas (20.2%=100) than the urban areas (9.7%=46), (p=0.001). The mean age was higher in rural areas (42.4 $\pm$ 16.8) than in urban areas (38.5 $\pm$ 13.7). Majority of the household heads were females in both rural (68.8%=341) and urban areas (65.1%=309) respectively. The female-male sex ratio of the household head is 2:1(similar in both rural and urban areas). The predominant religion was Christianity in both rural (86.3%=428) and urban areas (86.7%=412), respectively.

About half of the household heads in both the rural (50.8%=252) areas and urban (45.1%=214) areas had secondary education. Majority of the household heads work in the informal sector (both rural (85.1%) and urban (75.2%)), while more people work in the formal sector (24.8%) in the urban areas than the rural area (14.9%),(p<0.001). Majority of the rural (81.3%=403) and urban (88.0%=418) household heads were married, and about 14.3% (71) of the rural HH heads were widowers/widow/divorcee compared to 5.5% (26) in the urban counterparts, (p<0.001). In addition, the most predominant tribe was Yoruba (in both rural (91.1%=425) and urban areas (93.5%=444) respectively). The rural household heads (20.2%=100) had more elderly person above 65years of age than the urban areas (10.3%=49) (p<0.001). On the other, both the rural (36.7%=182) and urban HHs (38.1=181) had similar number of children under-five years of age.

Table 3.2: Socio-economic characteristics of the household heads in the rural and urban communities of Ekiti State, Nigeria

<b>Socio-demographic variables</b>	<b>Location</b>		<b>Statistical indices</b>
	<b>Rural n = 496 Freq. (%)</b>	<b>Urban n = 475 Freq. (%)</b>	
<b>Wealth Status of Household</b>			
<b>Poorest</b>	200(40.3)	37(7.8)	$\chi^2=200.120$
<b>Poor</b>	82(16.5)	99(20.8)	df = 4
<b>Average</b>	72(14.5)	130(27.4)	<b>p &lt; 0.001</b>
<b>Rich</b>	85(17.2)	41(8.6)	
<b>Richest</b>	57(11.5)	168(35.4)	
<b>Household Income(naira)</b>			
<b><math>\leq 20,000</math></b>	236(47.6)	165(34.7)	$\chi^2=25.780$
<b><math>&gt;20,000 - 50,000</math></b>	200(40.3)	203(42.7)	df = 3
<b><math>&gt;50,000 - 150,000</math></b>	58(11.7)	101(21.3)	<b>p &lt; 0.001</b>
<b><math>\geq 150,000</math></b>	2(0.4)	6(1.3)	
<b>Median income</b>	20,000	37,976	z = 5.451
			<b>p &lt; 0.001</b>

$\chi^2$  – chi-square, p- level of significance (< 0.05), df - degree of freedom.

This study revealed that two-fifths of the rural households (40.3%=200) were among the poorest wealth quintile compared to their urban counterpart (7.8%=37). Similarly, about one-third of the urban HHs (35.4%=168) were among the richest wealth quintile compared to their rural counterpart (11.5%=57), ( $p<0.001$ ). In this study the median HH income in the urban areas is 37,976Naira (124.1USD) (One USD=306naira at 2018) <sup>128</sup> with a range of 398,000 Naira (1300.7USD) where the income lie between 2000-400,000naira (6.5-1307.2USD), in rural areas median HH income 20,000Naira (65.4USD) with a range of 199,500 Naira (652USD) where the income lie between 500-200,000Naira (1.6-653.6USD), ( $p<0.001$ ).

Table 3.3: Total household spending and health spending of the household heads in the rural and urban communities of Ekiti State, Nigeria

Variable	Location		Statistical indices
	Rural n = 496 Freq. (%)	Urban n = 475 Freq. (%)	
<b>Total Household spending(naira)</b>			
<50 000	336(67.7)	214(45.1)	$\chi^2= 62.521$
50 000-100 000	111(22.4)	219(46.1)	df = 1
>100 000	49(9.9)	42(8.8)	<b>p &lt; 0.000</b>
<b>Median household spending</b>	34925	52500	$z = 6.545$ <b>p &lt; 0.001</b>
<b>Household Health spending(naira)</b>			
<5 000	424(89.3)	439(88.5)	$\chi^2= 1.7639$
>5 000- <10 000	24(5.0)	29(5.9)	df = 1
>10 000-<15 000	13(2.7)	9(1.8)	p < 0.623
>15 000	14(3.0)	19(3.8)	
<b>Mean household health spending</b>	2572±18848	3551±12978	$z = 2.865$ p =0.229

The median household spending is higher in the urban area (52,500naira; 172USD) than the rural areas (34,925naira; 114USD) (One USD=306naira at 2018). <sup>128</sup> The total household spending of two-third of the rural household is less than 50,000naira (163USD) monthly while about half of the urban household spends between 50000-100000naira monthly (163-327USD). The range of total household spending for the rural household is 253,000 naira (827 USD) (1,000naira-254,000naira:3.3-830.1USD) while for the urban household it is 1,037,500 naira; 3390 USD (7,200 naira -1044700 naira; 24-3,414 USD).

The mean household health spending is higher in the rural area (3,550naira; 11.6USD) than the urban areas (2,572naira; 8.4USD). The household health spending of majority of the rural and urban household is less than 5000naira (16.3USD) monthly. The range of the household health spending for the rural household is 131,000 naira; 428USD (0-131,000naira:0-428USD) while for the urban household it is 397200 naira; 1298USD (0-397200 naira; 0-1298USD).

Table 3.4: Prevalence of household catastrophic health expenditure within rural and urban communities of Ekiti State, Nigeria

Catastrophic Health Expenditure	Location		Statistical indices
	Rural n = 496 Freq. (%)	Urban n = 475 Freq. (%)	
<b>Based on Household Total Expenditure</b>			
<b>At 10% Threshold (HCHE1)</b>			
Yes	92(18.5)	61(12.8)	$\chi^2= 5.952$ df = 1
No	404(81.5)	414(87.2)	<b>p = 0.015</b>
<b>Based on non-subsistence income</b>			
<b>At 40% Threshold (HCHE2)</b>			
Yes	41(8.3)	12(2.5)	$\chi^2= 15.491$ df = 1
No	455(91.7)	463(97.5)	<b>p &lt; 0.001</b>

The prevalence HCHE<sub>1</sub> was higher in the rural areas 18.5% (92) than the urban areas 12.8% (61), (p=0.015). The prevalence of HCHE<sub>2</sub> (based on the definition that any household spending more than or equal 40% of their non-food expenditure of income) was also higher in the rural areas 8.3% (41) compared to the urban areas 2.5% (12) which was statistically significant (p<0.001). It is worthy of note that the two methodological calculations of HCHE gave different results.

Table 3.5: Sensitivity Analysis at various thresholds of the prevalence of household catastrophic health expenditure within rural and urban communities, Ekiti State

Catastrophic Health Expenditure	Location	
	Rural n = 496 Freq. (%)	Urban n = 475 Freq. (%)
<b>Based on Household Total Expenditure(HCHE<sub>1</sub>)</b>		
<b>At 5% Threshold</b>	138(27.8)	81(17.1)
<b>At 10% Threshold</b>	92(18.5)	61(12.8)
<b>At 20% Threshold</b>	55(11.1)	23(4.8)
<b>Based on non-subsistence expenditure of income(HCHE<sub>2</sub>)</b>		
<b>At 20% Threshold</b>	90(18.1)	37(7.8)
<b>At 30% Threshold</b>	65(13.1)	21(4.4)
<b>At 40% Threshold</b>	41(8.3)	12(2.5)
<b>At 50% Threshold</b>	35(7.1)	8(1.7)

The prevalence of HCHE<sub>1</sub> has a higher range of value in the rural areas (11.1% to 27.8%) than the urban areas (4.8% to 17.1%). Similarly the prevalence of HCHE<sub>2</sub> has a higher range of value in the rural areas (7.1% to 18.1%) than the urban areas (1.7% to 7.8%). The sensitivity analysis of HCHE<sub>1</sub> showed that with an increasing trend in the thresholds there is a corresponding decrease in the prevalence of HCHE<sub>1</sub> (at 5%,10% and 20% threshold, it shows a corresponding prevalence of 22.6%, 15.8% and 8.0% respectively). Equally the sensitivity analysis of the prevalence of HCHE<sub>2</sub> also shows similar trends (at 20%, 30%, 40%, 50% threshold, it shows a corresponding prevalence of 13.1%, 8.9%, 5.5% and 4.4% respectively).

#### 4. DISCUSSION

This study found that the prevalence of household catastrophic health expenditure (for the different methodological definition) in the rural and urban community in Ekiti State was also within the range of that reported in a systematic review done in a cross-country analysis among different household survey (Xu et al, 2003, Knaul et al, 2011 and Brinda et al, 2014 ). This study demonstrated the fact that the rural prevalence of household catastrophic health expenditure was higher than the urban prevalence (for the two methodological calculation of HCHE). The prevalence of HCHE<sub>1</sub> was significantly higher in the rural areas, 18.5% than in urban areas, 12.8% ( $p=0.015$ ). This may be explained by the higher presence of the elderly in the rural area, who may have had chronic health conditions necessitating an increase in healthcare cost. Also rural dwellers may have a higher HH size and reduce HH income or higher poverty rate. Furthermore, the presence of HCHE is highest among the rural household spending less than 50 000naira monthly and among urban household spending between 50 000 (163USD)-100 000naira (327USD)monthly; hence any little health shocks in the household can lead to catastrophic spending in the rural poor.

The urban prevalence in this study is similar to a study by Saito et al, (Saito, Gilmour, Rahman, Gankin, Shrestha, Shibuya, 2014) who reported prevalence HCHE<sub>1</sub> in urban part of Nepal of 13.8%. Also a similar study by Onoka et al (Onoka et al, 2010) revealed HCHE<sub>2</sub> prevalence of 15%. Another urban study in Ekiti state by Olatunya et al (Olatunya et al, 2015) revealed the prevalence of HCHE<sub>1</sub> was 20.7%. It was higher than that of this present study because the present study is a population-based study while Olatunya et al (Olatunya et al, 2015) study was a hospital-based study directed at sickle cell disease patients and their households. Also, a sharp contrast was noticed in the study by Ukwaja et al (Ukwaja et al, 2013) who observed a higher proportion and higher magnitude of HHs with HCHE<sub>1</sub> in the urban resident compared to the rural resident (OR=3.8, 95%CL (1.9-7.7)). This difference may have occurred because the study (Ukwaja et al, 2013) populations were household members that had tuberculosis (which occur more in overcrowded urban areas), and it is a hospital-based study compared to this present study which is population-based.

In this present study, the prevalence of HCHE<sub>2</sub> was higher in the rural areas (8.3%) than the urban areas (2.5%), which was statistically significant at  $p<0.001$ . The urban prevalence result is similar to the study by Ilesanmi (Ilesanmi et al, 2014) whose prevalence of HCHE<sub>2</sub> was 6.6% in the urban areas of Oyo State, Southwest of Nigeria. The similarity may have occurred because the two studies took place among similar demographics in the Southwestern part of Nigeria. Similarly, in another study (Onwujekwe et al, 2012) in eastern Nigeria by Onwujekwe, rural prevalence is higher (39%) compared to its urban prevalence (15%), though it shows similarity in the pattern of the prevalence but the magnitude is higher possibly because it is a health facility-based study. The difference in the prevalence between Onwujekwe (Onwujekwe et al, 2012) and this study may be attributed to the older age group of the respondent in Onwujekwe's study, (Onwujekwe et al, 2012) who in this case, are more likely to be prone to more chronic disease which increases the healthcare utilization, healthcare cost, risk of hospitalization and or hospital admission. Equally, in another study by Onwujekwe, (Onwujekwe et al, 2011) a higher prevalence rate may have occurred because Onwujekwe's study (Onwujekwe et al, 2011) was a hospital-based study where more ill individuals are more likely to have sought healthcare service and pay for healthcare directly and indirectly compared to the present study. A study (Puteh and Almuallm, 2012) in India showed a higher prevalence in the rural areas (25.3%) than urban areas (17.5%). This Indian study has a similar pattern but a higher magnitude than our study.

The sensitivity analysis of HCHE<sub>1</sub> showed that an increase in the threshold leads to a corresponding decrease in the prevalence of HCHE<sub>1</sub>. Similarly Buigut et al (Buigut et al, 2015) study revealed that an increase in the threshold (5%, 10%, 15%, 20%, and 30%) will have a corresponding decrease in prevalence of HCHE<sub>1</sub> (28.4%, 22.8%, 20.8%, 19.7%, and 8.5%). Also this study revealed that prevalence of HCHE<sub>2</sub> at an increasing threshold also leads to a corresponding decrease in prevalence of HCHE. This is equally similar to a study by Buigut et al (Buigut et al, 2015) that at increasing threshold (10%, 15%, 20%, 30%) there was noticed a corresponding decrease in the prevalence of HCHE<sub>2</sub> (6.1%, 4.1%, 2.7%, 1.6%).

The findings of high prevalence of HCHE as highlighted in this study have some public health significance and policy implication. This indicate the need for a reduction in OOPs (from 70% to less than 30%) and an increase

in prepayment method of healthcare financing (from 5% to >70% coverage) (Hsiao, 2015, World Bank, 2016 and Boerma, Eozenou, Evans D, Evans T, Kieny, Wagstaff, 2014.). Hence the urgent need for further studies to find the different factors responsible for the high prevalence of HCHE in both rural and urban areas, particularly in the rural areas.

## 5. CONCLUSION

The study concluded that the prevalence (based on HE >10% of the total expenditure of income) of HCHE<sub>1</sub> was higher in the rural areas than urban areas of Ekiti state, Nigeria. Similarly, the prevalence of HCHE<sub>2</sub> (based on HE ≥40% of the non-subsistence of income) was higher in the rural areas than the urban areas of Ekiti state, Nigeria. The sensitivity analysis of HCHE<sub>1</sub> and HCHE<sub>2</sub> also revealed that an increase in the threshold leads to a corresponding decrease in the prevalence of HCHE (for both definitions).

The high prevalence of HCHE (which is higher in the rural areas) is indicative of little or no prepayment scheme of the health system, hence it is recommended that government at all level should adopt and increase the coverage of healthcare insurance, especially to the rural communities where the prevalence of HCHE is higher.

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