

Review Article

Factors that determine the willingness to pay for private health policy in the Sunyani Municipality, Bono Region of Ghana

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Keywords

• Cross-sectional study; Descriptive statistics; Logistic regression; Multi-stage sampling; National health insurance scheme; Operating characteristics curve; Private health policy; Questionnaire

Abstract

Background: Since the commencement of the National Health Insurance Scheme (NHIS) in Ghana, some major conditions are not covered under the system, as they are considered expensive to treat. Individuals have to cough up additional monies to pay for certain services. It is important to have a health insurance plan in place to ensure that critical health conditions do not impair one's financial independence.

Aim: The motive of this study is to find out the willingness of individuals to pay for a private health policy and the factors that may affect their decision.

Methods and material: The study was conducted in the Sunyani Municipality, Bono Region of Ghana. A multi-stage sampling technique was used to select respondents. This study is a cross-sectional study that collects both quantitative and qualitative data on 150 respondents using a structured questionnaire. We present descriptive statistics of the variables and then build a model to establish the relationship between a dichotomous willingness to pay (wtp) response variable and factors that determine one's wtp. We arrived at this using a logistic regression model. We checked the predictive power of this model using the receiver operating characteristic (ROC) curve. We analyzed Statistically using STATA version 14.1.

Results: Our results shows that, majority (65.33%) of the respondents are wtp for a private health policy. Willingness to pay for a private health policy is significantly associated with spouse who are employed and having the ability to contribute for the private health policy.

Conclusion: The findings from this study would help industry players to model a policy that can be supported in the long run and assist insurance firms to decide whether or not it is feasible to follow through with independent secondary and tertiary health care plans.

BACKGROUND

Health, as defined by the World Health Organization, is the state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity [1]. Demand for healthcare differs from demand for other market goods because most consumers require some form of health care at some point in their lives without which they could lose their lives or suffer significant reduction in quality of life [2]. The need to use healthcare is more compelling service than other services because the outcome for using or not using healthcare services involves more than just economic well-being [1,2]. This calls for the need to have a sustainable health policy. Health policy is a set of decisions, plans, and actions to be followed to accomplish specific health care goals within the society [3].

The World Health Organization acknowledges equity in health financing as one of its three main priorities in the health care

system (WHO, 2010). According to Kusi and colleagues [4], equal funding of healthcare and financial risk management indicates that access to healthcare does not bring untold misery on the concerned household. In Ghana, the government introduced the National Health Insurance Scheme (NHIS) in 2004, to provide Ghanaian citizens with fair access to and financial coverage of basic health care services [5]. This move was in line with the WHO's global recognition of universal coverage as a high priority target for any financing mechanism for healthcare [6-8]. Despite the provision of the NHIS, some major conditions are not covered under the system, as they are considered expensive to treat. Most successful health insurance schemes in Africa are affiliated with the formal sector of developing countries designing health insurance schemes [9]. These schemes do not involve individuals in the informal sector, who live mostly in rural areas [10,11].

In the face of health-related contingencies, health care plans offer financial security. It is therefore crucial to have a health

insurance scheme in place to ensure that it does not impair financial freedom, no matter how serious an illness is [12-14]. In view of this, an independent health care system is very necessary in order to achieve the specific health care goal of covering the levels of health care provision that the NHIS fails to cover. For the new system to run efficiently, factors such as income level of individuals, their ability and willingness to pay, amount that individuals are willing to pay for either a secondary or tertiary policy or both, whether they need the policy for themselves, their dependents or both themselves and dependents need to be considered.

According to Varian [15], willingness to pay (wtp) is the maximum price at or below which a consumer will definitely purchase a single unit of the product. This is in line with the standard economic view of the price of consumer reservations. In the determination of the maximum amount of money one is willing to pay in return for a specific benefit [16]. In the absence of real-world experience, the wtp for health insurance in low-income countries is measured by contingent valuation (CV) methods. The contingent valuation methods directly determine what individuals would be willing to pay for a hypothetical health insurance package [15,17].

Precisely gagging consumers' willingness to pay for a product or service is a key to formulating competitive strategies, performing value assessments, and creating new products [18]. It is also vital for various pricing strategies to be introduced, such as non-linear pricing, one-to-one pricing, and tailored promotions.

Increasing the usage of health care is a crucial priority for many developing countries, as it will boost the health status of the community. Increased opportunity to health services will create equitable health care solutions to the population. However, there are people who still do not make good use of the health care offered, particularly for financial reasons. Financing health care is a global challenge. In the resource-constrained environment of developing countries however, this challenge frequently assumes epic proportions. There is no doubt that health insurance policies are a crucial matter, dealing with both economic and social challenges [19-21]. In the face of rising health care prices at micro and macro levels, health insurance is becoming a realistic option for funding health care in Ghana. This is therefore a means of mobilizing private funds to enhance the quality of health care at the macro stage.

The choice to use health services can often influence the purchasing power of consumers and the quality of health services. Among other considerations in the procurement of health insurance, the price of health care proved to be a significant barrier to certain individuals who would choose to access health care facilities [22-25]. Market demand adjustments can affect the degree and frequency of use of resources and the revenues collected as well as enhancing consumer access to healthcare.

Even though the NHIS has relatively made health care provision affordable, it does not have certain provisions that people may need. It is not out of place to find instances where people needed certain health services for either themselves or their dependents but unfortunately could not get them due to the fact that those conditions were not covered under the NHIS. This

causes a lot of financial burden on the people involved, as they would need to cough up additional money immediately to pay certain services or buy some lifesaving drugs. It could be that at the time of emergency, an affected individual may not be in the position to provide the amount of money needed. This could have very bad consequences for the member or his ailed dependent.

Globally, exposure to quality health services remains a big challenge for most health systems. In that regard, a lot of countries have introduced different health financing methods to provide quality basic health care to all its citizens. The National Health Insurance Scheme (NHIS) is one of the mechanisms used by the government of Ghana to offer affordable health care services to all residents. The NHIS was established in 2003 by the Act of parliament (ACT 650, Amended Act 852) and it successfully kicked off in 2004. Under the NHIS Amended Act 852 (2012), every Ghanaian is expected to enrol in a health insurance scheme. The goal of the NHIS is to provide equitable access for all by removing financial barriers to access basic health care services to Ghanaian citizens.

The scheme is financed through a central National Health Insurance Fund (NHIF) which is sourced from the National Health Insurance Levy (NHIL) (2.5% tax on selected goods and services), 2.5% of Social Security and National Insurance Trust (SSNIT) contributions largely coming from formal sector worker's, premium payers also make payments and renew their membership annually to benefit from scheme and donor funds. Ghana's current NHIS policy (Act 852) allows the following category of people to be exempted from paying premium; pregnant women, indigents, persons with mental disorder, social security recipients and pensioners, elderly (70 years and above) and differently-abled persons as determined by the Ministry of Gender.

In 2014, 40 percent of the population comprising of approximately 10.5 million Ghanaians were covered under the NHIS, with numbers rising from 0.5 per capita to 3 per capita between 2005 and 2014 on outpatient and inpatient visits to health facilities. Also, considering the per capita system, one disadvantage is that the provider may be tempted to supply the client with fewer than required resources.

The NHIS does not attempt to treat all ailments endured by covered participants. Nevertheless, other prevalent diseases such as malaria, cholera, upper respiratory tract infections, diarrheal diseases, are classified as NHIS-related diseases.

Ghanaians critics against NHIS have claimed that the policy is not financially viable owing to the significant proportion of NHIS participants under the non-co-payment premium exception (making part-payment to insurance provider under defined conditions) combined with high medical supplies / logistics and health care distribution costs. The satisfaction of NHIS patients with quality of health care at NHIS-accredited health facilities still remains poor, particularly with regard to the hesitation of unmotivated medical personnel, long waiting periods, separate treatment for NHIS-insured and non-NHIS-insured customers, quality of medications covered by NHIS, and some inadequate treatment methods.

Furthermore, in most cases, one cannot predict the onset of

illness and the opportunity to demand medical services always keeps rising incidentally. It is difficult for clients to adhere to the above-mentioned treatments. They are faced with the alternative of finding greater coverage and care by heading to other non-NHIS health facilities willing to pay for treatment unless they are willing to leverage their personal link to access the services they require. The willingness to pay for a private insurance program would rely on the personality and socio-economic background of the person, as well as their capacity to manage and contribute to the scheme.

In Ghana, the NHIS Act, 2003 (Act 650) established two (2) forms of private health insurance schemes: Private Mutual Health Insurance Scheme (PMHIS) and Private Commercial Health Insurance Scheme (PCHIS) [5]. The PMHIS is defined as a health insurance scheme run solely for the benefit of its participants. PCHIS is defined as a health insurance that functions on the basis of profit-based business principles. The private health insurance scheme allows for the underwriting of all or any of duplicate, complementary and supplementary insurance policies.

Contingent valuation theory and observational research have demonstrated that experiments in developing countries may be conducted to extract accurate and credible health-related willingness to pay data [9]. Such a legitimate and accurate willingness to pay details to the target demographic will promote the design and implementation of the scheme. Generally, the ability to pay data is seldom obtained or used as part of the design of health insurance policies in developing countries [9]. Before the introduction of an independent secondary and tertiary health care system to complement the NHIS, there is a need to ascertain the specific needs of individuals, with respect to the health care plans, so that with the appropriate actuarial and statistical models, very good policies, tailor-made for them, can be developed. It is also important to look at market price reactions by people's desire and capacity to pay. The focus of the study is to ascertain the ability and willingness of individuals to subscribe to and pay for the independent secondary and or tertiary health care plans and to determine factors that affect individual's willingness to subscribe to the policy.

HEALTH CARE FINANCING IN GHANA

The Ghanaian health system has evolved over time. Before independence, healthcare was paid for out of pocket. After independence, the socialist government headed by Dr. Kwame Nkrumah sought to eliminate all obstacles of access to health care and to guarantee that all had access to health insurance irrespective of their socio-economic status. As such, consumer fees were eliminated and health insurance was now open to everyone and funded by general taxation and donation funding.

The free health insurance that was part of the public agenda was also endorsed by the 1967 Arusha Agreement, which aimed to guarantee equal access to social services for the poor and those residing in impoverished rural areas. These entirely tax-funded insurance initiatives tried to fix some of the inequities in the nationwide provision of health services. Attention was paid to building a wide variety of primary health care services across the country, encouraging and supporting preventive initiatives such as immunization and antenatal care.

With the country's economy crashing under extreme macroeconomic difficulties in the mid-1970's, there was limited economic growth and the free healthcare policy was [5]. The problem has been worsened by an uncertain political climate by repeated military interference in government. This led to the implementation of usage fees in the mid-1970s and substantial hikes in the fees in the 1980's. Again, this financing plan was inadequate to satisfy the growing need for the sector's services. In reaction to these problems, the government launched a 'cash and carry' scheme in the mid-1980s. This framework saw the total elimination of government subsidy, with people charging the entire expense of health care. The fundamental principle underpinning the 'cash and carry' scheme was inevitably undermined when it, in effect, deprived the vulnerable and generated large disparities.

The quest for an appropriate financing mechanism contributed to Act 650 in 2003. The National Health Insurance Scheme (NHIS) was created by this Act. This was intended to remove all financial obstacles generated by earlier health reforms. The goal of the NHIS is to provide participants with access to health coverage without having to pay at the point of access and to provide affordable medical care. We present the historical creation of funding for health care in Ghana in Table 1.

THE NATIONAL HEALTH INSURANCE SCHEME (NHIS)

Ghana became the first sub-Saharan African nation to adopt NHIS in 2003 through an Act of parliament (ACT 650, Amended Act 852) and was fully introduced in 2004. The NHIS was established to replace the cash and carry system of health care delivery, also known as the out-of-pocket (OOP) payment system. This scheme was set up with the aim of providing equal access and financial support of basic health care services to Ghanaians. Under NHIS, as amended by Act 852 (2012), every Ghanaian is required to participate in a health insurance scheme

The NHIS funding comes from 2.5% Value Added Tax (VAT) levy on selected goods and services, 2.5% of workers Social Security and National Insurance Trust (SSNIT) contribution, parliamentary approval from the consolidated fund, donations, grants, gifts, and other charitable contributions, money that may accrue from the investment by the National Health Insurance council (NHIC) and from graduated premium contributions by those in the informal sector.

The NHIS does not seek to treat all diseases suffered by insured participants. However, many popular diseases such as malaria, upper respiratory tract infections and diarrheal diseases, are included in the NHIS benefits list. Likewise, NHIS-insured participants are entitled to medical emergency treatment such as road traffic accidents. Also, under the free NHIS program for pregnant women, pregnant women are excluded from NHIS premium fees. Diseases such as cancers that are fairly rare are not covered by NHIS.

PRIVATE HEALTH INSURANCE SCHEME (PHIS)

The National Health Insurance Authority (NHIA), established under Act 650 is mandated by National Health Insurance Act, 2012 (Act 852) to regulate Private Health Insurance Schemes

every individual. To encourage truthful responses, the purpose of the study was briefly explained to the respondents and strict confidentiality was assured. Once completed, questionnaires were immediately collected.

The response variable of interest

As stated earlier, the response variable in this study is a dichotomous willingness to pay variable (which takes a value of 0 if an individual is not willing to pay or 1 if an individual is willing to pay). The percentage distribution of this variable is presented in Table 1.

The predictors of the response variable

The status of the response variable is influenced by certain variables called predictors. These predictors determine the status of the response variable. The potential predictors of the response, introduced in this section, will be used to assess

their influence on the status of the response variable. Some of the potential predictors of the response variable are age group (takes a value of 0 if a respondent is in 20-39 age group and 1 if 40 and above); gender (takes a value of 0 if male and 1 if female); level of education (takes a value of 0 if informal and 1 if formal); occupation (takes a value of 0 if he/she works at the administrative sector, 1 if at the health sector, 2 if at the educational sector and 3 if working at any other sector relative to those mentioned); marital status recorded 0 if respondent is single or 1 if married; spouse employment status takes a value of 0 if yes and 1 if no. The study also investigated for the effects of frequent visitation to the hospital, National Health Insurance Scheme (NHIS) subscription, average amount spent on their family health care per annum, kind of service(s) to be covered if the policy is being initiated, range of payments for the policy per annum that suits their financial strength, a need for the private policy to complement the NHIS, ability to contribute to

Table 1: Chronological development of health care financing in Ghana.

Year	Event	Rationale	Features	Sources of Financing	Results
1957	Using the British system as a framework for national health service	Driven by early Economic performance, natural resources, and a strong export base	- Everyone has the right to free health care - Delivery of health care across a network of public-owned facilities	General revenue	Unsustainable with a downturn in economic results, the scheme proved to be too costly
1985	Adoption of co-payments	Co-payments for services	-Co-payments for Services -Delivery of health care across a network of government-owned facilities	General revenue and usage fees	Out-of-pocket usage pays from partial-to-full recovery
1992	Installed cash-and-carry system	-To increase funds for Providers -To make the return of payments legitimate -Restricting excessive use	-Total treatment of medications -Reduced costs for infants and health care services	General revenue and usage fees	Outpatient visits declined by 66%
Early 1990s	Voluntary mutual health insurance organization movement	-Heavy cash-and-carry burden -Lack of social protection mechanisms -Lack of government oversight of the informal sector	-Subsidization of the vulnerable by the better off -Social protection against the impoverishing cost of illness	-Donors such as the DANIDA and USAID -Community	-Reduced gap between those covered and those not covered -Paved the way for spread of MHOs
Early 2000s	Profusion of mutual health organizations (MHOs)	-Trend in other African countries -Progress of early MHOs in Ghana -Encouragement by the Ministry of Health	-Spread across 67 out of 138 districts in 10 regions -Diversity of organizational practices and rewards -Based on district or Profession or religion or gender	-Donors such as the DANIDA and USAID -Community	-Financial protection and access to health care for the vulnerable -Plan for the representation of greater portions of the population
2003	National mandatory health insurance reform	-Relative success of the MHOs -Agenda of the governing government (electoral platform)	-Abolish cash and carry -Introduction of mandatory health insurance -Increase coverage in all districts by MHOs	-Nation health insurance levy (NHIL)-2.5% VAT -2.5% of SSNIT state budget transfers -Returns on investment made by the National Insurance Council -Voluntary contributions	-National Health Insurance Council set up -Introduction of interim administration arrangements -Move toward 90 district mutual health schemes

the independent health care plan through premiums, reason for opting for the policy is that it provides a wider range of health care provision. Table 1 presents percentage distribution of these potential predictors of the response variable Table 2.

Table 2: Percentage distribution of the response variable (willingness to pay) and predictors.

Variables	N	% (percent)
Willingness to pay		
No	52	34.67
Yes	98	65.33
Age		
20-39	73	48.67
40 and above	77	51.33
Gender		
Male	105	70.00
Female	45	30.00
Education		
Informal	40	26.67
Formal	110	73.33
Occupation		
Administration	58	38.67
Health	36	24.00
Education	27	18.00
Others	29	19.33
Marital status		
Single	43	28.67
Married	107	71.33
Spouse employed		
Yes	77	70.00
No	33	30.00
Frequency visitation to the hospital per annum		
1 and 2	82	55.78
3 and 4	43	29.25
5 and above	22	14.97
NHIS subscription		
Yes	130	86.67
No	20	13.33
Average amount spent on family health per annum		
0-499	36	24.00
500-1000	56	37.33
1000 and above	58	38.67
Health service(s) to be covered under the private health policy		
Photography		
Yes	79	52.67
No	71	47.33
Medical examinations		
Yes	79	52.67
No	71	47.33
Cancer treatment other than cervical and breast cancer		
Yes	68	45.33
No	82	54.67
Organ surgery (Heart, Brain, Kidney, etc.)		

Yes	96	64.00
No	54	36.00
Mortuary services		
Yes	32	21.33
No	118	78.67
Rehabilitation other than physiotherapy		
Yes	41	27.33
No	109	72.67
VIP ward accommodation		
Yes	102	68.00
No	48	32.00
HIV antiretroviral medicines		
Yes	17	11.33
No	133	88.67
Range of payment for the policy per annum per your financial strength		
Below 500	15	10.00
500-999	45	30.00
1000-1499	64	42.67
1500-1999	18	12.00
2000 and above	8	5.33
Private health policy to complement NHIS		
Yes	129	86.00
No	21	14.00
Ability to contribute for the policy through payment of premiums		
Yes	108	72.00
No	42	28.00
Private policy provides wider range of health care provision		
Yes	135	90.00
No	15	10.00
Private health policy should be made optional and not mandatory		
Yes	141	94.00
No	9	6.00
Add on parents to the private health policy as dependents		
Yes	104	69.33
No	46	30.67

The percentage distributions of the variables in the Table 1 showed higher proportion (65.33%) of respondents willing to pay for private health policy and majority of these respondents (51.33%) are aged 40 and above and 70% of them males. Approximately 73% of the respondents have received formal education, 39% of the respondents work in the administrative sector. Majority (71.33%) of the respondents are married and 70% of the spouses are employed. The percentage distributions showed that approximately 56% of the respondents do visit the hospital (1-2 times) per annum, 86.67% of them subscribed for NHIS and majority (38.67%) of these respondents spend 1000 and above on their family health care per annum. Respondents chose health service(s) they prefer to be covered under the policy, approximately 53% preferred to be covered for photography, approximately 53% also preferred to be covered under medical examination, most respondents (54.67%) also did not prefer to be covered for cancer treatment other than cervical and breast cancer, many (64%) also opted to be covered for organ surgery (Heart, Brain, Kidney, etc.), approximately 79% of the respondents did not prefer to be covered for mortuary services, 72.67% did not also want policy for rehabilitation other than

physiotherapy, 68% preferred VIP ward accommodation and large proportion (88.67%) did not want to be covered for HIV antiretroviral medicines. Majority (42.67%) were willing to pay for the private policy within the range of GHC1000-1499 per their financial strength, most (86%) opined that there was the need for a private health policy to complement the NHIS, 72% of these respondents had the ability to contribute for the private health policy through payment of premiums, large proportion (90%) thought that the policy provided a wider range of health care provision, majority (94%) of the respondents thought the private health should be made optional and not mandatory and 69.31% wished to add on parents to the private health policy as dependents

Statistical analyses

The purpose of this section is to describe the form of the statistical method (logistic regression model) [5-10,27,28] that would be used to establish the relationship between the response variable and the predictors and also, to estimate the effects of the predictor variables on the response variable.

The general form of the logistic regression model [6-10,28] can be written as

$$\log it [\Pr (y_i | \mathbf{X}, \boldsymbol{\beta})] = \log it (p) = \log \left(\frac{p}{1-p} \right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_p X_p, \quad (1)$$

where X_1, \dots, X_p are the risk predictors; β_1, \dots, β_p are the coefficients of regression. These coefficients represent the magnitude and direction of the effects of \mathbf{X} design matrix of the predictors on the dichotomous response variable y_i and $\boldsymbol{\beta}$ is a vector of the regression coefficients. The p in equation (1) represents the probability that a person is willing to pay and $\frac{p}{1-p}$ is the odds of the response variable among respondents who are exposed to the predictors compared with those who are not exposed to the same predictors. This implies that $\boldsymbol{\beta}$ is the log odds ratio of the willingness to pay status for those who are exposed to the predictors relative to those who are not exposed [11]. This statistical method is implemented to the willingness to pay data using STATA version 14.1 software [12-16] for estimation of the regression coefficients.

The model (1) is used to estimate the predicted response probability for an individual. We determined the predicted probability using the back-transformation defined as

$$\hat{p} = \frac{(\hat{\beta}_0 + \hat{\beta}_1 X_1 + \hat{\beta}_2 X_2 + \dots + \hat{\beta}_p X_p)}{(1 + \hat{\beta}_0 + \hat{\beta}_1 X_1 + \hat{\beta}_2 X_2 + \dots + \hat{\beta}_p X_p)} \quad (2)$$

where $\hat{\beta}_1, \dots, \hat{\beta}_p$, are estimators of ; β_1, \dots, β_p respectively. We used these predicted probabilities in equation (2) to classify

individuals into those who are actually willing to pay or not willing to pay group [17,18]. Individuals are classified into either group based on a "threshold" value, π_0 determined by the researcher. In this way, if $\hat{p} \geq \pi_0$ an individual is classified into willingness to pay group and if $\hat{p} < \pi_0$, then an individual is classified into not willing to pay group. For instance, if $\pi_0 = 0.5$ if individuals have same chance of being classified into either of the two groups. The threshold value π_0 can be determined from the observed data with the aim of minimizing the overall proportion of misclassification or to avoid/minimize the probability of assigning an individual to willingness to pay when such individual should have actually been assigned to the not willing to pay group and vice versa. In Table 3, we summarized the relationship between the true situation and the prediction [17,18].

Given the summaries in Table 3, we define two terminologies of classification known as sensitivity and specificity [17,18]. Sensitivity (SEN) is defined as the proportions of individuals who are willing to pay given that they are actually willing to pay. This means that sensitivity can alternatively be defined as

$$\frac{a}{a+c} \times 100$$

using the definitions in Table 3. On the other hand,

we defined specificity (SPEC) as the proportions of individuals who are not willing to pay given that they are classified as those who are actually not willing to pay. This implies that, we can

$$\text{alternatively define specificity as } \frac{d}{b+d} \times 100 [5].$$

We now

define the two misclassification situations as $b/(b+d) = 1-\text{SPEC}$; which gives the proportions of positive predictions given that an individual is not willing to pay and $c/(a+c) = 1-\text{SEN}$; which gives the proportions of negative predictions given that an individual is willing to pay.

Prediction and classification methods are commonly used in disease status prediction and classification. One of these misclassification probabilities may be more serious than the other given the nature of the disease being considered. Some examples of such diseases are HIV/AIDS and chronic illness. In this instance, specificity will be more serious than sensitivity since individuals who actually have the disease (and need treatment or much attention) will be classified as negative and hence will not be given treatment due to the disease which will in turn deteriorate their conditions more rapidly. It is a common practice to focus on minimizing the probability of false negative which leads to maximizing sensitivity.

We evaluate the predictive power of the model fitted to the willingness data using the Receiver Operating Characteristic (ROC) curve [19,20]. The ROC curve is graphs of sensitivity versus 1-specificity with varying threshold value π_0 . Since

Prediction	Willing to pay	Not willing to pay	Total predictions
Positive prediction	TRUE +Ve (a)	FALSE +Ve (b)	Number of +Ve predictions (a+b)
Negative prediction	FALSE -Ve (c)	TRUE -Ve (d)	Number of -Ve predictions (c+d)
TRUE totals	Willing to pay (a+c)	Not willing to pay (b+d)	

Table 4: Unadjusted and adjusted log odds ratios and 95% confidence interval (95%CI): logistic regression model.

Covariates	Unadjusted odds ratio		Adjusted odds ratio	
	Log odds ratio	95% CI	Log odds ratio	95% CI
Age				
20-39	1 (reference)		1 (reference)	
40 and above	0.50	(-0.074, 1.079)	1.06	(-0.043, 2.163)
Gender				
Male	1 (reference)		1 (reference)	
Female	-0.06	(-0.787, 0.676)	0.25	(-0.984, 1.491)
Education				
Informal	1 (reference)		1 (reference)	
Formal	-0.13	(-0.900, 0.637)	0.72	(-0.805, 2.255)
Occupation				
Administration	1 (reference)		1 (reference)	
Health	0.11	(-0.318, 0.540)	0.30	(-0.452, 1.057)
Education	0.11	(-0.204, 0.434)	0.05	(-0.449, 0.557)
Others	0.25	(-0.011, 0.509)	0.45	(-0.008, 0.910)
Marital status				
Single	1 (reference)		1 (reference)	
Married	0.04	(-0.469, 0.397)	-0.28	(-1.943, 1.379)
Spouse employed				
Yes	1 (reference)		1 (reference)	
No	1.08	(0.130, 2.025)	1.68	(0.324, 3.027)
Frequency of visitation to the hospital				
1-2	1 (reference)		1 (reference)	
3-4	0.15	(-0.256, 0.547)	-0.29	(-0.957, 0.369)
5 and above	-0.22	(-0.535, 0.097)	-0.37	(-0.927, 0.186)
NHIS subscription				
Yes	1 (reference)		1 (reference)	
No	0.25	(-0.777, 1.267)	0.19	(-1.237, 1.627)
Average amount spent on family health care per annum				
0-499	1 (reference)		1 (reference)	
500-1000	0.01	(-0.457, 0.430)	-0.10	(-0.921, 0.719)
1000 and above	0.04	(-0.334, 0.250)	-0.20	(-0.762, 0.355)
Health service(s) to be covered under the private health policy				
Photography				
Yes	1 (reference)		1 (reference)	
No	-0.28	(-0.956, 0.392)	-0.33	(-1.382, 0.728)
Medical Examination				
Yes	1 (reference)		1 (reference)	
No	0.07	(-0.602, 0.746)	-0.03	(-1.205, 1.137)
Cancer treatment other than cervical and breast cancer				
Yes	1 (reference)		1 (reference)	
No	-0.19	(-0.866, 0.491)	0.05	(-1.007, 1.000)
Organ surgery (Heart, Brain, Kidney, etc.)				
Yes	1 (reference)		1 (reference)	
No	-0.29	(-0.983, 0.406)	0.13	(-0.990, 1.261)
Mortuary services				
Yes	1 (reference)		1 (reference)	
No	0.99	(0.190, 1.787)	0.96	(-0.356, 2.281)
Rehabilitation other than physiotherapy				
Yes	1 (reference)		1 (reference)	
No	-0.03	(-0.788, 0.725)	-0.12	(-1.249, 1.007)
VIP ward accommodation				

Yes	1 (reference)	1 (reference)
No	-0.31 (-1.026, 0.397)	-0.22 (-1.336, 0.893)
HIV antiretroviral medicines		
Yes	1 (reference)	1 (reference)
No	0.03 (-1.026, 1.088)	-0.61 (-2.538, 1.325)
Range of payment for the policy per annum per your financial strength		
Below 500	1 (reference)	1 (reference)
500-999	-0.97 (0.713, 0.518)	-0.08 (-1.365, 1.211)
1000-1499	0.03 (0.367, 0.421)	0.09 (-0.771, 0.954)
1500-1999	-5.47 (-0.367, 0.367)	0.02 (-0.675, 0.721)
2000 and above	-0.14 (-0.490, 0.212)	-0.04 (-0.712, 0.632)
Private health policy to complement NHS		
Yes	1 (reference)	1 (reference)
No	0.07 (-0.908, 1.046)	0.14 (-1.387, 1.674)
Ability to contribute for the policy through payment of premiums		
Yes	1 (reference)	1 (reference)
No	-0.91 (-1.644, -0.175)	-1.58 (-2.757, -0.400)
Private policy provides wider range of health care provision		
Yes	1 (reference)	1 (reference)
No	0.42 (-0.781, 1.614)	0.81 (-1.791, 3.415)
Private health policy should be made optional and not mandatory		
Yes	1 (reference)	1 (reference)
No	0.06 (-1.365, 1.492)	0.19 (-1.748, 2.124)
Add on parents to the private health policy as dependents		
Yes	1 (reference)	1 (reference)
No	0.73 (-0.055, 1.511)	0.78 (-0.523, 2.081)

Table 5: Prediction and classification of willingness to pay status.

Prediction	Willing to pay (B)	Not willing to pay (~B)	Totals
+Ve	65	30	95
-Ve	2	11	13
Totals	67	41	108

Sensitivity	Pr(+ B)	97.01%
Specificity	Pr(- ~B)	26.83%
Positive predictive value	Pr(B +)	68.42%
Negative predictive value	Pr(~B -)	84.62%
False + rate for true ~B	Pr(+ ~B)	73.17%
False - rate for true B	Pr(- B)	2.99%
False + rate for classified	Pr(~B +)	31.58%
False - rate for classified	Pr(B -)	15.38%

$\hat{p} \geq \pi_0$ classifies individual as willing to pay and $\hat{p} < \pi_0$ as not willing to pay, the number of positive predictions will increase as the threshold decreases. This implies that sensitivity will increase with decreasing threshold π_0 value and 1-specificity will increase with decreasing threshold π_0 value. Whenever sensitivity and 1- specificity are equal, the proportion of positive prediction given that an individual is not willing to pay is also equal to the proportion of positive prediction given that an individual is willing to pay. When this happens, the model is said to have no predictive power. Models with high predictive power are characterized with higher sensitivity relative to 1-specificity. More often, we prefer that sensitivity increases much faster than 1-specificity as π_0 varied 1 towards 0.

RESULTS

The purpose of this section is to present and provide interpretation of the results from logistic regression model fitted to the willingness to pay data. The Table 4 presents the unadjusted and adjusted log odds ratios of the regression coefficients from this logistic regression model.

We found that respondents aged 40 and above are more likely to pay for private health policy relative to those aged from 20 to 39. This might be due to the fact that most of the active working force is from 40years and above. There is an increase in the log odds ratio of willingness to pay among females relative to males. The results revealed that those in the health and educational sectors and other occupations are likely to pay for

the private health policy compared to those in the administrative sector. Also, there is increased in the log odds of willingness to pay among respondents who are married relative to respondents who are single. The adjusted log odds ratio reveals the opposite. Visiting the hospital 3-4 times per annum increases the log odds of willingness to pay and those with 5 times and above per annum have a reduced log odds relative to those who visit 1-2 times per annum. Adjusted odds ratio results showed reduction in the log odds of willingness to pay among those whose visit hospital more than 3-4 and 5 and above times relative to those who visit 1-2 times. Also, respondents who have not subscribed to the National Health Insurance Scheme are more likely to pay for the private health policy relative to those who have subscribed. Respondents' amount spent on family health per annum is not influenced by their willingness to pay. Respondents who do not want to be covered under the health services such as photography, medical examinations, and rehabilitation other than physiotherapy and VIP ward accommodation are less likely to pay for the private health policy. Respondents who do not want to be covered for mortuary services and HIV antiretroviral medicines are more likely to pay for the private health policy.

There is increase in the log odds of willingness to pay among those who are willing to pay between GHC 000-1999 for private health policy relative to 500. This seems to suggest that people are willing to pay for private health policy within a range of GHC1000-1999 which suits their financial strength. The results also showed that respondents who feel that private health policy do not complement the NHIS are more likely to pay. There is significant increase in the log odds of willingness to pay among spouses who are not employed relative to those spouses not employed. Respondents who do not have the ability to contribute for the private health policy are significantly less likely to pay for the private health policy compared to those who have the ability to contribute.

Assessing the predictive power of the Model

Here we assess the predictive power of the fitted logistic regression model using the Receiver Operating Characteristics

(ROC) curve discussed in Section 5.4. We first determine the cut-off π_0 value using the Figure 2. In this study, when $\pi_0 = 0.50$ sensitivity is 77% and specificity is 50%; and with $\pi_0 = 0.75$, sensitivity (55%) is lower and specificity (89%) is higher. This gives an indication that sensitivity increases with decreasing threshold π_0 value. In this study, the threshold value is 0.25 with 97.01% sensitivity and 26.83% specificity as 26.83% to produce the classification results presented in Table 5. Specifically, these results give an indication that the probability that an individual will pay given that such individual actually pay is 97.01% and the probability that an individual did not pay given that such individual actually pays) is 26.83%. Positive and negative predictive values are 68.42% and 84.62% respectively.

We used the Figure 3 to assess the predictive power of the model. This graph displays the ROC curve which estimates the area under the curve. When sensitivity = 1-specificity, the area under the ROC curve is 50%, implying that model has no predictive power. On the other hand, if sensitivity increases faster than 1-specificity, ROC curve will be more "bowed" and hence is said to have predictive power. The ROC curve displayed in Figure 3 showed that the area under the ROC curve is approximately 80%, indicating that the model has higher predictive power.

DISCUSSION AND CONCLUSION

This paper investigated the effects of some selected potential determinants on willingness to pay for private health policy. The response variable is willingness to pay, which is dichotomous variable coded as 1 if a person is willing to pay or 0 if a person is not willing to pay. This study took place in the Sunyani Municipality, Bono Region of Ghana. Respondents were selected using a multi-stage sampling approach. This is a cross-sectional study where data on 150 respondents were collected using a structured questionnaire. We evaluated the effects of the potential risk factors on the response variable using a logistic regression model under the Frequentist [6,7,11,20-24,27] We implemented the logistic regression model to the willingness to pay data using STATA version 14.1.

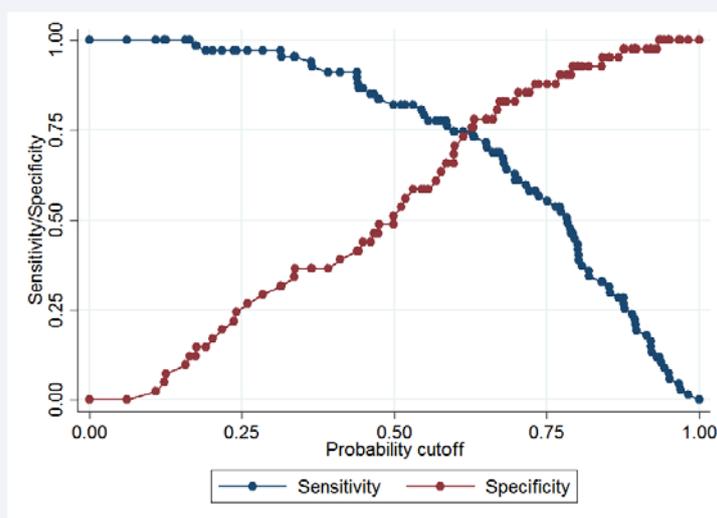


Figure 2 A graph of Sensitivity and Specificity versus different cut-off values..

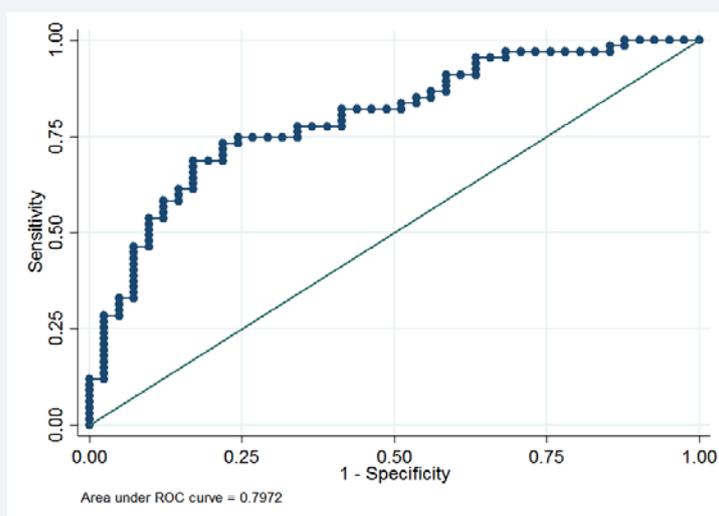


Figure 3 Graph of sensitivity versus 1-specificity.

The study results showed that people who are 20-39 years, married, males, un-insured, in health and educational sectors, who visit hospital 3-4 times per annum, are more likely to pay for private health policy. Also, people are more likely to pay GHC1000-1999 for private health policy to ensure that they enjoy conditions that the National Health Insurance does not cover. We found that spouses who are not employed are more willing to pay for the private health policy. This was found to be statistically significant. Respondents who do not have the ability to contribute for the private health policy are highly less willing to pay for the private health policy compared to those who have the ability to contribute. This result shows that respondents can afford an amount if they have the ability to contribute for the private health policy through premiums.

Based on our results, we conclude that majority (65.33%) of the respondents are willing to pay for a private health policy, spouse not employed and those who have the ability to contribute for the private health policy were statistically significantly more willing to pay for private health policy. Further studies on this topic should be extended to cover the whole Bono Region or all regions in Ghana, which requires enough funding and more personnel for data collection. Private health policies should be extended to residents in Sunyani Municipality since most of our respondents are willing to pay to enjoy conditions that are not covered under the national health insurance scheme. The policy should be modeled for members whose spouse are not employed and also has the ability to contribute for the policy.

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