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Prevalence and predictors of catastrophic health expenditure due to out-of-pocket payment among rural households in Delta State, Nigeria: a community-based cross-sectional study

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Abstract

Background Any healthcare expenditure that threatens a household's financial capacity to maintain its subsistence living is regarded as catastrophic health expenditure (CHE). Many people in low- and middle-income countries such as Nigeria face financial difficulties when they fall sick. This study assessed the prevalence and predictors of CHE due to out-of-pocket (OOP) payments among rural households in Delta State, Nigeria.

Methods A cross-sectional study design was employed to assess the prevalence of CHE among a random multistage sample of 412 households. Data was collected using an interviewer-administered semi-structured questionnaire. Descriptive and inferential analyses of data collected were carried out using the IBM SPSS version 22 software.

Results The sex distribution revealed that 50.5% (n = 208) of the household heads were females, while 49.5% (n = 204) were males. The prevalence of household CHE at 5% and 10% thresholds of household income was 30.3% (n = 125) and 21.8% (n = 90) respectively. When both direct medical and direct non-medical costs were considered the prevalence of household CHE increased to 35.4% (n = 146) and 25.5% (n = 105) respectively. Households with no history of hospitalisation, with less than seven persons, whose heads were aged below 40 years, and had no formal education had 88% (AOR = 0.12; 95% CI 0.05–0.32), 79% (AOR = 0.21; 95% CI 0.09–0.49), 93% (AOR = 0.07; 95% CI 0.01–0.45), and 43% (AOR = 0.57; 95% CI 0.34–0.96) decreased odds respectively of experiencing CHE.

Conclusion This study revealed a relatively high prevalence of CHE due to OOP payments among rural households. There is an urgent need to scale up health insurance coverage to reduce the burden of CHE experienced by rural households.

Keywords Prevalence · Predictors · Sociodemographic · Socioeconomic · Catastrophic health expenditure · Out-of-pocket · Rural communities

Abbreviations

CHE	Catastrophic health expenditure
NCDs	Non-communicable diseases
OOP	Out-of-pocket
WHO	World Health Organisation

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1 Introduction

Catastrophic health expenditure (CHE) poses a significant barrier to achieving universal health coverage and underscores the urgent need for systemic reforms to ensure that no one is pushed into poverty due to healthcare expenses. CHE has been defined as out-of-pocket (OOP) payments above a share of total household spending or non-food spending that that pose a risk to a household's ability to pay for its necessities, incur debts or become impoverished [1–3].

According to estimates from the World Health Organisation (WHO) and World Bank, the number of people globally experiencing CHE due to OOP payments surpassed one billion in 2019 [4]. In Africa an estimated eleven million people fall into poverty annually due to high OOP payments. [5]. OOP payments accounts for more than 70% of overall healthcare expenditure in Nigeria [6]. The goal of universal health coverage (UHC) is thus far from being achieved because of the overreliance on OOP payments, which hampers and widens the gap in access to high-quality care and increases the risk of CHE for Nigerian households [7].

OOP payment is an inefficient and unfair method of paying for healthcare in Nigeria [8–10]. Households are put under extreme financial strain, which is made worse by the fact that they have little opportunities to earn money while they are ill [11]. Communities whose main source of income is agriculturally based are worse affected. Depending on when crops are harvested or sold, impoverished households in these agrarian areas may have varying amounts of income available throughout the year [11, 12].

CHE does not always equate to significant health care costs because for the impoverished, even relatively little medical expenses might have severe financial consequences. This is because, in contrast to wealthier households, impoverished households are less able to handle even very little healthcare expenditures because nearly all their resources are allocated towards meeting their subsistence demands [1, 2]. Many people in low- and middle-income nations like Nigeria live below the poverty line and struggle financially to pay for healthcare when they or member of their households are sick [11].

. Evidence has shown that non-communicable diseases (NCDs) [13, 14] as well as communicable diseases such as HIV/AIDS, tuberculosis, malaria and pneumonia are a major driver of OOP payments for healthcare for households in sub-Saharan African countries including Nigeria [14]. With about 40% of the Nigerian population living in poverty and social conditions that foster ill health [15], the dual burden of non-communicable and communicable diseases will continue to push households in both rural and urban communities into financial catastrophe. This is against the backdrop that the overall health insurance coverage in Nigeria remain very low [7] with about 97% of the population (particularly the less privileged and vulnerable groups) without coverage [7, 16]. This implies that the greater part of the population are constantly at risk of CHE from high OOP payments for health [15]. Previous studies in Nigeria have assessed the prevalence of CHE particularly among urban households with estimates ranging between 13.7% and 48% [17–21]. These studies have also highlighted the associated factors driving CHE particularly among urban households.

However, there is paucity of data on the prevalence and predictors of CHE among Nigerian rural households. Nigeria is a highly heterogeneous country, and the drivers of CHE can indeed differ across urban and rural communities [20]. This study was therefore conducted to bridge the gap by assessing the prevalence (at different thresholds) and the socio-demographic and socio-economic predictors of household CHE in rural communities of Delta State, Nigeria. Findings from this study will not only highlight the prevalence of CHE at different thresholds, but also factors driving CHE among rural households in the study setting.

2 Methods

2.1 Study setting, design, participants, and sampling technique

The geographic setting of the study is Delta State which is an oil rich and agricultural producing State that is situated in the South-South geo-political zone of Nigeria. The State is one of the 36 States in Nigeria and has a projected population of 5,636,100 from the last national census in 2006 [22]. The geographical area of the State is divided into upland and riverine with twenty-five Local Government Areas (LGA) categorised into three senatorial districts namely Delta North, Delta Central, and Delta South.

The study employed a community-based cross-sectional design and was conducted over seven months from January to July 2017. The study participants were rural household heads in Delta State, Nigeria. In this study, a household is

defined as people who live together and eat from the same pot, while a household's head is the person responsible for leadership and decision-making in the household.

The study participants were selected using a multistage (4 stage) sampling technique. In the first stage, one senatorial district (Delta North) was selected by simple random sampling (balloting) from the list of the three senatorial districts in Delta State, Nigeria. In the second stage, one LGA (Ukwuani LGA) was selected by simple random sampling (balloting) from the list of nine LGAs in Delta North senatorial districts. In the third stage, two rural communities (Umuebu and Umuaja) were selected by simple random sampling (balloting) from the list of seven rural clans in Ukwuani LGA. In the fourth stage, cluster sampling technique was employed to select houses from where eligible household heads were recruited in the two selected rural communities (Umuebu and Umuaja).

The Fisher's formula [23] $n = [Z^2 * P (1—P)]/d^2$ was used to determine the minimum sample size of household heads who participated in the study. Based on the prevalence of catastrophic health expenditure of 24% from a previous study [17], an error margin (d) of 5% and a standard normal variate (Z) of 1.96 at a 95% confidence level, the determined minimum sample size was 280. However, 412 household heads (206 each from the two selected rural communities) were selected to participate in the study. All consenting adult household heads who have lived in the selected communities for more than six months were included in the study. However, in the absence of the household head, the spouse, or the eldest member of the household considered the most suitable replacement for the household head was interviewed. All household heads that are too old or too ill to respond to the questions and those that are already on health insurance (who had financial risk protection) were excluded from the study.

2.2 Data collection

Data were collected using an interviewer-administered semi-structured questionnaire. On the scheduled days of data collection, trained data collectors visited the two selected rural communities and used the questionnaire to elicit information on households' history of illness episodes in the preceding three months of the study, the sociodemographic and socioeconomic characteristics of the households as well as out-of-pocket (direct medical and non-medical) payments incurred from the costs of health care during illness episodes.

2.3 Outcome and independent variables

The outcome variable was the prevalence of catastrophic health expenditure (CHE) experienced by households. In this study, both the proportionality of income approach [24] and the ability to pay approach [25] were used to estimate CHE. The household's ability to pay is defined as the effective income remaining after subsistence expenditures has been removed. Household OOP expenditure for health exceeding threshold ranges of 5%, and 10% were termed catastrophic using the proportionality of income approach; while household OOP expenditure for health exceeding threshold ranges of 10%, and 40% were termed catastrophic using the ability to pay approach. The independent variables include socio-demographic (age, sex, education, household size), and socio-economic (occupation, household income, participation in thrifts) characteristics of the household heads.

2.4 Data analyses

Data collected was analysed using the IBM SPSS version 22 software. Both descriptive and inferential analysis of data collected was done. Bivariate and multivariate analyses (using chi-square tests and binary logistic regression respectively) were conducted, and statistical significance set at $p < 0.05$. Binary logistic regression analysis was used to determine the socio-demographic and socio-economic predictors of household catastrophic health expenditure. All variables significant during bivariate analysis using Pearson's chi-square tests at a p-value < 0.2 were entered stepwise into the binary logistic regression model to obtain the adjusted odds ratio (AOR) of each factor on the outcome variable at 95% confidence interval. The model fitness was measured by the Hosmer–Lemeshow test. The statistical significance of the model ($p = 0.872$) revealed that the binary logistic regression model (with independent variables included) was a good fit to the data.

3 Results

Sociodemographic and socioeconomic characteristics of the respondents:

The mean age of the household heads was 50.42 (SD = 14.54) years, 29.1% (*n* = 120) of which were aged 40–49 years, 27.7% (n = 114) were aged 60 and above years, 23.3% (n = 96) were aged 39 and below years, and 19.9% (n = 82) were aged 50–59 years. Their sex distribution revealed that 50.5% (n = 208) of the respondents were females, while 49.5% (n = 204) were males. More than three-fifths (63.3%; n = 261) were married, and 80.1% (n = 330) had at least basic education. All the participants reported a history of at least one episode of illness among members of their household in the past 3 months for which OOP payment was made. Of these, 9.7% (n = 40) reported a history of hospitalization of at least one member of their household (Table 1).

The monthly mean household income was ₦22,287.29 ($ 48.38). More than one-third (41.0%; n = 169) of respondents reported a household income of ₦20,000 ($ 43.42) and above and more than three-fifths (65.0%; n = 268) of them were farmers (Table 1).

Mean direct medical and non-medical costs, and prevalence of household CHE:

The mean total costs (direct medical and non-medical) incurred by household during illness episodes in the past 3 months was ₦5,630.5 ± 10,649.9 ($ 12.23 ± 23.13); while the mean direct medical and mean direct non-medical costs incurred were ₦5,390.8 ± 10,265.5 ($ 11.71 ± 22.29) and ₦484.3 ± 624.5 ($ 1.05 ± 1.36) respectively (Table 2).

Table 1 Sociodemographic and socioeconomic characteristics of the respondents (N = 412)

Variables	Categories	Frequency (%)
Age (Years)	39 and below	96 (23.3)
	40–49	120 (29.1)
	50–59	82 (19.9)
	60 and above	114 (27.7)
Mean age ± SD	50.42 ± 14.54 years	
Sex	Male	204 (49.5)
	Female	208 (50.5)
Marital status	Married	261 (63.3)
	Single	20 (4.9)
	Divorced	41 (10.0)
	Widowed	90 (21.8)
Education	Nil formal	82 (19.9)
	Formal	330 (80.1)
Occupation	Farmers	268 (65.0)
	Public employed	23 (5.6)
	Others (traders, business owners)	94 (22.8)
	Unemployed	27 (6.6)
Household size (number of person)	6 and below	251 (60.9)
	7 and above	161 (39.1)
Mean household size ± SD	6 ± 3 persons	
History of at least one episode of illness in the past 3 months for which OOP payment was made	Yes	412 (100.0)
	No	0 (0.0)
History of hospitalisation	Yes	40 (9.7)
	No	372 (90.3)
Household monthly income	≥ ₦20,000 ($ 43.42)	169 (41.0)
	< ₦20,000 ($ 43.42)	243 (59.0)
Mean household monthly income ± SD	₦22,287.29 ± 16,865.77 ($ 48.38 ± 36.62)	
Participation in thrift collection	Yes	180 (43.7)
	No	232 (56.3)

Table 2 Household health expenditure (mean direct medical and non-medical cost) incurred during last illness episode (N = 412)

Variables	Mean cost ± SD
Direct medical costs incurred (registration, drugs, lab tests etc.,)	₦5,390.8 ± 10,265.5 ($ 11.71 ± 22.29)
Direct non-medical cost of transportation to health facility for treatment	₦484.3 ± 624.5 ($ 1.05 ± 1.36)
Direct medical and non-medical costs incurred	₦5,630.5 ± 10,649.9 ($ 12.23 ± 23.13)

When only direct medical cost was considered the proportion of households that experienced CHE at 5% and 10% thresholds of household income was 30.3% (n = 125) and 21.8% (n = 90) respectively. When both direct medical and direct non-medical costs were considered the proportion of households that experienced catastrophic health expenditure at 5% and 10% thresholds of household income increased to 35.4% (n = 146) and 25.5% (n = 105) respectively (Fig. 1).

When only direct medical cost was considered the proportion of households that experienced CHE at 10% and 40% thresholds of capacity to pay was 21.8% (n = 90) and 8.7% (n = 36). When both direct medical and direct non-medical costs were considered the proportion of households that experienced catastrophic health expenditure at 10% threshold of capacity to pay increased to 29.4% (n = 121) (Fig. 2).

3.1 Socio-demographic and socioeconomic predictors of household CHE

The association of socio-demographic characteristics of household heads such as age ($\chi 2 = 12.59$; $p = 0.006$), sex ($\chi 2 = 40.11$; $p < 0.001$), education ($\chi 2 = 5.00$; $p = 0.025$), occupation ($\chi 2 = 9.79$; $p = 0.002$), household size ($\chi 2 = 12.85$; $p < 0.001$), and hospitalisation during last illness episode ($\chi 2 = 34.19$; $p < 0.001$) with catastrophic health expenditure (CHE) were statistically significant (Table 3). Similarly, the association of socio-economic characteristics such as household income ($\chi 2 = 32.89$; $p < 0.001$), participation in thrift ($\chi 2 = 9.29$; $p = 0.002$), and occupation ($\chi 2 = 9.79$; $p = 0.002$) with catastrophic health expenditure (CHE) were statistically significant (Table 3).

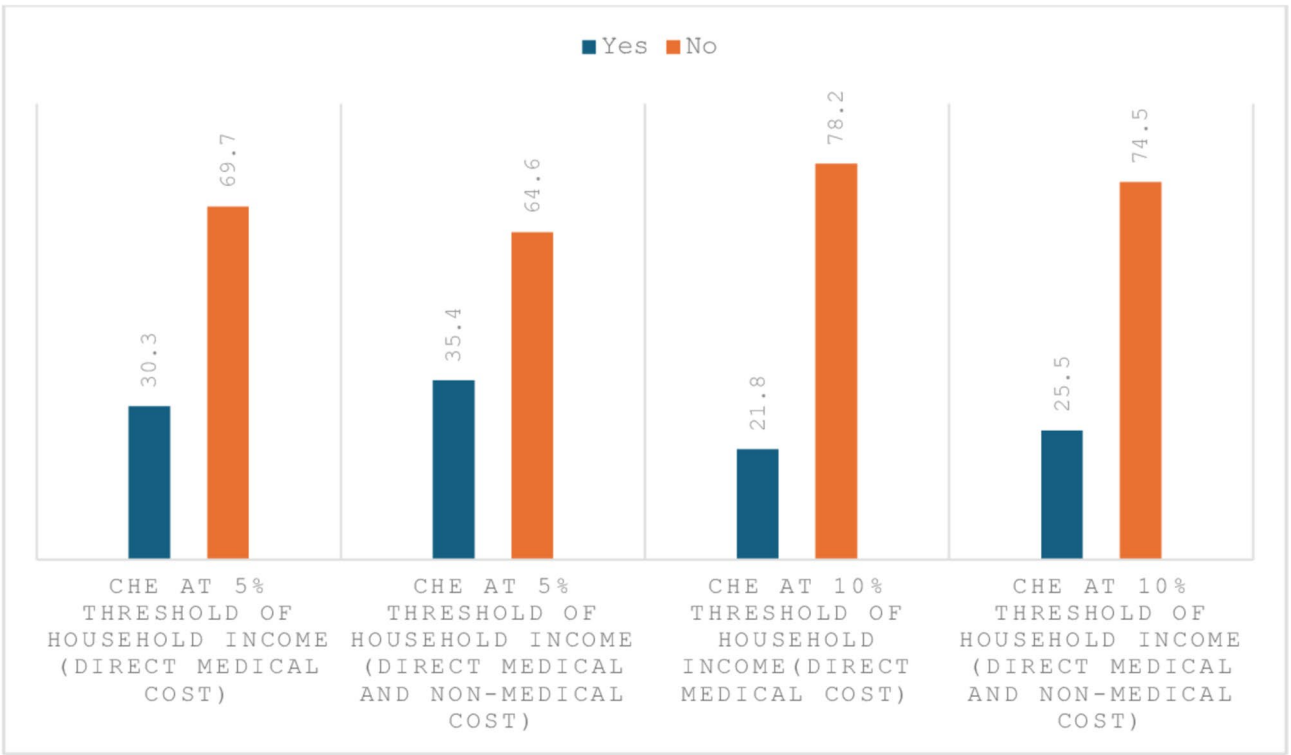

Fig. 1 Pattern of occurrence of catastrophic health expenditure (CHE) based on proportionality of income approach

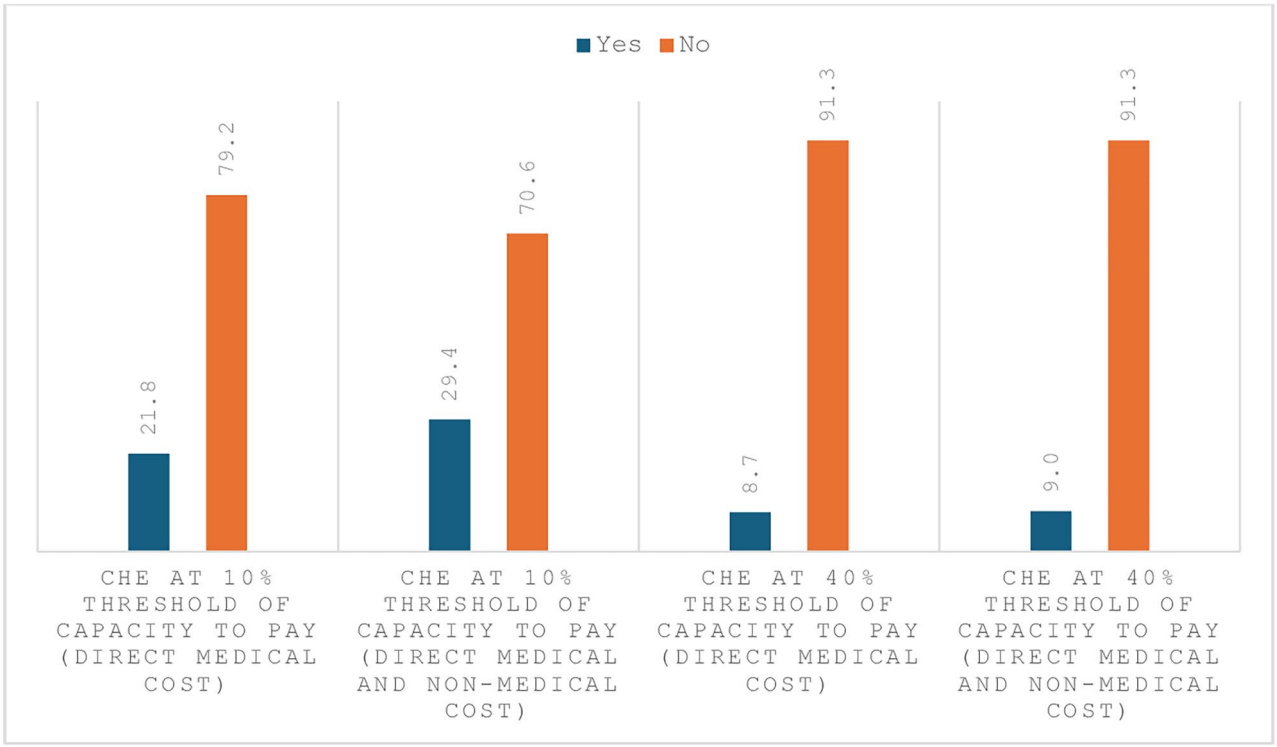

Fig. 2 Pattern of occurrence of catastrophic health expenditure (CHE) based on ability to pay approach

Table 3 Socio-demographic and socioeconomic predictors of household catastrophic health expenditure (N = 412)

Variables	Categories	Occurrence of CHE at 10% Threshold		Bivariate analysis $\chi 2$ (P-value)	Binary Logistic Analysis AOR (95% C.I)
		Yes n = 105 (25.5%)	No n = 307 (74.5%)		
Age (Years)	39 and below	16 (16.7)	80 (83.3)	12.59 (0.006)	0.07 (0.01–0.45)
	40–49	26 (21.7)	94 (78.3)		1.94 (0.71–5.29)
	50–59	21 (25.6)	61 (74.4)		1.23 (0.43–3.54)
	60 and above	42 (36.8)	72 (63.2)		1
Sex	Male	80 (39.2)	124 (60.8)	40.11 (< 0.001)	0.59 (0.28–1.25)
	Female	25 (12.0)	183 (88.0)		1
Marital status	Married	67 (25.7)	194 (74.3)	0.013 (0.91)	1.02 (0.72–1.44)
	Others	38 (25.2)	113 (74.8)		1
Education	Nil formal	13 (15.9)	69 (84.1)	5.00 (0.025)	0.57 (0.34–0.96)
	Formal	92 (27.9)	238 (72.1)		1
Occupation	Farmer	82 (30.6)	186 (69.4)	9.79 (0.002)	1.92 (1.26–2.90)
	Others	23 (16.0)	121 (84.0)		1
Household size	6 and below	48 (19.1)	203 (80.9)	12.85 (< 0.001)	0.21 (0.09–0.49)
	7 and above	57 (35.4)	104 (64.6)		1
Hospitalisation	Yes	29 (72.5)	11 (27.5)	34.19 (< 0.001)	1
	No	76 (20.4)	296 (79.6)		0.12 (0.05–0.32)
Household income	≥ $ 43.42	72 (42.6)	97 (57.4)	32.89 (< 0.001)	8.47 (4.28–16.76)
	< $ 43.42	33 (13.6)	210 (86.4)		1
Participation in thrift	Yes	32 (17.8)	148 (82.2)	9.29 (0.002)	1
	No	73 (31.5)	159 (68.5)		4.51 (2.39–8.49)

The binary logistic regression analysis revealed that age, education, household size, and hospitalisation, occupation, household income, and participation in thrift were the predictors of household catastrophic health expenditure. Households with no history of persons hospitalised during last illness episode, with less than seven persons, whose heads were aged below 40 years, and had no formal education had 88% (AOR = 0.12; 95% CI 0.05–0.32), 79% (AOR = 0.21; 95% CI 0.09–0.49), 93% (AOR = 0.07; 95% CI 0.01–0.45), and 43% (AOR = 0.57; 95% CI 0.34–0.96) decreased odds respectively of experiencing CHE (Table 3).

Households whose heads had a monthly income of more than ₦20,000 ($ 43.42), whose heads did not participate in thrift contribution, and who were farmers had eightfold (OR = 8.47; 95% CI 4.28–16.76), and fivefold (OR = 4.51; 95% CI 2.39–8.49), and fivefold (AOR = 4.98; 95% CI 1.94–12.79) increased odds respectively of experiencing CHE (Table 3).

4 Discussion

In this study, OOP payments for health care during illness episodes was catastrophic for a significant proportion of households in the study setting. This proportion at 5% and 10% thresholds of household income, and at 10% and 40% thresholds of capacity to pay further increased when the cost of transportation was considered in addition to direct medical cost.

This observation is suggestive of the fact that direct non-medical cost from transportation contribute to no small measure in tilting households into financial catastrophe while seeking health care and it is in keeping with findings reported from previous studies conducted in South Africa [26] and Kenya [27]. The number of households facing CHE is often used as a proxy for measuring the level of financial risk protection [28]. Therefore, the relatively high prevalence of CHE observed in this study provides insight into the poor level of financial risk protection the health care system affords households in the study setting. With about 40% of Nigerians living in poverty [15], this may drive low capacity to pay for health care during illness episodes among households.

Evidence has shown that the financial burden faced by households impairs prompt and appropriate health care seeking [29]. Poor households with ill persons are vulnerable to the "medical poverty trap" where they must cope with the effect of reduced disposable income for other consumptions, which in turn increases poverty [30].

Sociodemographic characteristics such as household heads' age, educational status, household size, and history of hospitalisation were associated with household CHE. Households with no history of hospitalisation had a decreased odds of experiencing CHE. This observation is supported by other studies conducted in Nigeria [31], Ethiopia [32], India [33] and Kenya [27] which have shown that CHE is more likely to result from the costs of in-patient care. Similarly, households whose heads had no formal education had a decreased odds of experiencing CHE. More educated people are more likely to have better information about diseases, understand the benefits of medical care, and adhere to treatment regimen better than less educated people [32, 34]. This could possibly explain why households whose heads had no formal education had a decreased odds of experiencing CHE in this study. In addition, households with fewer members had a decreased odds of experiencing CHE. This observation is supported by evidence from a study conducted in Myanmar which revealed that large households were more likely to experience CHE compared to small households [35]. Furthermore, households whose heads were aged below 40 years had a decreased odds of experiencing CHE. A possible explanation could be that household heads who are aged below 40 years have small households and therefore have a higher capacity to pay compared to their older counterparts. Also, younger persons are less prone to chronic non-communicable diseases and evidence has shown that presence of chronic diseases increases the odds of experiencing CHE [36–38]

This study also revealed that socioeconomic characteristics such as monthly household income, household heads' occupation, and participation in thrift contribution were associated with household CHE. Households whose heads had a monthly income of more than ₦20,000 ($ 43.42), had an increased odds of experiencing CHE. A possible explanation may be that households with higher income are more likely to utilise conventional health care service compared to poorer households [39]. Similarly, households whose heads did not participate in thrift contribution had an increased odds of experiencing CHE. This may be due to the absence of a social safety net, hence their exposure to the risk of financial catastrophe due to illness. In addition, households whose heads were farmers had an increased odds of experiencing CHE. Farmers have seasonal income fluctuations with peak in harvest season and may not have adequate income during household illness episodes, thus increasing their likelihood of catastrophic health spending.

5 Limitations of the study

The findings of our study should be interpreted considering the following limitations. Firstly, the self-report nature of study leaves room for reporters and recall bias which is a concern in cost estimation studies. Second, this study did not estimate the indirect costs incurred by households while seeking health care during illness episodes. Third, is the inability to infer causality due to the cross-sectional nature of the data collected in this study.

6 Conclusion

The results of this study are an important contribution to the literature on the burden of CHE due to OOP payments during illness episodes among rural households. In addition, direct non-medical costs from transportation significantly exacerbated the risk of CHE which has the potential to drive household into income poverty and ultimately hamper access to healthcare. This highlights the need for concerted efforts by the relevant stakeholders in the health sector to urgently scale up health insurance coverage to reduce the burden of CHE experienced by households in rural communities in the study setting. Considering the limitations of this study, further research is needed to better understand how sociodemographic and socioeconomic factors drive CHE among rural households in Nigeria.

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Data availability The datasets generated and/or analysed during the current study are not publicly available due to the reason that it was gathered for the postgraduate fellowship research of the first author by the first author but are available from the first author on reasonable request.

Declarations

Ethics approval The Delta State University Teaching Hospital Health Research Ethics Committee (HREC) provided ethics approval (DELSUTH/HREC/2015/037) to conduct the study. The general conduct of the study was in accordance with the Declaration of Helsinki. Permission was also obtained from the heads of communities before the study was conducted.

Human ethics and consent to participate A written statement of informed consent was obtained from all eligible study participants. They were informed of the purpose of the research, anticipated benefits and risks as well as their right to participate or refuse to participate in the study. They were also assured of the confidentiality of any information obtained from them.

Consent for publication Not applicable.

Competing interests The authors declare no competing interests.

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