International Journal of Community Medicine and Public Health
Enuagwuna FC et al. Int J Community Med Public Health. 2024 Jan;11(1):79-86
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20234111

Original Research Article

Risk and determinants of catastrophic health expenditure among rural households in rivers state

Fredrick C. Enuagwuna[1]*, Daprim S. Ogaji[1], Oghenerukevwe Tebu[2]

[1]Department of Preventive and Social Medicine, University of Port Harcourt, Choba, Rivers State, Nigeria
[2]Epidemiology Division, University of Port Harcourt School of Public Health, Choba, Rivers State, Nigeria

Received: 07 November 2023
Revised: 19 December 2023
Accepted: 20 December 2023

***Correspondence:**
Dr. Fredrick C. Enuagwuna,
E-mail: drfred.enuagwuna@yahoo.com

ABSTRACT

Background: Concerns about how the expense of healthcare impacts rural families' ability to pay their bills are rising, especially in environments where prepayment systems are inadequate and people pay cash while using health services. This research evaluated the method of payment, frequency, and contributing factors of catastrophic health expenditure (CHE) among rural inhabitants of Rivers State.
Methods: This retrospective longitudinal study was conducted among 450 inhabitants in six rural communities in Rivers State. The participants were chosen using a multistage sampling process. A validated semi-structured questionnaire which was interviewer administered was used to obtain the data. IBM statistical package for the social sciences version 25 was used to analyze the data. Data were summarized using means, frequency, and proportions while bivariate and multivariate binary logistic regression were used to explore determinants of CHE with $p \leq 0.05$ considered statistically significant.
Results: The result showed that 94.9% of rural households pay for health care via out-of-pocket payment and 88.4% rural residents experience catastrophic health payment. Household income of less than N100,000 (AOR=2.8, 95% C.I.=1.4-5.4, p=0.002) and having two or more dependents (AOR=3.3, 95% C.I.=1.3-8.0 p=0.002) were determinants of CHE.
Conclusions: There is need to increase public funding for healthcare as well as expand the coverage of the NHIS to mitigate the effect of health care cost on rural residents in Rivers State.

Keywords: CHE, Incidence, Determinants, Rural areas, Rivers State

INTRODUCTION

The development of a health finance system that safeguards the populace against the financial risks related to poor health financing is one of the primary obligations of the health system. This risk can be assessed in terms of extremely expensive medical care and financial ruin from them.[1,2]

CHE as an assessment of financial risk protection is often linked with households who utilize unaffordable health care services often paid for out-of-pocket.[3]

CHE has been described as a situation when out-of-pocket payments is higher than an estimated range of household expenses, which forces the household to forgo necessities, liquidate assets, take on unnecessary debt, or suffers from poverty.[4] Direct, out-of-pocket (OOP) payment for health at point of service is regarded as the least effective and unfair method of funding a health system.[5] Paying at the point of access to services provides limited room for risk pooling, reduces provider competitiveness, and consumers pay more than they would under a prepayment system because of the fragmentation of risk and the urgency of treatment.[6] Various thresholds have been used by researchers to

estimate CHE in different countries. A 10% criterion of total household spending has been utilised in several research.[7] While others have used 40% of their budget on non-food items.[8]

Financial protection for health appears to be segmented and fragmented in so many nations with low and middle income. Most of the populace are excluded from access to public pre-payment options such as social security, and resort to paying directly out of pocket.[9-11] In order to improve people' access to healthcare, the national health insurance scheme (NHIS), currently known as the national health insurance authority (NHIA), was officially implemented in 2005. by offering financial security.[12] Although the NHIA started operating in Nigeria almost two decades ago, it serves below 5% of the entire citizens.[6,13] Most of the current enrollees work in the public sector and reside in cities. The majority of rural population are engaged in the informal setting, where prepayment plans are virtually unknown. Consequently, the access and use of health care services is limited.

The prevalence of OOP for health care in Brazil ranged from 50% to 70.8% according to a report in 2018.[14] In Egypt's rural population, out-of-pocket payments accounted for nearly 60% of all medical expenses,[15] while survey in Cote d'Ivoire, Sub-Saharan Africa, revealed approximately 13.3% of participants experienced OOP health expenditure.[16] An earlier community-based study in an Urban area of Southern Nigeria, reported over 90% of the respondents paid for healthcare via out-of-pocket payment.[17]

The prevalence of CHE using 40% of non-food expenditure was 13.7% according to a report in Nigeria, across Africa, it ranged from 0.2% in Ghana, to 7% in Botswana, 1.3% in Lesotho and 12% in Tunisia.[18-21] While in other part of the world, studies reported that the prevalence of CHE was 16.5% in Iran,[22]14.8% in India [23] and 11% in Bangladeshi.[24] The prevalence of CHE using 10% threshold was 18.5% in Nigeria, 14% in Malawi, 52.8% in China, between 7% to 19% in Austria and 9.6% in Argentina.[25-28]

Some risk factors for incurring CHE from earlier studies include: living a rural residence, head of household being unemployed, advanced age (elderly) chronic illness and utilization of specialist healthcare.[29] Others includes number of unemployed households, hospitalization of a household member,[30] being of a low socioeconomic status, utilization of private health care providers, having a large household size, the presence of an elderly household member and absence of health insurance cover.[31]

Determining the prevalence and determinants of CHE in rural area will provide evidence-based for intervention to achieved access and equity in health care delivery among the population. This study identified the mode of payment for healthcare as well as determined the prevalence and determinants of CHE among households in the rural communities in Rivers State.

METHODS

Study design

This quantitative study utilized a retrospective longitudinal study design.

Study settings

This study was conducted in Ayana-Ekede and Okoloile communities of Andoni LGA, Obohia and Ikweke communities of Oyigbo LGA, Umuebebulu and Umugodo communities of Etche LGA Areas of Rivers State. The Nigerian Niger Delta is home to the oil-rich state of Rivers. Five tertiary healthcare organizations provide specialized services. There are around 381 PHCs spread across Rivers State's rural regions, with an average of 18 in each LGA and 1 in each ward. Residents of remote towns in Rivers State may also get medical care from conventional health practitioners, pharmacies, traditional medicine and private health providers. These medical facilities also refer patients to five tertiary institutions in Rivers State as well as ordinary hospitals.

Study participants

The study population were households who are normally residents within the rural communities in Rivers State, Nigeria for up to three months prior to commencement of study; a period sufficient enough for one to require medical care. Community members who are the household heads and who have typically lived in the chosen community for up to three months prior to the study's start. While heads of households who were absent throughout the data collecting period were not included in the research

Sample size

The sample size was estimated using the estimation formula for calculating sample size for household descriptive surveys given by the department of economic and social affairs, statistics division, United Nations as follows:[32]

$$n_h = \frac{(z^2)(r)(1-r)(f)(k)}{(p)(n)(e^2)}$$

n_h is the sample size in terms of the number of chosen households, z^2 is the metric that indicates the desired degree of confidence, where 1.96 equates to a 95% level of confidence, r is an estimated value for the survey's primary indicator (CHE) 32.8% Yenagoa, Bayelsa State, f is the default value for the sample design effect, Deff, is 2.0. and k is a multiplier to take into consideration the 10% stated non-response rate in poor countries, p is the

target population's share of the overall population [household heads are the target population; using the rule of thumb of 45 times 0.03 and assuming an average age of 45 years p=1.35, n=6 which is the people make up the typical household size in underdeveloped nations and e is the error-margin to be permitted (10%).[17]

Hence the minimum sample size required to conduct this study was estimated to be 454 households.

Sampling technique

A multistage sampling procedure was used to choose the homes. that involved selection of six communities from the 21 rural local government Areas of Rivers State as follows; the first stage was the selection of three local government areas from the list of 21 rural local government areas using a simple random sampling method. Andoni, Etche and Oyibo LGA's were selected at this stage. The second stage was selection of three wards from the list of wards in each of the three selected LGAs through a simple random technique using balloting. Ward 4 was selected out of the eleven wards in Andoni LGA, ward 6 was selected out of the 10 wards in Oyigbo LGA and Ward 3 was selected out of the 19 wards in Etche LGA. The third stage was selection of communities. A simple random sampling using balloting was used to select two communities each from the selected wards. Ayama-Ekede and Okoloile communities were selected from the list of 15 communities in ward 4 of Andoni LGA, Obohia and Ikweke were selected from the 8 communities in ward 6 of Oyigbo LGA, Umuebulu and Umugodo were selected from the list of 12 communities in ward 3 of Etche LGA. The fourth stage was selection of house from communities using a cluster sampling method. The Homes were grouped into three clusters; a toss of a bottle was used to determine which of the three clusters to be sampled. Households living in these houses were interviewed and a repeat visit were made where responsible person was absent in initial visit.

Study instrument

It was semi-structured structured questionnaire adapted from valid existing instruments that have been used in related investigations.[17,33] The questionnaire was programmed in the open data kit application (ODK). It was an interviewer administered in simple English language, but the interviewer may decide to relay it in pidgin English depending on the educational level of the respondent. It has five subsections: starting with a brief introduction of the study and the principal investigator. It also sought the consent of participants. The subsections included social demographic information of households, household payment mechanism for healthcare, household total income, household total consumption and household expenditure. Health care cost for multiple episodes of illness was determined by asking questions on amount spent on various direct medical and direct non- medical cost in addition to siting receipt of payment made for health care. Costs associated with consultations, medications, tests, and admissions/hospital stays incurred during the past three months are considered direct medical costs, an estimate of direct non-medical costs was made, including the price of travel (to and from the hospital), meals consumed while visiting, and lodging.

The total food consumption was determined by asking questions on the amount each household spent within a given period.

Data analysis

Data was analyzed using IBM statistical product and service solution version 25.

Variables were summarized as means and standard deviation for continuous variables while categorical variables were summarized as frequency distribution tables and charts, Also, the financial burden of treatment on the respondents was assessed based on the tendency for CHE using a threshold of 10% of total expenditure. These figures were used to estimate the CHE

The duration of illness for both chronic and acute conditions were assessed for each member of household that fell ill within the study period.

Selected household asset holdings such as ownership of television, radio, refrigerator, watch, cable TV, generator, air condition, electric iron, computer, fan, mobile phone, canoe, boat, animal cart, bicycle/tricycle, motorcycle, car truck and a house. Others are house roofing materials, type of floor, type of wall material, type of toilet, type of cooking fuel and electricity, were used to develop a cumulative assets-based wealth scale in quintile using principal component analysis. The five categories are poorest, poor, middle, wealthy and wealthiest.

Chi-square tests was used to ascertain the relationship between the explanatory factors and the outcome. Having dichotomized the proportions, a binary logistic regression was done to explore the relationships between the study's independent/explanatory variables and the occurrence of CHE (dependent variable). First, a bivariate binary logistic regression was done between CHE and the independent variables - gender, marital status, religion, educational status, and occupation of household head. A multivariate binary logistic regression was done to determine the relationship between various independent variables that were statistically significant in determining the probability of a household encountering CHE during the univariate test. Only variables with $p \leq 0.05$ during the univariate analysis were considered statistically significant for the multivariate regression equation.

Study duration

The study was carried out from November 2021 to February 2023.

RESULTS

Table 1 shows 336 (74.7%) of respondents had secondary education/ below, 266 (59.1%) earn N100,000/else, 399 (88.7%) had no financial support, 337 (74.9%) had no elderly persons, 429 (95.3%) had no household managing a long-term condition, 423 (94.0%) had >2 dependent and 94 (20.9%) of respondents belonged to wealthiest social economic category.

The 338 (75.1%) of household had 1-2 members who fell ill in past 3 months, 338 (75.6%) fell ill between 3-6 months, 21 (4.7%) of respondents had household member who was managing a health condition, 13 (61.9%) of them managing hypertension, 8 (38.1%) were managing diabetes, 8 (38.1%) managing stroke and 83 (18.4%) of respondents had household member living with disability. Table 3 shows that 4 (0.9%) of respondents had health insurance, 19 (4.2%) of respondents' employer pay for their health care expenses, 427 (94.9%) pay for health care via out-of-pocket method, 398 (88.4%) experienced CHE. Average daily income of respondents-3,888.9±11,757.5, monthly income of respondents 98,638.9±43,099.1, average monthly income from other sources-3,424.6±12,792.4, average annual income of households 1,074,206.2±627,219.1, average daily expenses-3,296.4±6,713, average monthly expenses-60,111.2±20,641.2, average monthly food expenses-54,137.78±19, 324, average monthly non-food expenses was 39,722.3±16,818.7

Table 1: Social demographic characteristics.

Variables	N (%)
Education	
Secondary education/below	336 (74.7)
Tertiary education[R]	114 (25.3)
Income (Naira)	
≤100000	266 (59.1)
>100000	184 (40.9)
Financial support	
No	399 (88.7)
Yes	51 (11.3)
Have elderly persons	
No	337 (74.9)
Yes	113 (25.1)
Household member managed for long term condition	
No	429 (95.3)
Yes	21 (4.7)
Number of dependent	
>2	423 (94.0)
≤2	27 (6.0)
Wealth index	
Poorest	90 (20.0)
Poor	90 (20.0)
Middle	90 (20.0)
Wealthy	94 (20.9)
Wealthiest	86 (19.1)

Table 2: Households health status and pattern of illness (n=450).

Variables	N	Percentages (%)
Number of members of households who fell ill		
None	3	0.7
1-2	338	75.1
3-4	109	24.2
Duration of illness, n=447		
<3 months	32	7.2
3-6 months	338	75.6
7-12 months	71	15.9
>12 months	6	1.3
Household managing long-term health condition		
Yes	21	4.7
No	429	95.3
Long term health conditions being managed, n=21		
Hypertension	13	61.9
Diabetes	8	38.1
Stroke	8	38.1
Sickle cell	2	9.5
Cancer	1	4.8
HIV/AIDS	1	4.8
Household with disability		
Yes	83	18.4
No	367	81.6

Table 3: Health service payment mechanisms and prevalence of CHE (n=450).

Variables	N	%
Method of healthcare payment (mean ± SD)		
Health insurance	4	0.9
Employer	19	4.2
Out of pocket	427	94.9
Daily income	3,888.9±11,757.5	
Monthly income	98,638.9±43,099.1	
Other sources of income	3,424.6±12,792.4	
Total household monthly income	102,063.5±46,719.5	
Household income in 3 months	306,190.4±140,158.5	
Annual income	1,074,206.2±627,219.1	
Daily expenses	3,296.4±6,713	
Monthly all expenses	60,111.2±20,641.2	
Monthly food expenses	54,137.78±19,324	
Monthly non-food expenses	39,722.3±16,818.7	
Direct medical cost	46,526.5±13,071.0	
Direct non-medical cost	25,937.6±29,872.8	
Total cost of healthcare	72,500.0±35,559.8	
Catastrophic health expenditure		
Yes	398	88.4
No	52	11.6

Table 4: Predictors of CHE.

Variables	COR (95% C.I.)	P value	AOR (95% C.I.)	P value
Education				
Secondary education	2.1 (1.5-3.8)	0.015	1.5 (0.5-4.1)	0.398
Tertiary education [R]				
Income (Naira)				
≤100000	2.3 (1.3-4.3)	0.004	2.8 (1.4-5.4)	0.002*
>100000 [R]				
Financial support				
No	2.4 (1.1-5.0)	0.021	1.49 (0.7-3.4)	0.340
Yes [R]				
Have elderly persons				
No	0.6 (1.1-1.5)	0.006	0.6 (0.3-1.1)	0.137
Yes [R]				
Household member managed for long term condition				
No	3.3 (1.2-9.0)	0.018	2.1 (0.7-6.1)	0.180
Yes [R]				
Number of dependent				
>2	4.4 (1.9-10.4)	0.001	3.3 (1.3-8)	0.002*
≤2				
Wealth index				
Wealthy/wealthiest	1.2 (0.6-2.1)	0.588	0.7 (0.4-1.4)	0.383
Poor/poorest/middle				

*Statistical significance R-reference category AOR-Adjusted odds ratio.

Table 4 shows that income level was a significant predictor of CHE (AOR=2.8, p=0.002), also the number of dependents in a household was a significant predictor of CHE (AOR=3.3, p=0.002).

DISCUSSION

The main mode of payment for health care in the rural part of Rivers State is predominantly out of pocket payment as the uptake of the social health insurance coordinated by the NHIA is still very limited and predominately among government employees and actors in the organized private sector. NHIA has not achieved universal application in Nigeria and in the rural parts of Rivers State. This finding corroborated with a finding from a community-based study in neighboring Bayelsa State were out of pocket payment was reported as the main mode of payment for health care.[17] The implication of this finding is that most rural residents in Rivers State may not be able to access health care at the point of need or the extent it is needed in situations where they cannot afford the cost.

The study showed that more than two-third of the respondents spend ten percent or more of their total income on health care expenditure hence running into catastrophic health payment, this can be as a result of out-of-pocket spending becoming the primary method of paying for healthcare. This incidence of CHE is consistent with research conducted in China to identify the factors that predict CHE in families with breast cancer patients.[34] The findings was however, higher than what was reported in a study to determine the prevalence of household's catastrophic health among rural and urban communities in Ekiti State South western Nigeria where the prevalence of households CHE is higher in rural areas compared to the urban areas,[25] and other parts of the world.

The income level of the respondent was a significant predictor of CHE. The incidence of CHE was significantly higher among the respondents who earn less. The low-earning respondents may have spent more of their limited resources to pay for healthcare hence exposing them to catastrophic health expenditure this corroborate with the findings in a study to determine the predictors of CHE among households with breast cancer patients in China.[34] Other reports have identified low socioeconomic status as a risk factor for incurring CHE.[29] The implication of this finding is that low-income earners residing in rural areas may not be able to access healthcare as at when desired. Community health insurance scheme could help reduced the out-of-pocket payment for health care in the rural areas. According to a study in a rural community of North Western Nigeria, most of the respondents were willing to pay for a community-based health insurance scheme.[35]

Household size [dependents] was a significant predictor for incurring catastrophic health payment. This may be attributed to more medical expenses that accompanies large family size. Having a large family size was also reported as a risk factor for incurring catastrophic health payment. A study of marital status, households size and poverty in Nigeria has shown that increased household

size directly correlates with increasing level of poverty.[36] Significant number of the household members were dependents, while most of the respondents' partners were petty traders. Hence most of the out-of-pocket payments were made by the head of households, this finding is similar or corroborate with the findings of a systematic review done to identify the determinant of household's CHE in low -to high income countries around the world.[37]

Stake holders should strengthen policies that reduce the family size of households in addition to advocacy on the use of family planning services in the rural areas. This will help reduce the risk of incurring catastrophic health payment among the rural population.

Implications of the findings of the study

The risk of CHE among rural household is high and mainly attributed to near absence of financial risk protection in the event of illness episodes, low socio-economic status and high number of dependents. Achieving universal health coverage in rural communities in Rivers State remains a mirage if concerted efforts are not made to address issues related to financial risk protection. This is quintessential among rural agrarian communities with low socio-economic status, high dependency ratio with the preponderant mode of payment for health care being out-of-pocket at the point of access.[38] Strategic options for changing this ugly situation are the implementation of the Rivers State contributory health protection programme [RIVCHPP] which has immense potential to offering financial protection to resident to access health services thereby improving the chances of attaining universal health coverage. Further studies should probe into the consequence of out-of-pocket payment for health care in Rural Areas of Rivers State as there is evidence that out of pocket payment increases the risk of CHE among households with pediatrics emergencies, acute illnesses in adults requiring hospitalization, household receiving essential obstetric care, and those with long-term medical conditions.[38,39] Governments can consider using digital services to extend social protection to rural residents, modifying contribution plans to account for the types of jobs that are prevalent there, and offering more flexible payment options to take into account seasonality and fluctuating income. In the wake of a shock, donations might be temporarily reduced or suspended, which could further improve accessibility.[40] Offering assistance to individuals in need might help increase participation in social insurance programmes. By streamlining administrative processes, ensuring that programme requirements are not unduly onerous, and making services easily available, it is possible to reduce the hidden costs of participation in and access to social security systems generally. Social protection is a crucial area of policy to address both rural poverty and disparities. There is a lot of evidence that social protection has a good effect on reducing poverty and inequality as well as on its capacity to foster inclusion. Through the lifetime, having access to consistent and sufficient social protection benefits helps to decrease vulnerability and avoid poverty. When families experience economic shocks, it lessens the need to depend on harmful coping mechanisms, such as having kids drop out of school or selling off possessions.[40]In order to address the unique demands of the rural population, new programmes might also be established. This choice enables the use of certain design features that are sensitive to rural specificities. To guarantee stability and long-term financing, social protection programmes should also be rooted inside comprehensive legal and institutional frameworks.

Limitations

The study was prone to recall bias because the respondents had to recall expenses made up to three months prior to the interview. However, efforts were made to validate claims through repeating some questions to ensure consistency of response and reference to payment receipts when necessary. The data collection protocol provided for extensive documentation of health events as well as incomes and expenditure of households.

CONCLUSION

A high proportion of rural residents are not covered by the social health insurance, thus exposed to CHE. The socioeconomic status and family size are major determinants of CHE among the rural population. Stakeholders at the State and national level should collaborate to improve coverage of social health insurance among the rural population. Furthermore, scale up of family planning activities should be intensified among residents in rural areas of Rivers state.

ACKNOWLEDGEMENTS

Author would like to thanks to the communities' leaders, heads of households, staff and patients of the designated primary health centres for their cooperation during the period of data collection in this study.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee University of Port Harcourt's Ethics Committee granted approval for study [UPH/CEREMAD/REC/MM84/022]

REFERENCES

1. Li Y, Wu Q, Liu C, Kang Z, Xie X, Yin H et al. Catastrophic health expenditure and rural household impoverishment in China: What role does the new cooperative health insurance scheme play? PLoS One. 2014;9(4).
2. Li Y, Wu Q, Xu L, Legge D, Hao Y, Gao L et al. Factors affecting catastrophic health expenditure and impoverishment from medical expenses in China:

policy implications of universal health insurance. Bull World Health Organ. 2012;90(9):664-71.
3. Aregbeshola BS, Khan SM. Determinants of catastrophic health expenditure in Nigeria. Eur J Health Econ. 2018;19(4):521-32.
4. Financial toxicity associated with treatment of localized prostate cancer. Nature Reviews Urology. 2020;17:28-40.
5. Knaul FM, Wong R, Arreola-Ornelas H, Econ MH, Méndez O, Bitran R et al. Household catastrophic health expenditures: A comparative analysis of twelve latin American and Caribbean countries. Salud Publica Mex. 2013;53(2):85-95.
6. Adewole DA, Adebayo AM, Udeh EI, Shaahu VN, Dairo MD. Payment for Health Care and Perception of the National Health Insurance Scheme in a Rural Area in Southwest Nigeria. Am J Trop Med Hyg. 2015;93(3):648-54.
7. Edeh HC. Exploring dynamics in catastrophic health care expenditure in Nigeria. Health Econ Rev. 2022;12(1):22.
8. Liu H, Zhu H, Wang J, Qi X, Zhao M, Shan L et al. Catastrophic health expenditure incidence and its equity in China: A study on the initial implementation of the medical insurance integration system. BMC Publ Heal. 2019;19(1):1-12.
9. Asante A, Price J, Hayen A, Jan S, Wiseman V. Equity In Health care financing in low-and middle-income countries: A systematic review of evidence from studies using benefit and financing incidence analyses. PLoS One. 2016;11(4):1-20.
10. Kabia E, Goodman C, Balabanova D, Muraya K, Molyneux S, Barasa E. The hidden financial burden of healthcare: a systematic literature review of informal payments in Sub-Saharan Africa. Wellcome Open Res. 2021;6:297.
11. Sowmithra V, Maiya G, Jain T. Pattern of Out of Pocket Healthcare Expenditure and Prevalence of Catastrophic Health Expenditure in Patients Attending a Tertiary Hospital in Chennai. Ann Trop Med Publ Heal. 2020;23(23).
12. Hafez R. Nigeria Health Financing System Assessment. Washington, DC: World Bank; 2018. Available at: https://openknowledge.worldbank.org/handle/10986/30174. Accessed on 24 January, 2023.
13. PWC. Sustainability of State Health Insurance Schemes in Nigeria: Beyond the launch. 2019.
14. Rodrigues JARM, Cunha ICKO, Vannuchi MTO, Haddad M do CFL. Out-of-pocket payments in hospital bills: a challenge to management. Rev Bras Enferm. 2018;71(5):2511-8.
15. Farahat TM, Shaheen HM, Khalil NA, Basma S, Ibrahem. Out-of-pocket health expenditure in rural population. Menoufia Med. 2018;31(3):846-9.
16. Attia-Konan AR, Oga ASS, Touré A, Kouadio KL. Distribution of out of pocket health expenditures in a sub-Saharan Africa country: evidence from the national survey of household standard of living, Côte d'Ivoire. BMC Res Notes. 2019;12(1):25.
17. Adesina AD, Ogaji DS. Out-of-Pocket Payment for Healthcare and Implications for Households: Situational Analysis in Yenagoa, Bayelsa State. J Community Med Prim Health Care. 2020;32(1):1-16.
18. Aregbeshola BS, Khan SM. Original Article Out-of-Pocket Payments, Catastrophic Health Expenditure and Poverty Among Households in Nigeria. Int J Health Policy Manag. 2018;7(9):798-806.
19. Sataru F, Twumasi-Ankrah K, Seddoh A. An Analysis of Catastrophic Out-of-Pocket Health Expenditures in Ghana. Front Health Serv. 2022;2:1-9.
20. Akinkugbe O, Chiliba C, Setshegetso N. Health Financing and Catastrophic Payments for Health Care: Evidence from Household-level Survey Data in Botswana and Lesotho. Afr Dev Rev. 2012;24(4):358-70.
21. Khemiri K. Decomposing inequality in catastrophic health expenditure in Tunisia: which differences between rural and urban women after the 2007 reform. J Health Med Res. 2020;S(5):13.
22. Ravangard R, Jalali FS, Bayati M, Palmer AJ, Jafari A, Bastani P. Household catastrophic health expenditure and its effective factors: a case of Iran. Cost Eff Resour Alloc CE. 2021;19:59.
23. Swetha NB, Shobha S, Sriram S. Prevalence of catastrophic health expenditure and its associated factors, due to out-of-pocket health care expenses among households with and without chronic illness in Bangalore, India: A longitudinal study. J Prev Med Hyg. 2020;61(1):E92-7.
24. Ahmed S, Ahmed MW, Hasan MZ, Mehdi GG, Islam Z, Rehnberg C et al. Assessing the incidence of catastrophic health expenditure and impoverishment from out-of-pocket payments and their determinants in Bangladesh: Evidence from the nationwide Household Income and Expenditure Survey 2016. Int Health. 2022;14(1):84-96.
25. Ajayi PO, Ibirongbe DO, Ipinnimo TM, Solomon OO, Ibikunle AI, Obiagwu AE. The Prevalence of Household Catastrophic Health Expenditure in Nigeria: A Rural-Urban Comparison. J Health Med Sci. 2021;4(2).
26. Mulaga AN, Kamndaya MS, Masangwi SJ. Examining the incidence of catastrophic health expenditures and its determinants using multilevel logistic regression in Malawi. PLoS One. 2021;16(3):e0248752.
27. Duan W, Zhang W, Wu C, Wang Q, Yu Y, Lin H et al. Extent and determinants of catastrophic health expenditure for tuberculosis care in Chongqing municipality, China: a cross-sectional study. BMJ Open. 2019;9(4):e026638.
28. Virdis J, Eugenia Elorza M, Delbianco F. Financial protection from health care spending in Argentina: evolution and distribution (1985-2018). Stud Appl Econ. 2022;40(2).
29. Eze P, Lawani LO, Agu UJ, Amara LU, Okorie CA, Acharya Y. Factors associated with catastrophic health expenditure in sub-Saharan Africa: A

systematic review. PLOS One. 2022;17(10):e0276266.
30. Ajayi PO, Ipinnimo TM, Esan DT, Solomon OO, Moronkeji T. Determinants of catastrophic health spending among rural households in Nigeria. Niger Health J. 2022;22(3):278-87.
31. Abdel-Rahman S, Shoaeb F, Fattah MNA, Abonazel MR. Predictors of catastrophic out-of-pocket health expenditure in rural Egypt: application of the heteroskedastic probit model. J Egypt Public Health Assoc. 2021;96(1):23
32. Department of Economic and Social Affairs UN. Designing Household Survey Samples: Practical Guidelines. 2005.
33. Oyefabi AdegboyegaO, Aliyu AlhajiA, Idris A. Sources of health care financing among patients at the Ahmadu Bello University Teaching Hospital, Zaria, Nigeria. J Med Trop. 2014;16(1):27.
34. Sun CY, Shi JF, Fu WQ, Zhang X, Liu GX, Chen WQ et al. Catastrophic Health Expenditure and Its Determinants Among Households With Breast Cancer Patients in China: A Multicentre, Cross-Sectional Survey. Front Public Health. 2021;9.
Lawal A, Gobir A, Aliyu A, Sufiyan M, Olorukooba A, Amadu L, et al. Community-Based Health Insurance Scheme In A Rural Community Of North West Nigeria: A Roadmap To Achieving Universal Health Coverage. Kanem J Med Sci. 2020;14(2):124-30.
35. Anyanwu JC. Marital Status, Household Size and Poverty in Nigeria: Evidence from the 2009/2010 Survey Data. Afr Dev Rev. 2014;26(1):118-37.
36. Azzani M, Roslani AC, Su TT. Determinants of household catastrophic health expenditure: A systematic review. Malays J Med Sci. 2019;26(1):15-43.
37. Ogaji DS, Adesina, AD. The predictors of Catastrophic health expenditure among households in Yenegoa, Bayelsa State. Nig Med J. 2018;2(1):9-23.
38. Ogaji DS, Nwi-ue LB, Agalah HN, Ibok SG, N-ue DM. Impact and contributors to cost of managing long term conditions in a university hospital in Nigeria. J Community Med Prim Health Care. 2015;27(2):30-40.
39. United Nations. Social protection in rural areas: achieving universal access for all. Available at: https://www.un.org/development/desa/dspd/2021/05/social-protection-in-rural-areas/. Accessed on 10 March, 2023.

Cite this article as: Enuagwuna FC, Ogaji DS, Tebu O. Risk and determinants of catastrophic health expenditure among rural households in rivers state. Int J Community Med Public Health 2024;11:79-86.