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Assessment of rural households' willingness to pay for healthcare insurance in Bauchi state of Nigeria

Ocena gotowości wiejskich gospodarstw domowych do płacenia za ubezpieczenie zdrowotne w stanie Bauchi w Nigerii

Abstract. Contrary to previous studies on agriculture, cross-disciplinary studies on the value of health risk reduction (VHRR), value of statistical life (VSL), and value of statistical case (VSC) are extremely uncommon in Nigeria and the study area specifically. In light of the lack of information, this study will likely use the VSL and VSC methodologies to address the "benefit transfer" on environmental health risk reduction linked to morbidity incidence within the agricultural sector. Consequently, this research aimed to determine rural households' willingness to pay (WTP) for healthcare insurance in Bauchi State of Nigeria. Using an easy-cost route approach, cross-sectional data were elicited by a well-structured questionnaire coupled with an interview schedule from a total of 319 households selected through a multi-stage random sampling technique. To achieve the specified objectives, the collected data were subjected to both descriptive and inferential statistics. Empirically, malaria and typhoid were the major morbidities affecting the households and, on average, cost a household a whopping sum of NGN 70, 944.70 per month. Consequently, the majority, though marginally above half of the sampled households showed interest in social healthcare insurance in order to have access to better healthcare services. However, the premium rate poses a threat to the sustainability of the scheme, as evidenced by its inverse relationship with WTP; thus, a spoon-feeding premium rate at the initial phase is suggested, pending the beneficial impact of the scheme on the lives of the majority in the study area. Old age, poor agricultural holdings, and lack of credit facilities were the stumbling blocks to WTP for healthcare insurance in the study area. Therefore, the study advises policymakers to improve social health safety coverage for old-aged households, provide adequate credit facilities, and leverage for income generation, thereby enhancing the scope and sustainability of social healthcare insurance in the study area.

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Key words: healthcare, insurance, morbidity, WTP, rural households, Nigeria

Synopsis. W przeciwieństwie do wcześniejszych badań nad rolnictwem, interdyscyplinarne badania wartości redukcji ryzyka dla zdrowia (VHRR), wartości statystycznego życia (VSL) i wartości statystycznego przypadku (VSC) są niezwykle rzadkie w Nigerii, a konkretnie na badanym obszarze. W świetle braku informacji w niniejszym badaniu prawdopodobnie wykorzystana zostanie metodologia VSL i VSC, w celu zajęcia się „transferem korzyści" w zakresie środowiskowego zmniejszenia ryzyka dla zdrowia związanego z zapadalnością w sektorze rolnym. W związku z tym badanie to miało na celu określenie gotowości wiejskich gospodarstw domowych do płacenia (WTP) za ubezpieczenie zdrowotne w stanie Bauchi w Nigerii. Korzystając z podejścia opartego na łatwych kosztach, dane przekrojowe uzyskano za pomocą dobrze skonstruowanego kwestionariusza połączonego z harmonogramem wywiadów z łącznie 319 gospodarstwami domowymi wybranymi za pomocą wieloetapowej techniki losowego doboru próby. Ponadto, aby osiągnąć określone cele, zebrane dane poddano statystyce zarówno opisowej, jak i indukcyjnej. Empirycznie, malaria i dur brzuszny były głównymi chorobami dotykającymi gospodarstwa domowe i średnio kosztowały gospodarstwo domowe sumę 70 944,70 NGN miesięcznie. W związku z tym większość, choć nieznacznie ponad połowa badanych gospodarstw domowych, wykazała zainteresowanie społecznym ubezpieczeniem zdrowotnym w celu uzyskania dostępu do lepszych usług opieki zdrowotnej. Stawka składki stanowi jednak zagrożenie dla trwałości programu, co widać po jego odwrotnej relacji z WTP, w związku z czym sugeruje się stawkę premii za karmienie łyżeczką przy starcie w oczekiwaniu na korzystny wpływ programu przejawiający się w życiu większości na badanym obszarze. Poza tym podeszły wiek, słabe gospodarstwa rolne i brak możliwości kredytowych były przeszkodami dla WTP w zakresie ubezpieczeń zdrowotnych na badanym obszarze. W związku z tym w badaniu doradzono decydentom, aby zaimprowizowali ubezpieczenie zdrowotne w zakresie bezpieczeństwa socjalnego dla gospodarstw domowych w podeszłym wieku i zapewnili odpowiednie instrumenty kredytowe – dźwignię finansową dla generowania dochodów, zwiększając w ten sposób zakres i trwałość ubezpieczeń społecznych w badanym obszarze.

Słowa kluczowe: opieka zdrowotna, ubezpieczenie, zachorowalność, gospodarstwa domowe na obszarach wiejskich, Nigeria

JEL codes: R11, R20, I13

Introduction

The healthcare sector has expanded quickly in recent years to satisfy the demands of a constantly expanding population that faces a variety of health-related problems [Abbas et al. 2019, Ayanore et al. 2023]. Governments are under pressure to devote more funds to the health sector as a result of the sharp increase in healthcare expenses [Garedew et al. 2020, Kaso et al. 2022]. As official annual health budgets struggle to match the community's need for healthcare, the majority of health services are acquired privately in developing countries and some developed countries [Oga et al. 2019, Berry et al. 2020, Njie et al. 2023]. Setting priorities among conflicting health programs is a difficult challenge in

such situations. In addition to valuing societal preferences in relation to their willingness to pay, it is necessary to take into account the non-health benefits of healthcare [Alhassan et al. 2022, Kaonga et al. 2022]. In these circumstances, WTP is more important to take into account when making decisions than simply using Quality-Adjusted Life Years (QALYs), [Jeetoo and Jaunky 2021, Anbesu et al. 2022]. According to Olsen, from a consumer sovereignty viewpoint, WTP is superior to QALYs in that there are no limitations on which characteristics of a healthcare plan individuals are permitted to value [Abbas et al. 2019, Agyei-Baffour et al. 2022].

Furthermore, long-term health outcomes are often the goal of public health interventions [Habib and Zaidi 2021]. Both the health and non-health advantages of interventions must be valued when developing and implementing preventive health programs [Chiwire et al. 2021, Negera and Abdisa 2022]. A cost-benefit analysis, which includes WTP, can be claimed to have the theoretical underpinnings of welfare economics to support the economic analysis for decision-making in publicly financed healthcare [Rahman et al. 2020, Giannouchos et al. 2021]. In order to ensure that the total amount of health gains is allocated fairly, a cost-benefit analysis using WTP tries to quantify allocative efficiency [Nugraheni et al. 2022, Steigenberger et al. 2022]. The implementation of preventive public health initiatives, cross-border health insurance, assessing health status advancement, health insurance retention, implementing WTP to reduce waiting times for medical procedures, WTP for child survival, and health-related safety strategies are just a few of the topics covered in WTP studies that have been reported globally [Amaghionyeodiwe 2020, Jeetoo et al. 2022]. It has been proven that obtaining WTP information is helpful in the decision-making process pertaining to the delivery of healthcare services when patients must shoulder the majority of their medical costs [Sarker et al. 2020, Laksono et al. 2022]. To enhance health outcomes, it is possible to provide healthcare services at prices that are acceptable to the target populations by obtaining WTP values [Chanie and Ewunetie 2020, Behzad et al. 2022].

A good example of how people can be covered by health insurance depending on the weight of their expressed preferences is the WTP-based health insurance plans [Alam et al. 2023]. In nations like the UK, where healthcare is either free or heavily subsidized, conducting WTP research may be challenging since participants may find it difficult to relate to the hypothetical market scenarios that are included in the contingent value approach. According to Minyihun et al. [2020] and Taddesse et al. [2020], thorough consideration and the inclusion of data from WTP combined with QALYs can support the decision-making process. This could be accomplished by taking into account both the non-health advantages of the health outcomes linked to interventions and the stated desires of the patients who are lobbying for broader healthcare benefits [Nageso et al. 2020, Addis et al. 2022].

Given that the bulk of the rural population is engaged in agriculture, rural livelihoods and agriculture are synonymous [Coker et al. 2022]. Morbidity is logically prevalent among Nigeria's rural resource-poor farmers. Contrary to other agricultural studies, there is a dearth of cross-disciplinary research on the Value of Health Risk Reduction (VHRR), Value of Statistical Life (VSL), and Value of Statistical Case (VSC) in Nigeria's agriculture sector [Akwaowo et al. 2021, Elegbede et al. 2022, Tabansi et al. 2022], with no evidence of such in Bauchi State. Access to affordable, high-quality healthcare in rural areas

is still a significant problem in Bauchi State of Nigeria. Due to their low financial resources and lack of proper health insurance coverage, many rural households encounter considerable obstacles when trying to get healthcare. This research aims to offer insights into the feasibility and sustainability of healthcare insurance programs suited to the particular needs of rural communities by comprehending the factors impacting their desire to spend on healthcare coverage. As a result, this problem statement emphasizes the urgent need for research to comprehend rural households' willingness to pay for healthcare insurance and create practical solutions to these healthcare challenges. Nevertheless, it highlights the pressing problem of healthcare access and affordability in rural areas of Bauchi State. The results of this study will help stakeholders and policymakers devise focused measures to improve rural households' access to healthcare, affordability, and general health outcomes in Bauchi State. In addition, by utilizing the VSL and VSC methodologies, the study will contribute important background knowledge and possibly address the lack of information on "benefit transfer" on environmental health risk reduction due to morbidity incidence within the agricultural sector. The study will also help to estimate the value of health-related benefits linked to initiatives and intervention programs in the agricultural sector. Consequently, this research aimed to assess rural households' willingness to pay (WTP) for healthcare insurance in Bauchi State of Nigeria. The specific objectives were to identify the morbidity(s) affecting rural households, estimate the economic cost of morbidity per month, assess the households' WTP for healthcare insurance, and determine the factors affecting WTP for healthcare insurance among the rural households in the study area.

Research methodology

The state is situated between longitudes 8°45' and 11°0' East of the Greenwich meridian and latitudes 9°30' and 12°30' North of the equator. According to the 2006 census, Bauchi State had a population of 4,655,073 and was projected to have 7,685,312 inhabitants by 2021 [NPC 2021]. Due to its size and geographical changes, Bauchi State, which is located in northeastern Nigeria, has a wide range of agro-climatic conditions and has a landmass of 49,259 km^2. The state's location in the Sahel area, which has a semi-arid to sub-humid climate, has a significant impact on the state's climate. Typically, the rainy season starts in May and lasts through September or October. The majority of the state's yearly precipitation falls during this time. The dry season often begins in November and lasts through April. The Harmattan wind from the Sahara desert can blow during this time, bringing dry and dusty conditions along with the hot, dry weather. The climate in Bauchi State is often warm to hot all year round. During the dry season, temperatures are higher, frequently topping 40°C (104°F) during the day and occasionally going over 30°C (86°F) during the night. The state's vegetation ranges from the Guinea savannah in the south to the savannah grasslands in the north. While Bauchi State's southern regions see comparatively higher rainfall and more intensive agricultural operations, the state's northern regions are more arid. In Bauchi State, agriculture has a vital economic role. The state frequently cultivates crops like millet, sorghum, maize, rice, and groundnuts. Additionally, raising cattle, sheep, and goats is quite important for the economy.

Using a multi-stage random sampling technique, a total of 322 respondents were chosen in a household survey conducted in the year 2022. Firstly, all the stratified agricultural zones of the Bauchi State Agricultural Development Project (BASADP) – namely Zones (A) Western, (B) Central, and (C) Northern were selected as livelihood challenges are a general phenomenon. Subsequently, given the disproportionate distribution inherent with LGAs across the strata, the representative LGAs were proportionately selected. Thereafter, from each of the selected LGAs, two villages were randomly selected. Based on the sample frame generated by the reconnaissance survey (Table 1), Krejcie and Morgan's [1970] formula (Equation 1) was used to determine the representative sample size. Thus, a total sample size of 322 households was randomly chosen for the study. A well-structured questionnaire coupled with an interview schedule was used to collect the relevant information for the research. Objectives I, II, III, and IV were achieved using descriptive statistics, cost of morbidity technique, contingent valuation method, and tree regression, respectively.

Table 1: Sampling frame of rural households
Tabela 1. Operat losowania gospodarstw domowych na obszarach wiejskich

Zones	LGAs	Villages	Sampling frame	Sample size
Western	Dass	Kagadama	3,230	9
		Wandi	9,210	26
	Kirfi	Badara	5,767	16
		Beni	5,322	15
	Tabawa-Baleawa	Burga	5,532	16
		Zango	4.127	12
	Toro	Polchi	4,241	12
		Zalau	5,300	15
Central	Ningi	Zidinga	3,403	10
		Tsangayan Dirya	5,350	15
	Darazo	Lanzai	9,120	26
		Yautare	8,423	24
Northern	Katagum	Chinede	5,437	15
		Ragwam	4,216	12
	Gamawa	Wabu	9,326	26
		Lariski	2,671	8
	Giade	Jugudu	3,310	9
		Hardori	3,221	9
	Misau	Akuyam	5,324	15
		Zindi	3,350	10
	Shira	Kilbore	2,320	7
		Yana	5,230	15
Total	11	22	113,330	322

Source: Reconnaissance survey, 2022.

Źródło: Badanie rozpoznawcze, 2022.

$$n_p = \frac{N(X)}{X + (N-1)} \tag{1}$$

$$X = \frac{Z^2 x P(1-P)}{e^2} \tag{2}$$

Where:
n = sample size,
N = population size,
e = acceptable sampling error,
X = finite sample size,
P = proportion of the population.

Cost of morbidity technique: Following Oparinde et al. [2018] and Abaoba [2020], the costs of morbidity technique was used to estimate the economic burden of mortality among farm families.

$$FC = \sum_{i=0}^{n} \left(F_d + F_m + F_t\right) \tag{3}$$

$$T = \sum_{i=0}^{n} \left(Ts \times as \times w\right) + \left(Tc \times ac \times w\right) \tag{4}$$

$$E = \sum_{i=0}^{n} \left(FC + T\right) \tag{5}$$

Where:
FC = total financial cost of healthcare during the farming season (N),
F_d = financial cost of medicines, herbs, etc. (N),
F_m = financial cost of medical consultancy (N),
F_t = financial cost transportation (N),
T = total time cost (days of forgone production),
Ts = Time cost of the sick person (s), (days of forgone production),
Tc = Time cost of the caregiver (s), (days of forgone production),
w = Daily wage rate of the sick person/caregiver (N),
as = Age coefficient of the sick person (s),
ac = Age coefficient of the caregiver (s).

According to Sauerborn et al. [1996], an individual's financial production rises from their very early 20s to roughly age 40 and gradually declines after that. This information was used to determine the value of the age coefficient a. The values of coefficient a were as follows:

Age ≤ 17 years = 0.5; Age ≥ 18 = 1; Age ≥ 41= 0.75; Age ≥ 56 = 0.67; Age > 65 = 0.45

Contingent valuation method (CVM): In non-marketed commodities like health insurance, CVM is frequently used to evaluate WTP modifications [Gidey et al. 2019, Ogundeji et al. 2019, Njie et al. 2023]. According to research by Njie et al. [2023], double-bounded dichotomous choice (DBDC) questions with a follow-up approach are more effective because they allow respondents to share more details about their WTP. The arithmetic mean was utilized to estimate WTP in both the present and ideal case scenarios in order to establish the average WTP needed to pay for healthcare insurance. The following formula is used to get the average WTP:

$$\text{Average WTP} = \frac{\sum_{i=1}^{n} \text{bidding amount}}{\sum_{i=0}^{n} \text{number of respondents who are WTP}} \tag{6}$$

Tree regression

$$\text{WTP}_i = f\left(X_1, X_2, \ldots \ldots \ldots \ldots \ldots \ldots X_n\right) \tag{7}$$

$$\text{WTP}_i = \beta_0 + X_1\beta_0 + \cdots \ldots \ldots \ldots \ldots X_n\beta_0 + \varepsilon_i \tag{8}$$

Where:
WTP_i = willingness to pay (yes = 1, no = 0);
X_1 = age [young-aged adult (< 31) = 0, middle-aged adult (≥ 31) =1, old-aged adult (> 45) = 2];
X_2 = gender (male = 1, otherwise = 0);
X_3 = marital status (single = 0, married = 1);
X_4 = education (non-formal = 0, primary = 1, secondary = 2, tertiary = 3);
X_5 = household size (small = 0, moderate = 1, large = 2);
X_6 = farming experience (small = 0, moderate = 1, high = 2);
X_7 = extension service (yes = 1, no = 0);
X_8 = credit access (yes = 1, no = 0);
X_9 = co-operative membership (yes = 1, no = 0);
X_{10} = agricultural holding [marginal (< 1) = 0, small (≥ 1) = 1, semi-medium (≥2) = 2, medium (≥3) = 3, large (≥4) =4];
X_{11} = operational holding [marginal (< 1) = 0, small (≥ 1) = 1, semi-medium (≥2) = 2, medium (≥3) = 3, large (≥4) = 4];
X_{12} = income (small = 0, semi-medium = 1, medium = 2, large = 3];
X_{13} = initial bidding (IBID) (yes = 1, no = 0);
X_{14} = livestock ownership (small = 0, moderate = 1, large = 2);
X_8 = off farm occupation (yes = 1, no = 0);
ε_i = noise;
β_0 = intercept;
β_{1-n} = regression parameters.

Results and discussion

III Health Challenges Encountered by Rural Households

An analysis of Table (2) showed malaria to be the major (30.1%) morbidity that affected rural households during the study period, followed by typhoid fever (yellow fever) (17.87%), and then headache (15.05%) and back pain (11.91%). Additionally, measles (3.13%) and rheumatism (3.13%) were found to be the least common morbidities that challenged the study area. Thus, it can be suggested that the malaria pandemic is still a stumbling block to a healthy rural environment despite several medical interventions by government and non-governmental agencies to ensure its total eradication. However, the possible reason for the slow pace of combating malaria might be attributed to the use of stereotype-applied medication.

Table 2. Distribution of health challenges suffered by rural households
Tabela 2. Rozkład wyzwań zdrowotnych doświadczanych przez wiejskie gospodarstwa domowe

Disease	**Frequency**	**[%]**
Malaria	96	30.1
Typhoid	57	17.87
Cholera	19	5.96
Measles	10	3.13
Cough	25	7.84
Tuberculosis	0	0
Rheumatism	10	3.13
Upset stomach	16	5.01
Headache	48	15.05
Back pain	38	11.91
Total	319	100

Source: Field survey, 2022.
Źródło: Badania terenowe, 2022.

Additionally, the side effects of malaria prevention methods (mosquito insecticide-treated nets, mosquito insecticides, etc.) in causing redness of the eyes and itching, breath contraction, and skin reactions are possible contributory factors affecting the success of malaria eradication in the study area. Thus, the study advises policymakers to adopt appropriate preventive malaria medical measures as well as sensitize rural households to practice indigenous sanitary measures that will make the environment healthy.

Cost of Morbidity Incurred by Rural Households per Month

On a per-head basis, the incurred economic cost of morbidity was NGN 5618.45, while the incurred financial and time costs of morbidity were NGN 1961.58 and NGN 3656.86, respectively (Table 3). Moreover, of the economic cost of morbidity, the percentage proportions of financial and time costs of morbidity were 35 and 65%, respectively.

When examining the breakdown of costs, the time cost of caregivers had the highest proportion (41.14%), followed by the cost of drugs (26.39%) and the time cost of a sick person (23.95%), while the cost of travel for healthcare was the least incurred morbidity cost (2.78%). Nevertheless, on average, the economic, financial, and time costs of illness were NGN 70,944.70, NGN 24,859.05, and NGN 6085.65, respectively. Furthermore, the proportion of the financial and time costs to the economic cost exhibited the same trend as that of the morbidity cost per head. Therefore, it can be suggested that the time cost accounted for the bulk cost incurred for morbidity in the study area. Notably, the outcome of this research clearly points to the fact that apart from losses in labor productivity, the rural economy was challenged with a high loss of economic labor time, thus affecting the productivity of the rural economy. In a related study, Aboaba [2020] and Adekunle et al. [2016] established the time cost to be the highest cost that contributed to the economic cost of morbidity in their various study areas.

Table 3. Cost estimates of morbidity
Tabela 3. Szacunkowe koszty zachorowalności

Items	Per-head [NGN]	[%]	Average [NGN]	[%]
Cost of drugs/herbs etc.	1 482.81	26.39	18 687.07	26.34
Medical consultancy fees	322.34	5.74	4 166.95	5.87
Cost of travel	156.43	2.78	2 005.02	2.83
TCS	1 345.52	23.95	16 956.95	23.9
TCC	2 311.34	41.14	29 128.71	41.06
FC	1 961.58	34.91	24 859.04	35.04
TC	3 656.86	65.09	46 085.66	64.96
EC	5 618.44	100	70 944.7	100

Note: NGN means Naira (Nigerian currency); USD 1 = NGN 417 as of the period (2022) of the study.
Source: Field survey, 2022
Źródło: Badania terenowe, 2022.

A cursory review of the results showed that marginally above half (54.2%) of the sampled population were willing to pay for health insurance (Table 4).

Table 4. Willingness to pay and the bidding premium rate (s)
Tabela 4. Gotowość do zapłaty i stawki (-a) premii licytacyjnej

Items	Frequency	[%]
	WTP	
No	146	45.8
Yes	173	54.2
Total	319	100.0
	Initial bidding premium at NGN 1000	
No	221	69.3
Yes	98	30.7
Total	319	100.0

cont. Table 4
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Items	Frequency	[%]
	Lower premium at NGN 500	
No	206	64.6
Yes	113	35.4
Total	319	100.0
	Second bidding premium at NGN 2000	
No	283	88.7
Yes	36	11.3
Total	319	100.0
	Lower premium at NGN 1500	
No	231	72.4
Yes	88	27.6
Total	319	100.0
	Last bidding premium at NGN 3500	
No	302	94.7
Yes	17	5.3
Total	319	100.0
	Lower premium at NGN 2500	
No	255	79.9
Yes	64	20.1
Total	319	100.0

Source: Field survey, 2022
Źródło: Badania terenowe, 2022.

Therefore, it can be inferred that the rural populace had an interest in social healthcare insurance. Further, with initial premium bidding pegged at NGN 1000, only 30.7% of the rural households were willing to pay for healthcare insurance. However, when the premium amount was reduced to NGN 500, 35.4% of the households were willing to pay for healthcare insurance. At the second premium bidding of NGN 2000, only 11.3% were willing to pay for healthcare insurance, and when the premium amount was reduced to NGN 1500, 27.6% of the rural households were willing to pay for healthcare insurance. At the highest premium bidding of NGN 3000, only 5.5% of the rural households were willing to pay for healthcare insurance. However, when the premium was decreased to NGN 2500, 20.1% of the rural households were willing to pay for healthcare insurance. Evidently, an increase in the bidding premium is accompanied by a decrease in WTP for healthcare insurance, i.e., an inverse relationship exists between the premium rate and WTP for healthcare insurance. Therefore, to ensure the wide acceptability and sustainability of a healthcare insurance scheme in the study area, the study advises policymakers to introduce low-rate premiums at the initial stage, pending when the impact of the social insurance scheme will be felt by the rural economy, and afterward, a gradual increase in the premium rate.

Furthermore, at the maximum amount, the average WTP for households in the present situation was NGN 10147.11, and the average WTP for households with a positive WTP was NGN 1869.94 (Table 5).

Table 5. WTP for health insurance at present and ideal situations
Tabela 5. WTP dla ubezpieczenia zdrowotnego obecnie i w sytuacjach idealnych

Condition	Amount	Level	Mean (₦)
WTP – present	maximum	non-truncated	1014.11
		truncated	1869.94
	minimum	non-truncated	408.46
		truncated	753.18
WTP – ideal	maximum	non-truncated	1496.87
		truncated	2023.31
	minimum	non-truncated	615.67
		truncated	832.20

Source: Field survey, 2022.
Źródło: Badania terenowe, 2022.

At the minimum amount, the average WTP for households in the present situation was NGN 408.46, and the average WTP for households with a positive WTP was NGN 753.18. In an ideal situation at the maximum amount, the average WTP for households was NGN 1496.87, and the average WTP for households with a positive WTP was NGN 2023.31. At the minimum amount, the average WTP for households was NGN 615.67, and the average WTP for households with a positive WTP was NGN 832.20. Comparatively, the average WTP in an ideal situation being greater than that of the present situation is a reflection that the households will be willing to pay more if they derive better services from the social health insurance scheme.

Driver(s) of WTP for Healthcare Insurance

An analysis of the growth model showed that the tree regression had thirteen nodes, of which seven were terminal nodes and a depth of three, i.e., three levels below the root node. Of the sixteen specified independent variables in the model, only six predictors made significant contributions to WTP for healthcare insurance, thus being retained in the final model. The significant predictors were initial bidding (IBID), extension contact (EXT), age (AGC), educational level (EDC), agricultural holding (AGHC), and credit access (CRCD). The remaining variables that made no significant contribution to WTP were automatically eliminated from the final model. The diagnostic test summary of the index value showed that in nodes 3, 8, and 9, the observed percentage of the households' WTP in the target category is more than the expected percentage in the target category of the root node that shows a WTP, as evidenced by their respective index values that are higher than 100% (Table 6).

Table 6. Diagnostic test of gain and index
Tabela 6. Test diagnostyczny wzmocnienia i wskaźnika

Node	Node		Gain		Response	Index
	Frequency	%	Frequency	%	%	%
3	58	18.2	56	32.4	96.6	178.0
8	32	10.0	28	16.2	87.5	161.3
9	64	20.1	40	23.1	62.5	115.2
7	21	6.6	10	5.8	47.6	87.8
12	26	8.2	11	6.4	42.3	78.0
10	42	13.2	12	6.9	28.6	52.7
11	76	23.8	16	9.2	21.1	38.8

Source: SPSS computer print-out, 2022.
Źródło: Wydruk komputerowy SPSS, 2022.

Contrarily, for the terminal nodes 7, 12, 10, and 11, the observed percentage of households in the target category that shows a WTP is less than the expected percentage of households in the target category of the root node that shows a WTP, as indicated by their respective index values that are less than 100%. Nevertheless, the gain chart index showed the model to be fairly good, as evidenced by its cumulative gain chart that steeply rises towards 100% and then levels off (Fig. 1).

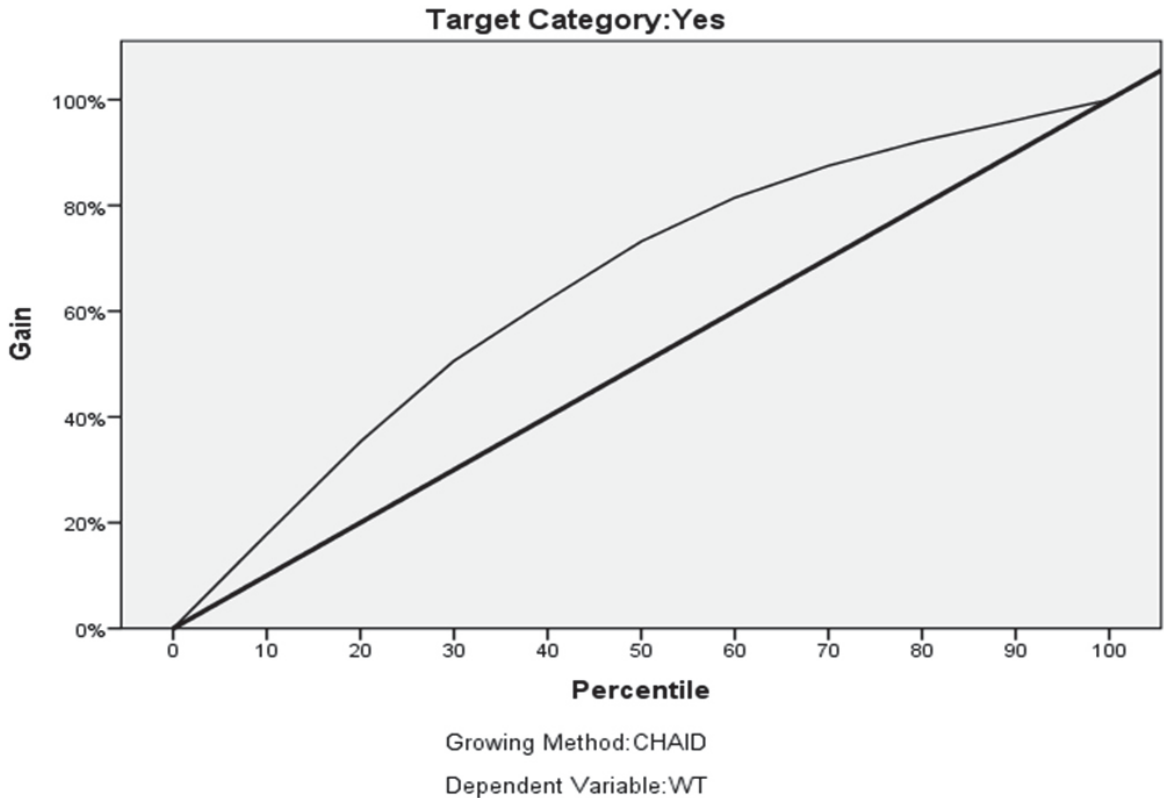

Figure 1. Gain chart distribution
Rysunek 1. Rozkład wykresu wzmocnienia

Source: own study.
Źródło: opracowanie własne.

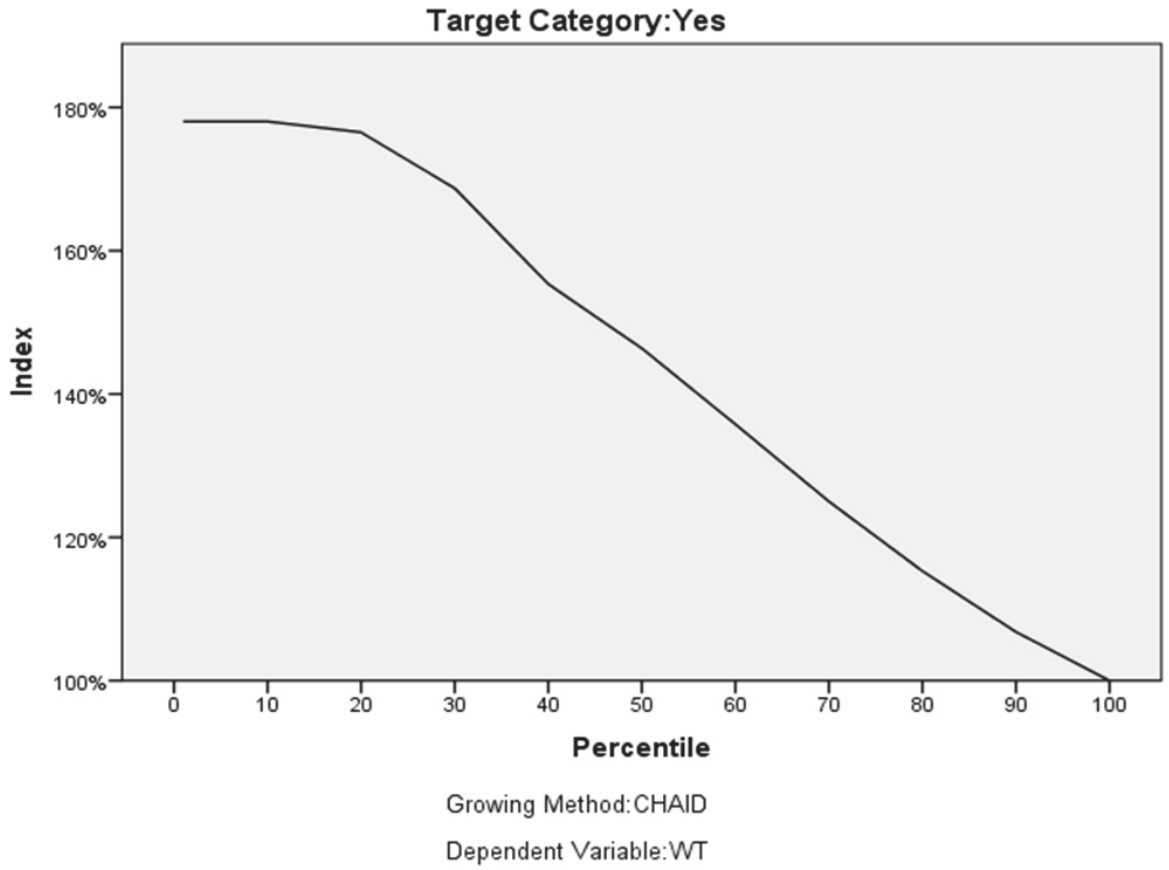

Figure 2. Index chart distribution
Rysunek 2. Rozkład wykresu indeksowego
Source: own study.
Źródło: opracowanie własne.

Also, the index chart indicates the accuracy of the model, as evidenced by its cumulative index chart that starts above 100% and gradually descends until it levels off at 100% (Fig. 2). Nevertheless, the risk of the model in misclassifying a household's WTP was 24.8%, as indicated by the risk estimate value of 0.248.

The tree diagram shows that IBID is the best predictor of WTP for healthcare insurance (Fig. 3). The possible reason might be associated with the price sensitivity of the households to the premium to be paid for the services, given their low-income status and the large, vulnerable household size that characterized the study area. For the rural households in the category of 'yes IBID', extension contact is the next best predictor for WTP. For the households in the category of 'yes EXT', EXT is the only significant predictor of WTP for healthcare insurance. Of the households in this category, 96.6% show a WTP for healthcare insurance, while 3.4% do not show a WTP for healthcare insurance. Thus, it can be inferred that the healthcare component of extension services, namely sensitization of rural households on the importance of good health – a relegated function of advisory services in the study area – played a key role in shaping the mindset of rural households on the necessity of affordable healthcare services. Nevertheless, this category of 'yes EXT' is considered a terminal node as it has no child node(s) below it. Meanwhile, for the 'yes IBID' households with 'no extension contact', the model includes one predic-

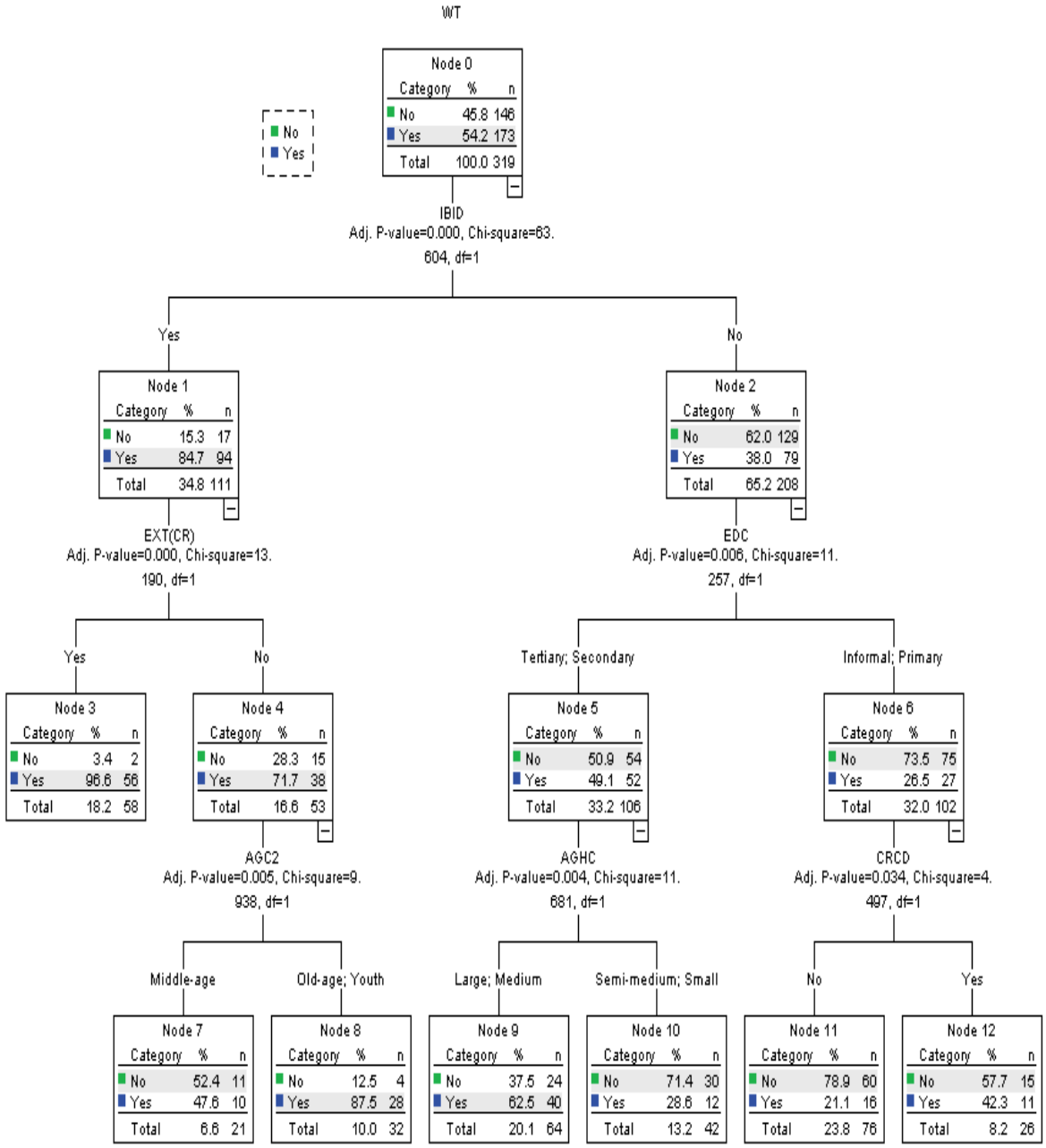

Figure 3. Determinants of WTP for healthcare insurance
Wykres 3. Determinanty WTP dla ubezpieczeń zdrowotnych

Source: own study.

Źródło: opracowanie własne.

tor: the age of the household's head. Evidence shows that slightly less than half (47.6%) of those households in the middle-aged category show a WTP for healthcare insurance, while over 87% of those households in the youthful age category show a WTP for healthcare insurance. The possible reason for high WTP among the youthful-aged category might be attributed to modernity that influences their social orientation compared to the middle-aged category, which tends to have reservations/skepticism about any innovative development in a typical African agrarian setting.

On the other hand, for the 'no IBID' households, educational level was the next best predictor of WTP for healthcare insurance. For the 'no IBID' households with secondary education, the model includes one more predictor – agricultural holdings. The results showed that over 62% of households with medium-scale agricultural holdings show a WTP for healthcare insurance, while just a handful (28.6%) of households with small-scale agricultural holdings show a WTP for healthcare insurance. The possible reason for low WTP among the households with small-scale agricultural holdings might be attributed to the subsistence nature of their scale of operation, whose business turnover ratio is poor compared to their counterparts with medium-to-large scale operational holdings in which the business turnover ratio is fair due to opportunities of enterprise diversification and intensification, thus the likelihood of high WTP for healthcare insurance. Likewise, for the 'no IBID' households with primary education, the model includes one more predictor – credit access. It was established that 42.3% of the households with access to credit show a WTP for healthcare insurance, while approximately 21.1% of households with no credit access show a WTP for healthcare insurance. Thus, the direct relationship of credit with income generation might be the possible reason for the WTP for healthcare insurance. However, the low educational level is the possible reason why slightly above half of the sampled population do not show a WTP for healthcare insurance among the category of households with credit access. Therefore, it becomes imperative for policymakers to enhance credit facilities and out-of-class health educational enlightenment, thus enhancing the social orientation of rural households on the necessity of affordable healthcare by exploring social healthcare insurance schemes in the study area. This act will go a long way in addressing the challenges of poor healthcare in the study area, inadequate public expenditure for healthcare, and limited public healthcare facilities, etc., thus enhancing the growth and development of the rural economy in the study area.

Conclusion and recommendation

Based on the findings, it can be suggested that malaria, followed by typhoid fever, were the major morbidities affecting the livelihood of rural households, thus costing households to incur an average morbidity economic cost of NGN 70,944.70. Rural households had an interest in the social healthcare insurance scheme, but a fair premium rate poses a threat to the wide acceptability and sustainability of the scheme. Nevertheless, an inverse relationship exists between the premium and WTP. Comparatively, there is a clear indication that the households will be willing to pay more if the scheme offers them better services. Furthermore, the key factors affecting WTP are old age, poor agricultural holdings, and lack of credit facilities. Thus, the study recommends the need for a social safety net insurance for old-aged households and the provision of credit facilities – a catalyst for rural households to generate incremental income vis-à-vis agricultural intensification and diversification. Households are advised to adopt eco-friendly preventive medical and environmental sanitary measures, thus reducing the consequences of malaria and typhoid fever in the study area.

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