

Understanding farmers' willingness to pay for health insurance during the COVID-19 pandemic in North Central Nigeria: Application of Turnbull estimator

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World Journal of Advanced Research and Reviews, 2024, 22(01), 712–719

Publication history: Received on 11 January 2024; revised on 11 April 2024; accepted on 13 April 2024

Article DOI: <https://doi.org/10.30574/wjarr.2024.22.1.0261>

Abstract

The global Coronavirus (COVID-19) pandemic necessitated the need to understand farming households' willingness to adopt the prepayment method for healthcare service delivery through health insurance. Both developed and developing countries can offer quality healthcare to individuals through health insurance to reduce the ever-increasing out-of-pocket (OOP) expenditure. Primary data was used in this study. The multi-stage sampling procedure was adopted in selecting 360 farm households for questionnaire administration in 2020. Contingent valuation was used to obtain relevant information on farm households' willingness to pay (WTP). Descriptive and inferential (sigma scoring, probit regression model, and Turnbull estimator) statistical tools were used to analyse the data. The results showed a low level of awareness (sigma score = 4.31) of health insurance, however, 80% of the farm households were willing to take health insurance. Awareness of health insurance ($\beta = 0.87$), farming experience ($\beta = 0.10$), education ($\beta = 0.06$), and distance to healthcare centre ($\beta = 0.06$) significantly determined farm households' willingness to take health insurance. Estimates of the contingent valuation revealed that the farm households were willing to pay about \$6 (\$1 approx 430 NGN as of 2020) per capita in a farming season. In formulating rural health insurance-related policy, the government and relevant stakeholders should consider the estimated mean value. Furthermore, for improved participation in health insurance programs among farm households, farmers' awareness of health insurance and literacy level should be prioritized.

Keywords: COVID 19; Health Insurance; Agriculture; Out-of-Pocket; Turnbull

1. Introduction

There is a common maxim that health is wealth. A productive health force is relevant in farming activities as poor health inflicts hardship on rural households which weakens the labour force, brings about the loss in labour and sometimes leads to death (Ibrahim, *et al.*, 2017; Titus *et al.*, 2015; Onuche *et al.*, 2014). The ability of farmers to work depends on their health status and thus determines the household's welfare (Shaibu and Ibrahim, 2016; Asenso-okyere *et al.*, 2011).

Universally, the common strategy in healthcare financing is the prepayment method (Chuma *et al.*, 2013; World Health Organization, WHO, 2010). However, most of the farming households in Nigeria and other developing countries adopt the out-of-pocket (OOP) payment method. This has a multiplier effect on the intensity of illnesses and days of incapacitation which may reduce farm households' productivity (Murray *et al.*, 2013). Nigeria's Federal Ministry of Health put the country's OOP payment at 70% of the total health expenditure; this figure is 40% above the recommended threshold by the World Health Organization (WHO, 2014; Federal Ministry of Health, FMOH, 2016).

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Following the high percentage of OOP payment in the country (among the highest in the world as reported by WHO, 2018), the need for a health insurance scheme at both the national and sub-national levels become a necessity.

The government-controlled health insurance scheme in Nigeria; the National Health Insurance Scheme (NHIS), is responsible for ensuring national health coverage and access to quality healthcare services at affordable rates among beneficiaries of the scheme (NHIS, 2015). The ongoing prepayment scheme by the NHIS is common among the formal sector works (excluding farmers and other artisans). There is an increasing awareness at the national and sub-national levels for adequate healthcare services. This has become a global discourse due to the impact of the global Coronavirus (COVID-19) pandemic. One of the many ways to subsidize healthcare delivery is the provision of financial protection to citizens through health insurance. However, empirical literature reveals limited studies that propel informed policy recommendations on effective policy design that can address health insurance at the farm households' level.

Given that agriculture is the backbone of the rural economy and a significant source of livelihood for millions of Nigerians, it is essential to assess farmers' willingness to pay for health insurance through premium payments. Literature (see for example Ogundeji *et al.*, 2019; Fawole and Adeoye, 2015; Ahmed *et al.*, 2013; WHO, 2009; Asfaw *et al.*, 2008; Ataguba, 2008; Lwambo *et al.*, 2005; Toonen, 1995) revealed that self-reported willingness to pay (WTP) and payment for healthcare services are not always directly correlated. The authors associated this scenario with social and economic variables. It further becomes imperative to establish WTP for health insurance schemes. On the specifics, Ogundeji *et al.* (2019) assessed the willingness-to-pay (WTP) for contributory health insurance scheme (SHIS) in Kaduna State, Nigeria and reported a high WTP for insurance premium of ₦6,156 (six thousand, one hundred and fifty-six naira) per year per person. The authors reported that 65% of the households could pay the premium; the study did not focus on farm households that are always financially constrained in paying for healthcare services. Aside from focusing on smallholder farming households, this current study adopted a strong inferential statistical tool such as the Turnbull estimator to make evidence-based recommendations.

The Turnbull estimator is imperative as most existing literature on the price for community health insurance uptake in Nigeria (see for example: Ogben and Ilesanmi, 2018; Babatunde *et al.*, 2016, David *et al.*, 2014; Makaudze, 2011) applied descriptive statistical tool such as mean which may not be strong for informed policy decisions. Application of such descriptive tools cannot provide an upper and lower bound as available in advanced econometric analysis that will provide reliable baseline information for designing effective health insurance policy that focuses on farming communities.

2. Methodology

2.1. Study Area and Sampling Procedure

The study areas are Benue and Kogi States, North Central Nigeria. The population for this study are rural farm households in both States. This study adopted a three-stage sampling procedure in selecting respondents. First, the central agricultural zone of Benue State and the Kogi agricultural zone B were randomly selected for the study. In stage two, two extension blocks were randomly picked from each of the agricultural zones. The second stage involves the selection of three (3) extension cells from each selected extension block. In stage three, thirty (30) rural farm households were randomly selected from each of the extension cells. In each selected household, the household head gave responses to the designed questions. A total of 360 respondents were used for the study.

2.2. Model Specification

2.2.1. Sigma Score

Following Shaibu *et al.* (2020), a sigma score (z) was calculated using the steps below:

Step 1: Percentage of awareness is given as;

$$A\% = \frac{\text{Number aware}}{\text{Sample size}} \quad (1)$$

Step 2: Determine B%

$$B\% = 100 - (A\% / 2) \quad (2)$$

Step 3: Check B% on the statistical table of normal deviates to get the sigma distance (X).

Step 4: In calculating Y, use a constant figure of 2 to increase the value of the sigma distance and multiply the result by the same constant.

$$Y = (X + 2) \times 2 \tag{3}$$

Step 5: The actual sigma score (Z) is given as:

$$Z = 10 - Y \tag{4}$$

Decision rule: Any mean score (Z) less than 5 was considered a low level of awareness of health insurance among rural farm households.

2.2.2. Probit Model

The probit model used to determine farm households' willingness to take health insurance is expressed as:

$$P_i = F(WTI_i) = \frac{1}{1 + e^{-WTI_i}} = \frac{1}{1 + e^{-X_i + \epsilon_i}} \tag{5}$$

Where $i=1, 2, 3, \dots, n$

P_i is a probability function, in which the farmers give a yes/no response to the willingness to take health insurance.

WTI is the willingness to take health insurance (1 if yes, 0 if otherwise).

X_1 is a factor of observed characteristics of a farm household which include:

X_1 = Age of household head (years)

X_2 = distance to the nearest health facility (km)

X_3 = Awareness on health insurance (dummy; yes = 1, no = 0)

X_4 = Household size (number)

X_5 = Farming experience (years)

X_6 = Farm size (hectares)

X_7 = Education (years)

2.2.3. Turnbull Estimator Analysis

$$\text{Average WTP} = \frac{\text{sum of bidding amounts}}{\text{Total number of respondents who were willing to pay}} \tag{6}$$

Following Giolo (2004); STATA statistical software was used to construct the average price and the lower and upper limit payment.

3. Results and Discussion

3.1. Socioeconomic Characteristics the Respondents

Table 1 describes the socioeconomic characteristics of the respondents.

The result (Table 1) reveals a mean age of 46 years among farm household heads in the study locations. This productive and active age is expected to have a positive influence on the willingness to take health insurance policies among farm households. The percentage distribution on sex could be attributed to gender roles in Africa where males are usually regarded as the household head. Married individuals were more involved in farming activities. The mean household size of 6 members is almost the same as the national average of 7 members per household and this result implies readily available labour for farming activities. The high percentage (78.3%) of farm household heads with formal education could have a positive impact on participation in health insurance programs.

Table 1 Distribution of farmers according to socioeconomic characteristics

Socioeconomic Characteristics	Frequency	Percentage	Mean/Mode
Gender			
Male	278	77.2	Male
Female	82	22.8	
Age			
20 – 40	104	28.9	46 years
41 – 60	224	61.7	
61 – 80	34	9.4	
Marital Status			
Single	22	12.2	Married
Married	256	71.1	
Divorced	16	4.4	
Widowed	38	10.6	
Separated	6	1.7	
Household Size			
1 – 4	64	17.8	6 persons
5 – 8	274	76.1	
9 – 12	22	6.1	
Educational Status			
No formal education	78	21.7	Sec. Educ.
Primary education	82	22.8	
Secondary education	118	32.8	
Tertiary education	82	22.8	
Farm Size			
1 – 3	214	59.44	4 hectares
3.1 – 6	120	33.33	
Above 6	26	7.22	
Farming experience			
1 – 10	70	19.44	23 years
11 – 20	80	25.56	
21 – 30	106	29.44	
31 – 40	60	16.67	
41 – 50	32	8.89	

Source: Field survey, 2020; No. of Respondents = 360

3.2. Farm Households' Awareness of Health Insurance

The distribution of farm households according to their level of awareness and willingness to take health insurance is presented in Table 2.

Table 2 Rural Farmers' Awareness and Willingness to Take (WTT) Health Insurance

Items	Frequency	Percentage	Sigma Score
Awareness on Health Insurance			4.316
Aware	72	20.0	
Not Aware	288	80.0	
Total	360	100	
WTT Health Insurance			
Willing	288	80.0	
Not Sure (Indifferent)	66	18.3	
Not Willing	06	1.7	
Total	360	100	

Source: Field Survey, 2020

The sigma score for awareness reveals that there is a low level of awareness of health insurance in the study area. This finding is not surprising as the current national health insurance scheme covers certain groups of individuals without cognizance of the farming population. This finding further underscores an earlier report by Mamo, (2015) that public and private health insurance covers almost entirely the formal sector in most African countries.

Despite the low level of awareness, 80% of the farm households were willing to take health insurance. The high percentage of farm households' willingness to take health insurance policy could be associated with increased knowledge level on rural health insurance policy and its associated benefits during the field survey. The farmers decided to take health insurance to avoid OOP payments. This finding is in tandem with the report of Onoka *et al.* (2013).

3.3. Factors Influencing Willingness to Take Health Insurance among Farm Households

Table 3 Output of the Probit Regression Model

Variable	Variable Name	Parameters	Est. Coefficient	Std. Error	Z-value	P>/Z/
X ₁	Age	β_1	0.206	0.279	0.74	0.460 ^{NS}
X ₂	Distance	β_2	0.063	0.028	2.26	0.024 ^{**}
X ₃	Awareness	β_3	0.867	0.236	3.68	0.000 ^{***}
X ₄	Household size	β_4	0.050	0.043	1.17	0.243 ^{NS}
X ₅	Farming experience	β_5	0.103	0.270	3.81	0.000 ^{***}
X ₆	Farm size	β_6	-0.045	0.038	-1.19	0.234 ^{NS}
X ₇	Education	β_7	0.107	0.043	2.51	0.012 ^{**}
	Constant	β_0	2.321	0.766	3.03	0.002 ^{***}
	Number of obs. = 360 LR chi ² = 72.63 ^{***} Pseudo R ² = 0.3860 Log likelihood = -56.76					

Source: Computed from Field Survey, 2020

*** and ** → sig. @ 1% and 5% level respectively. NS = Not Significant

The outcome of the Probit regression model reveals a log-likelihood ratio of -56.763 and a χ^2 value of 73.63, which indicates that all the explanatory variables included in the model significantly influenced the probability of farm

households' willingness to take health insurance at a 1% level of significance. Four of the independent variables significantly influenced the likelihood of farm households' willingness to take health insurance. These are distance to the nearest health facility, awareness of health insurance, farming experience, and education.

From Table 3, distance to the nearest health facility was positively signed ($\beta = 0.063$) and significant at 5% in influencing farm households' willingness to take health insurance. This implies that farm households closer to health facilities are more likely to take health insurance than those that are not close. Closeness to health facilities (primary, secondary, or tertiary healthcare centres) can probably increase farmers' awareness of health insurance and the associated benefits. It may also increase the readiness to use orthodox medicine against the usual tradomedicine practices in rural areas. This result agrees with an earlier report by Ataguba (2008) that distance among other variables significantly influenced willingness to pay (WTP) for community-based health insurance (CBHI).

The result (Table 3) further shows that the coefficient ($\beta = 0.867$) of awareness was positive and significant at a 1% level of significance in influencing the willingness to take health insurance. By implication, the probability of farm households' willingness to take health insurance is higher among farmers who are aware of the product. This is in line with our *a priori* expectation. Furthermore, farming experience positively influenced rural households' willingness to take health insurance. The coefficient ($\beta=0.107$) of education is positive and significant at 5%; implying that the probability of taking health insurance is higher among farm household heads who are educated than those who are not. Farmers who can read and write accept innovations such as subscribing to health insurance policies more readily than other categories of farmers (Falola *et al.*, 2012).

3.4. Willingness to Pay Price for Health Insurance

The distribution of farm households on the average price they are willing to pay for health insurance premiums is presented in Table 4. The average WTP using the Turnbull estimator was ₦202.56 per head per month (₦2,430.72 per head per annum). The decision to pay this amount as a premium could be associated with the respondents' low-income level. This finding is different from Babatunde *et al.* (2011) when the mean amount obtained was ₦522.0. However, the finding of this study is like Babatunde *et al.* (2014), when they reported ₦2,139.43 as the average amount farmers are willing to pay for Community Based Health Insurance (CBHI). The disparity can be attributed to knowledge of health insurance particularly CBHI and also the preference in the choice of services.

Table 4 Turnbull Estimates on Willingness to Pay Amount per Head in a Month in Naira (₦)

Premium (₦)	Share Yes	Share No	Change in Share No	ELB (Marginal Probability times premium)	Variance
50	0.79	0.21	-	0	3.12
100	0.72	0.28	0.07	3.56	1.60
150	0.56	0.44	0.16	16.0	5.31
200p & 300p	0.34	0.66	0.22	33.0	1.00
400	0.19	0.81	0.15	30.0	26.55
600	0.16	0.84	0.03	12.0	93.31
750	0.08	0.92	0.08	48.0	40.97
750+	0	1.0	0.08	60.0	
Total				ELB(WTP) 202.56	171.86

Source: Field Survey, 2020.

4. Conclusion

Health insurance policy at the farm household level is critical since this population are engaged in a 'risky' occupation and has historically high rates of being uninsured in Africa and Nigeria in particular. Findings from this study revealed that farm households were unaware of health insurance. However, about 80% were willing to subscribe to health insurance policies to manage days lost to illness in farming activities. The farmers were willing to take health insurance if the premium was not above ₦2,430.72 per head per farming season/annum. Additionally; distance to the nearest

health facility, awareness of health insurance, farming experience, and education influenced farm households' likelihood of taking health insurance.

Recommendations

Based on the findings of this study, it is recommended that:

- Farmers should be sensitized on the benefits of subscribing to available health insurance schemes by the health and agricultural extension agents. Awareness of the associated benefits of the scheme can further be increased by situating offices of the insurance programs at various agricultural extension blocks to ensure easy access to health insurance experts and the rate of insurance uptake.
- Farmers' education or adult literacy education should be taken seriously by the government and relevant organizations as it has a significant effect on farm households' participation in health insurance.
- Government and the private sector should consider providing health insurance to farm households at affordable rates to encourage its adoption. From the study, an average premium of ₦202.56 per head per month (₦2,430.72 per head per annum) was found. This price tag should serve as a guide to relevant stakeholders in formulating health insurance policy that addresses farm households.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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