Determinants of Demand for Private Health Insurance in Uganda

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Abstract

Health insurance coverage in Uganda is still very low, with only five percent of the individuals covered by any form of health insurance. This study examines the factors that influence demand for private health insurance in Uganda using the 2016 Uganda Demographic Health Survey data. A logistic regression model was employed to identify the determinants of demand for voluntary health insurance in Uganda. The results showed that wealth index, level of education, age of the individual, marital status, residence, and access to information were significant factors affecting uptake of health insurance in Uganda. Individuals from well off households were more likely to have a health insurance cover compared to individuals from the poor ones. Also, individuals who had access to information through listening to radio, reading newspapers, and watching television were more likely to demand health insurance compared to those without access. The findings, therefore, highlight the need for poverty reduction strategies to enhance the incomes of the poor and provide educational interventions regarding the benefits of health insurance in all regions.

Keywords: Demand; Health Insurance; logit; Uganda

JEL Classification Codes: C25, I10, I13

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1. Introduction

Health insurance is one of the sources of funds for financing the health sector apart from direct government budget expenditure, out of pocket expenditure and donor support (Mathauer & Kutzin, 2018; Panda *et al*., 2016; Pettigrew & Mathauer, 2016). In low- and middle-income countries, voluntary health insurance exists typically in form of employer-based and community-based health insurance schemes[1], which often cover user charges only. However, the coverage of health insurance is still very low in many developing countries (Pettigrew & Mathauer, 2016). In examining voluntary health insurance expenditures trends (1995-2012), Pettigrew & Mathauer (2016) found that 49 out of 138 low and middle income countries had voluntary health insurance (VHI) contribution of less than 1% of the total health expenditure, 39 countries had VHI of between 1% and 5% while only 23 countries had a VHI of above 5% of the total health expenditure. The 27 countries had no data or more than five years of data missing.

In Uganda, the government provides free health services at the point of consumption in all government health facilities except in the private wings of the general, referral and the national referral hospitals. Where the required services are not available in the government health facilities, Ugandans have to resort to the private health facilities where the health care services are expensive. As a result, Ugandans experience a very high out of pocket health expenditure, equivalent to 41% of the total spending on health (Republic of Uganda, 2018a). In addition, the 2015/16 National Health Accounts report showed that voluntary health insurance contributed 2.3% of the current health expenditure, which included employer based insurance and community based health insurance schemes (Republic of Uganda, 2018a).

The 2016/17 Uganda National Household Survey (UNHS) findings showed that health insurance coverage is still very low in Uganda and only 5% of the population aged 15 years and above had health insurance cover (Republic of Uganda, 2018b). In addition, only 11% of the population aged 15 years and above were aware of the health insurance services, out of which 42% would consider joining a health insurance scheme, as indicated in Figure 1. More men (34%) had heard of health insurance than women at 24%. The uptake of health insurance services was higher in urban areas at 8% compared to 3% in rural areas (Republic of Uganda, 2018b). Also, the Uganda Demographic Health Survey (UDHS) indicated that only 6% of the population aged 15-49 years have health insurance (Republic of Uganda, 2017).

[1] A voluntary health insurance scheme is one where the decision to join and the payment of a premium is voluntary.

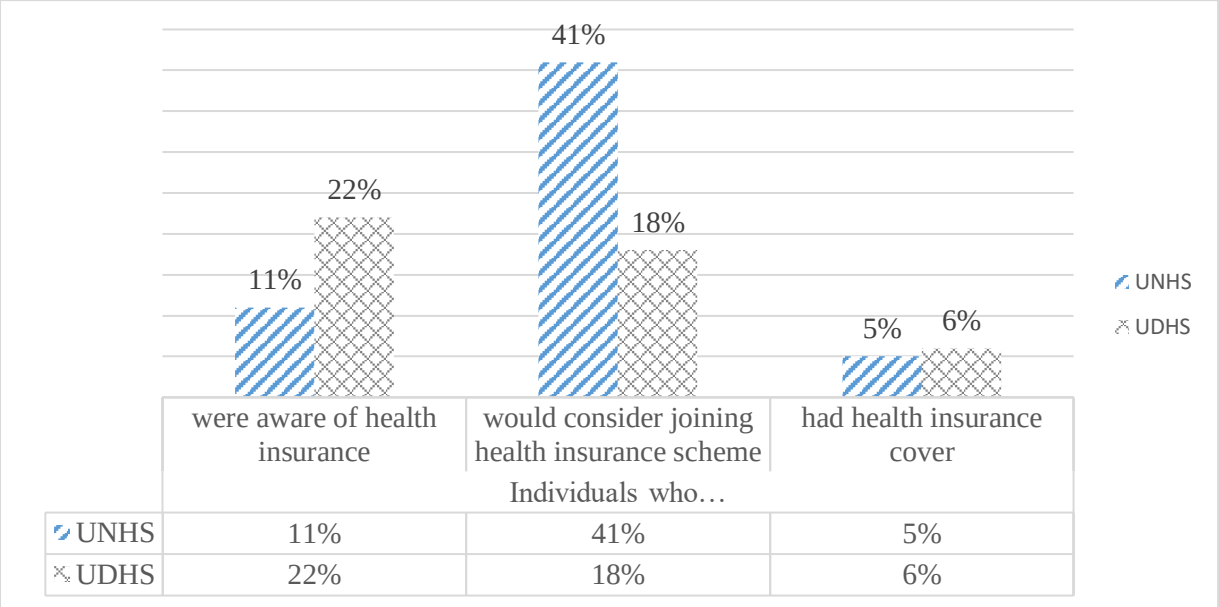

Figure 1: Proportion of population aware of health insurance, those covered and those interested in joining

Source: Author's Computation

Regarding the health insurance type, about 50% of the women's insurance was provided by the employer, 36% were insured by mutual or community organisations, and 14% had privately or commercially purchased the insurance. In an effort to improve health insurance coverage, the government has proposed the introduction of a contributory national health insurance scheme (Republic of Uganda, 2020; *The National Health Insurance Bill*, 2019)[2]. The Bill envisages integrating the existing private and community-based health schemes in to one national risk pooling scheme. This is aimed at achieving universal health coverage through financial protection, equitable access to health care services, capital development and enhance health care utilisation by all. It is against this background that the study investigated the factors that influence ownership of voluntary health insurance in Uganda. This serves to inform policy formulation and guide the implementation of the national health insurance schemes.

The rest of the paper is organised as follows. The next section presents a review of the theoretical and empirical literature on demand for health insurance. This is followed by a methodology section explaining the theoretical model, empirical model, data and variables used in the study. Section four presents the empirical results and discussion, while section five presents the conclusion and policy implications.

[2] The National Health Insurance Bill 2019 was enacted by Parliament in March 2021 but has not been assented to by the President.

2. Literature Review

2.1 Theoretical review

Several theories have been advanced and applied to explain the demand for health insurance. They include the consumer theory, the expected utility theory, the state-dependent utility theory, and the Nyman's access theory (Duku, 2018; Nkatha *et al*., 2020; Schneider, 2004; Ssempala, 2018; Tekelab *et al*., 2019; Zewde, 2014) as explained below.

1. Consumer theory

The consumer theory of demand for health insurance is based on the theory of consumer behaviour. If a consumer is informed, he/she maximizes utility as a function of consuming different goods given their relative prices, incomes, and preferences. Health insurance is expected to be a normal good with a positive income elasticity of demand. It is analogous to reducing the price of health care in the same way price reduction occurs exogenously in the market. An increase in price of a substitute, such as user fees, raises the demand for health insurance, as is a decrease in insurance premium.

2. Expected utility theory

Most studies have used the expected utility theory to explain demand for insurance under the conditions of uncertainty and risk aversion by Von Neumann and Morgenstern (Duku, 2018; Kiplagat *et al*., 2013; Mpuuga *et al*., 2020; Nkatha *et al*., 2020; Ssempala, 2018; Zewde, 2014). According to this theory, individuals are risk-averse and choose between taking risks with different implications on wealth. At the time of purchasing health insurance, individuals are not only uncertain about whether they will be ill or not but also of the financial implications should they become ill, for instance, the cost of treatment. Individuals purchase health insurance to protect themselves from catastrophic health expenditures in the event of ill health. In most cases, the cost of care is higher or more than the premium paid. The decision to demand health insurance is based on the expected utility with health insurance compared to the expected utility without health insurance. It is a choice between an uncertain loss that occurs with a probability when insured and a specific loss such as payment of premium. Risk-averse individuals prefer to pay a certain known amount as the insurance premium to an uncertain amount of the same expected utility in the event of illness.

According to the theory, purchasing health insurance depends on the individual's reaction to risk. The demand for health insurance by risk-averse individuals to avoid the possibility of wealth loss is higher than among risk-neutral and risk-loving individuals. However, the theory is silent about the effect of individual and household socioeconomic status on the decision to purchase health insurance.

3. State-dependent utility theory

The state-dependent theory asserts that a consumer's utility level and taste are influenced by the state of his/her health or social-economic status. Thus, individuals have different degrees of risk aversion, which influence their insurance demand decision. For instance, individuals who perceive their health status as good are less likely to purchase insurance than individuals who perceive their health status as poor. Also, individuals in households with higher socioeconomic status are more likely to demand health insurance because they can either afford

(paying the premium) or have a better understanding of the benefits of being issued. The poor have liquidity constraints that cause them to remain uninsured even when they may be better off with insurance.

4. Nyman's access theory

People generally prefer the risk of no loss at all to the certainty of small actuarially equivalent loss. Insurance choices are not only made based on utility alone but also on the consumer's expectations about the future, such as health status. Nyman (2003) asserts that perceiving health insurance as a price effect overlooks the origins of an insurance contract as a means of income transfer to those who are ill. The ideal income agreement is a voluntary trade-off where individuals contribute premiums and in turn, make a claim on the collective premiums in the event they fall sick. Premiums are, therefore, weighed on the probability of getting sick such that the higher the likelihood of illness, the higher the premium and vice versa. Welfare gain arises when there is a transfer of income from healthy people to those who become ill. This welfare gain caused by income transfer prompts individuals to purchase health insurance.

Thus, according to Nyman, demand for health insurance is derived from the demand for health and health care. It is derived from the access it provides to medical care, which generates more utility than the income spent on premiums. He argues that insurance consumers do not need to be risk-averse i.e. individuals can have diminishing marginal utility without risk aversion (Eisenhauer, 2006). People make a comparison between the benefits of purchasing insurance and health care expenditure without health insurance, given the risk attitude, which is mainly influenced by social and economic shocks. Individuals purchase insurance when the benefits outweigh the out of pocket payments.

According to the access theory, the central rationale for buying insurance is the individual's desire to obtain an income transfer from the risk pool if he/she becomes ill. Although this is valid, it asks why the consumer would pay a loaded premium upfront for a smaller expected transfer in the future. One possible answer would be that the consumer seeks to smoothen out consumption (or wealth) across time by sacrificing a little when healthy to be compensated in the event of illness or injury. That is to mitigate the risk of potentially large and perhaps unaffordable medical bills in future. In that case, the consumer exhibits the classic assumptions of risk aversion, which Nyman rejects.

2.2 Empirical review

Dror *et al*. (2016) and Panda *et al*. (2016) investigated the factors that affect uptake of voluntary and community based health insurance in low and middle income countries. The results showed that household income, education, age of the household head, gender of the household head, and marital status were significantly associated with enrolment in community health insurance schemes. Kazungu and Barasa (2017) in their study in Kenya also found that employment in the formal sector, marital status, gender, age, exposure to media and household welfare were significantly associated with health insurance coverage.

Cameroon *et al*. (1988) established that income and price significantly influenced demand for health insurance in Australia. Similar findings were found by Abu Bakar *et al*. (2012) in Malaysia; and Owusu-Sekyere and Chiaraah (2014) in Ghana who found that income had a positive influence on demand for health insurance. Also, Hopkins and Kidd (1996) estimated

a logit model and found that age, income, health status, and location were significant in determining demand for health insurance in Australia.

Abu-Baker *et al*. (2012) found that income level, age, gender, religion, education level and risk attitude significantly affected purchase of private health insurance in Malaysia. Jutting (2003) analysed factors explaining people's participation in insurance schemes in rural Senegal. The results showed that household income and religion were significant in influencing demand for health insurance. The results further revealed that the schemes had not reached the poorest of the poor, especially in villages that have difficulties accessing health care. Similar findings were also found by Nsiah-Boateng & Aikins (2018) in Ghana.

Furthermore, Ayitey *et al*. (2013) used a binary logit to study the determinants of insurance enrolment among Ghanaian Adults and found that income, age, religion, and access to information through televisions and media were significant determinants. Nketiah-Amposah (2009) also found that women were more likely to demand for health insurance than males. The study findings further indicated that the Ghanaian national health insurance scheme only served a few poor individuals. Another study by Owusu-Sekyere and Chiaraah (2014) found that income, level of education, sex, marital status, cost of curative care, and poor health status influenced Ghanaians' decision to join insurance schemes.

Mhlanga and Dunga (2020) investigated the determinants of demand for health insurance in South Africa using a logistic regression. The findings showed that health insurance coverage in South Africa was still low, and also gender, marital status, race, and education level were significant determinants. The male had a higher probability of demand for health insurance than their female counterparts.

Salari, Akweongo, Aikins, & Tediosi (2019) investigated the determinants of health insurance enrolment in Ghana using the Ghana Demographic and Health Survey data. The study found that education, age, wealth, occupation, and marital status were significant determinants of health insurance enrolment in Ghana's national health insurance schemes. Another study by Duku (2018) estimated a logistic regression model and found that age, sex, education level, marital status, and health status were significant predictors for health insurance enrolment among working-age adults in Greater Accra and Western regions of Ghana.

Nkatha *et al*. (2020) analysed macro-economic determinants of demand for health insurance in Kenya using macro data. The results showed that income levels, education level, inflation and unemployment affected demand for health insurance in Kenya. The results further indicated that income levels and education levels had a positive effect on demand for health insurance in the long run. In contrast, the inflation rate and unemployment had a negative effect on demand for health insurance. A study by Yamada, Yamada, Chen, and Zeng (2014) found that household income positively influenced purchasing of health insurance.

Tavares (2020) in his study found that health status and being risky takers significantly influenced the decision to buy voluntary private health insurance in universal coverage health systems in Europe. On the other hand, a study by Finn and Harmon (2006) employed panel data to examine demand for private health insurance in Ireland. The results showed that education, income and health status were significant determinants of demand for private health insurance in Ireland.

Takudzwa, Thabani, and Smartson (2020) employed a probit regression model to investigate the factors that influence demand for a health insurance cover by the public service employees in Zimbabwe. The findings showed that premium, employment type, place of residence, education level and access to information were significant predictors of participation in health insurance schemes.

In Uganda, the few empirical studies that exist, are either limited in scope or with contradicting results. Mpuuga *et al*. (2020) using the 2016/17 UNHS data, found that awareness, marital status, age, health status, region, wealth, and household status were strong determinates of demand for health insurance. On the other hand, Ssempala (2018) using the 2011 UDHS data, found that wealth, level of education, access to information and residence were significant determinants of demand for health insurance. His study findings, however, were not published in a reviewed journal. Although Mpuuga *et al*. (2020) found age, marital status, and health status significant, Ssempala (2018) found them insignificant. On the other hand, Ssempala (2018) found gender and education significant while Mpuuga *et al*. (2020) found them insignificant. These contradictions could be attributed to the differences in the data set used, the periods at which these data sets were collected and the methodology employed by the two studies. Mpuuga *et al*. (2020) used a logit model while Ssempala (2018) used a probit model to estimate the determinants of demand.

Nshakira-Rukundo *et al*. (2019) also examined the determinants of enrolment and renewing of community-based health insurance by households with children below five years in rural South-Western Uganda. The results showed that household welfare, husband's employment, access to information, and knowledge of health insurance premiums were significant determinants for enrolment and renewal decisions. Given the limited scope of this study, the findings may not be generalised to the whole country, which has different forms of health insurance and cultural differences.

3. Methodology

3.1 Theoretical Model

This study adopted the expected utility theory and the state dependent utility theory of demand for insurance and health insurance. The expected utility theory is commonly used in models of decision making under risk and uncertainty based on the expected utility maximisation. It is based on the assumption of diminishing marginal utility of income and risk aversion. According to this theory, demand for health insurance is a free choice between uncertain loss that occurs with a probability when not insured and specific loss such as payment of premium. People purchase health insurance to avoid a financial risk of lacking money to finance medical care in future when they get ill.

Individuals choose between alternatives and take the option that offers the highest total expected utility. The consumer's utility, U is a function of disposable income, Y given a probability, π that the individual will be ill and spend L on medical care. If there are no administrative costs, the consumer would purchase full insurance coverage for the actuarially fair premium of $P = \pi L$, for which the consumer would receive a payoff transfer R if ill.

For simplicity, we assume that $R = L$. The consumer chooses between being uninsured and being insured. The expected utility without insurance is;

$$EU_u = (1-\pi)\,U(Y) + \pi\,U(Y-L) \quad (1)$$

and, the expected utility with insurance is;

$$\begin{aligned} EU_i &= (1-\pi)U(Y-P) + \pi\,U(Y-L+R-P) \\ &= (1-\pi)U(Y-P) + \pi\,U(Y-P) \\ &= U(Y-P) \end{aligned} \quad (2)$$

The consumer is therefore presented with a choice between being uninsured and having an uncertain outcome with an expected utility in equation (1) or being insured and having a certain outcome with a certain utility in equation (2). If the marginal utility of income is diminishing, the consumer is better off purchasing health insurance and avoiding the loss, L. Thus, the expected utility-maximising consumer would purchase health insurance coverage if $EU_i > EU_u$ that is

$$U(Y-P) > (1-\pi)\,U(Y) + \pi\,U(Y-L) \quad (3)$$

From equation (3), the choice to purchase insurance is associated with certainty and a higher level of expected utility, implying that health insurance is demanded because of the certainty it provides (Nyman, 2003).

However, the benefits gained from health insurance coverage are not only limited to avoidance of uncertainty risk but also the ability to make health care accessible (Nyman, 2003). Thus, we also consider the effect of health state and social-economic variables as highlighted under the state-dependent utility theory.

3.2 Empirical Model

Following the theoretical model in equation (3) and the state-dependent theory, an individual either has health insurance or not. The response is binary in nature, with values one and zero for having health insurance and not having health insurance respectively. Since the dependent variable is binary, the ordinary least squares estimation method cannot be used. This is because the assumption of continuity of linear equations does not hold, and heteroscedasticity exists in binary models (Greene, 2012; Verbek, 2008). For this reason, a logit regression model was preferred and estimated since it uses a maximum likelihood estimation procedure and is extensively used in many studies (Abu Bakar *et al.*, 2012; Duku, 2018; Kazungu & Barasa, 2017; Mhlanga & Dunga, 2020; Owusu-Sekyere & Chiaraah, 2014; Salari *et al*., 2019).

The probability of an individual having a health insurance cover or not is defined by:

$$y_i = \begin{cases} 1 & if\ U_i^* > 0 \\ 0 & if\ U_i^* \leq 0 \end{cases} \quad (4)$$

In equation (4) above, U_i^* is the latent variable for the expected utility determined by the underlying response variable expressed in equation (5);

$$U_i^* = X_i\beta + \varepsilon \quad (5)$$

Where X_i is a vector of independent variables including age, sex, level of education, residence, marital status, wealth index, employment status, and access to information; β is a vector of the parameters to be estimated; and ε is the error term.

Since the logit model was applied, the error term is assumed to be distributed with a logistic distribution with zero mean and variance $\pi^2/3$. The probability that an individual has health insurance is thus defined as;

$$P(y_i = 1|X) = \Lambda(X'\beta) \quad (6)$$

Where $P =$ the probability, $\Lambda =$cumulative distribution function (cdf) of a logistic distribution, $X =$ Vector of known repressors, and $\beta =$ vector of unknown parameters. This means that the probability that $y_i = 1$ given X is given by the standard logistic cumulative distribution function described in equation (7) as follows:

$$Prob\ (y_i = 1|X) = \Lambda(w) = \frac{\exp(w)}{1 + \exp(w)} = \frac{1}{1 + \exp(-w)} \quad (7)$$

The parameters are estimated by the maximum likelihood method since the relationships are non-linear. The optimal solution is a set of parameter estimates for the likelihood function and its log-likelihood function indicated by equations (8) and (9) respectively;

$$\mathcal{L} = \prod_{i}^{n}[\Lambda(X'\beta)^{y_i}][1 - \Lambda(X'\beta)]^{1-y_i} \quad (8)$$

$$ln\mathcal{L}(\beta) = \sum_{i}^{n}[y_i\ ln\Lambda(X'\beta) + (1 - y_i)\ \ln(1 - \Lambda(X'\beta))] \quad (9)$$

The probability ratio (odds ratio) is then given by $p(y = 1)/p(y = 0) = \exp(X'\beta)$ and gives the number of times an individual is likely to have health insurance compared to not having health insurance. The odds ratio gives the effect of a predictor on the likelihood that an outcome will occur (Greene, 2012; Verbek, 2008).

3.3 Data Sources

The study used data obtained from the 2016 Uganda Demographic and Health Survey conducted by the Uganda Bureau of Statistics in collaboration with the Ministry of Health from June to December 2016 (Republic of Uganda, 2017). The 2016 UDHS is the most recent data set and was accessible. The sample was based on the 2014 Population and Housing Census and covered a total of 20,000 households. This enables comparability and enhances reliability of the findings. In addition, the sample was a national representative sample, given that it covered all the 112 districts of Uganda at the time. Out of the 19,088 eligible women identified from the household visited, 18,506 women were successfully interviewed, giving a response rate of 97%. The unit of analysis was women aged between 15 years to 49 years, and the data was analysed using Stata software version 14.

3.4 Description of Variables

Dependent Variable:

In this study, the dependent variable was ownership of health insurance. This was a binary choice variable defined as one if the individual had a health insurance cover and zero if the individual had no a health insurance cover.

Independent variables:

Guided by the works of Grossman (1972) and the empirical literature, the independent variables used in the study included attributes of the individual, household/family and the community as a whole. Table 1 presents the description of the independent variables used in the study and the expected effect.

Table 1: Description of independent variables

Variable	Description	Expected sign
Age of the respondent	Age of the respondent in completed years	+
Education level	Highest education level of the respondent defined as: 1= no formal education; 2= primary school; 3= secondary school; 4= post-secondary i.e diploma and university degree	+
Marital status	Marital status of the respondent defined as: 1 if married; and 0 otherwise	+
Residence	=1 if the individual lives in an urban household; =0 otherwise	+
Religion	The religious faith of the respondent defined as: 1=Pentecostal and other religions; 2=Anglican, 3=Catholic; 4= Muslim	+/-
Wealth index	A measure of household welfare defined as: 1=Poorest; 2= Poor; 3= Middle; 4= Rich; 5= Richest	+
Region	1= Kampala; 2=Central region; 3= Eastern region; 4= Northern region; 5= Western region	-/+
Frequency of reading newspapers or magazine	0= Not at all; 1=Less than once a week; 2= At least once a week	+
Frequency of listening to radio	0= Not at all; 1=Less than once a week; 2= At least once a week	+
Frequency of watching television	0= Not at all; 1=Less than once a week; 2= At least once a week	+
Sex of the household head	=1 if female; =0 otherwise	-/+
Age of the household head	Age of the household head in completed years	+/-

4. Results and Discussion

4.1 Descriptive Analysis

The average age of the household head was 41years with a standard deviation of 13.6. The minimum age was 15 and the maximum was 98 years. On the other hand, the average age of the women was 28years with a standard deviation of 9.4.

Table 2 shows the distribution of respondents by socio-demographic characteristics. Majority (76%) of the individuals were residents in rural areas, and only 2% of the women were covered

by health insurance. About 67% of the respondents lived in a male-headed household, while 62% were married. Regarding the distribution by household welfare, 21% and 20% were respectively in the poorest and poorer wealth quintile, 19% were in the middle wealth quintile while the richer and richest quintiles constituted 29% and 22% respectively.

For the levels of education, 59% of the individuals had primary education, followed by those having secondary education (23%). Only 11% had no formal education, and 7% had post-secondary education (diploma and above). The distribution by region showed that 27% of the respondents lived in the eastern region, followed by those in the western region at 26%. The central region had 16% of the respondents, the northern region had 19% of the respondents, and Kampala had 7% of the respondents.

Table 2: Distribution of respondents by socio-demographic characteristics

Variable	**Frequency** (N=18,506)	**Percent**
Education level		
No formal education	2,071	11.2
Primary	10,893	58.8
Secondary	4,213	22.8
Post-secondary	1,329	7.2
Residence		
Rural	14,127	76.3
Urban	4,379	23.7
Marital status		
Single	7,127	38.5
Married	11,379	61.5
Wealth index		
Poorest	3,884	21.0
Poor	3,640	19.7
Middle	3,485	18.8
Rich	3,454	18.7
Richest	4,043	21.8
Religion		
Pentecostal and others	2,989	16.2
Anglican	5,799	31.3
Catholic	7,552	40.8
Muslim	2,166	11.7
Region		
Kampala	1,300	7.0
Central	3,025	16.3
Eastern	5,039	27.3
Northern	4,368	23.6
Western	4,774	25.8
Frequency of reading news papers		
Not at all	14,629	79.0

Less than once a week	2,274	12.3
At least once a week	1,603	8.7
Frequency of listening to radio		
Not at all	4,974	26.9
Less than once a week	2,958	16.0
At least once a week	10,573	57.1
Frequency of watching television		
Not at all	13,048	70.5
Less than once a week	1,972	10.7
At least once a week	3,486	18.8
Sex of the household head		
Male	12,351	66.7
Female	6,155	33.3
Health insurance		
No	18,267	98.7
Yes	239	1.3

Source: Author's Computation

4.2 Bivariate Analysis

Table 3 shows the percentage of individuals who had a health insurance cover by selected socio-demographic characteristics. The chi-square test[3] was applied for each categorical variable to test the relationship between the independent variables and the outcome variable.

Table 3: Percentage of individuals with insurance by socio-demographic characteristics

Variable	Percentage	Chi-square Statistic	Probability
Education level		409.42	0.000
No formal education	0.8		
Primary	0.6		
Secondary	1.6		
Post-secondary	7.2		
Residence		82.93	0.000
Rural	0.9		
Urban	2.7		
Marital status		7.93	0.005
Single	1.0		
Married	1.5		
Wealth index		206.4	0.000
Poorest	0.2		
Poor	0.5		

[3] The chi-square test is used to evaluate tests of independence of variables when using a cross tabulation. The null hypothesis is that no relationship/association exists between the categorical variables.

Middle	0.8		
Rich	1.3		
Richest	3.4		
Religion		7.09	0.069
Pentecostal and others	1.0		
Anglican	1.4		
Catholic	1.5		
Muslim	0.8		
Region		141.17	0.000
Kampala	3.8		
Central	1.8		
Eastern	0.5		
Northern	0.4		
Western	1.9		
Frequency of reading newspapers		234.21	0.000
Not at all	0.8		
Less than once a week	1.9		
At least once a week	5.2		
Frequency of listening to radio		35.06	0.000
Not at all	0.5		
Less than once a week	1.5		
At least once a week	1.6		
Frequency of watching television		191.18	0.000
Not at all	0.7		
Less than once a week	1.3		
At least once a week	3.6		
Sex of the household head		2.99	0.084
Male	1.2		
Female	1.3		

The chi-square test was applied for each variable; N=10,263

Source: Author's Computation

The results in table 3 show that education level, residence, marital status, wealth index, region, frequency of reading newspapers or magazines, frequency of listening to radio, and frequency of watching television were statistically significant at 1% level of significance, which means that they were associated with having health insurance.

Ownership of health insurance was observed to increase with a higher wealth quintile. For instance, 3% of the individuals belonging to the richest wealth quintile had a health insurance cover compared to only 0.8% and 0.2% of the individuals belonging to the middle and poorest wealth quintile respectively. Regarding education, post-secondary education (diploma and above) had the highest percentage of individuals that had a health insurance cover at 7% while primary education had the least percentage of individuals with health insurance at 0.6%. Ownership of health insurance was observed to increase with the level of education except in those without formal education.

Urban residents were more likely to have health insurance than their rural counterparts. Three percent of urban residents had a health insurance cover compared to only 1% of the rural residents who had a health insurance cover. Further, 2% of the respondents in the central region while 4% in Kampala had a health insurance cover. Only 0.4% of residents in the northern region had health insurance, 0.5% of those from the eastern region had health insurance, and 2% of the respondents in the western region had health insurance.

Access to information was also statistically significant. Respondents who read newspapers, listened to radio or watched television at least once a week had the highest health insurance coverage at 5%, 2% and 4% respectively compared to those who did not at all with 0.8%, 0.5%, and 0.7% respectively. In addition, results from the correlation analysis showed that the individual's age was positively correlated with the age of the household head but negatively correlated with marital status. Also, the frequency of watching television was negatively correlated with rural residence.

4.3 Regression Analysis

The study employed a logistic regression model and estimated three models; model 1, model 2, and model 3. In model 1, all independent variables were used, while in model 2, age squared was introduced and the insignificant attributes for household head dropped. In model 3, age squared introduced in model 2 was dropped.

Several diagnostic tests were then performed to check for possible multicollinearity, model specification error and classification. The Variance Inflation Factor (VIF) was used to detect the problem of multicollinearity. As a rule of thumb, the VIF of 10 or greater (equivalently tolerance of 0.1 or less) is a cause for concern. In the presence of high multicollinearity, the coefficients are biased and standard errors tend to be inflated, giving small values of the t-statistic and with very wide confidence intervals of coefficients. This may lead to invalid statistical inferences and misleading conclusions. Table 4 shows that the mean VIF was 1.37, 10.15, and 1.33 for models 1, 2, and 3 respectively. This is far lower than the acceptable maximum of 10 except for model 2. All variables have a VIF of less than two and therefore passed the test except age and age-squared. A high VIF was expected since age squared is generated from age. Age squared was included in order to investigate the possibility of a nonlinear relationship between age and demand for health insurance. This means there is no concern for multicollinearity in models 1 and 2 and are therefore preferred.

Table 4: Multicollinearity diagnostics

Variables	Model 1		Model 2		Model 3	
	VIF	**1/VIF**	**VIF**	**1/VIF**	**VIF**	**1/VIF**
Health insurance	1.02	0.976	1.02	0.9759	1.02	0.9763
Age of the individual	1.35	0.741	54.9	0.0182	1.18	0.8439
Education level	1.55	0.645	1.57	0.6377	1.55	0.6465
Marital status	1.67	0.600	1.35	0.7434	1.17	0.858
Residence	1.45	0.691	1.44	0.6951	1.44	0.6967
Religion	1.01	0.990	1.01	0.9918	1.01	0.9919
Wealth Index	1.84	0.543	1.83	0.5452	1.83	0.5454
Region	1.24	0.804	1.24	0.8042	1.24	0.8042
Freq. of reading newspapers	1.38	0.725	1.38	0.7252	1.38	0.7261
Freq. of listening to radio	1.12	0.892	1.12	0.8942	1.12	0.8943
Freq. of watching television	1.74	0.576	1.74	0.576	1.74	0.5764
Age of the household head	1.22	0.821	53.18	0.0188		
Sex of the household head	1.26	0.792				
Mean VIF	**1.37**		**10.15**		**1.33**	

**1/VIF is tolerance, Freq. means Frequency*

On the other hand, the link test and goodness of fit test were used to test for misspecification, and the results are presented in Table 5. In all the three models, _hatsq is insignificant, meaning that there was no specification error and the models were well specified. For the goodness of fit, both the chi-square and Hosmer-Lemeshow goodness of fit tests were performed to test how well the model fits the data. Both tests were insignificant for all the three models, with a p-value greater than 50%. This means the predicted probabilities do not deviate from the observed probabilities, and therefore the model fits well the data.

Table 5: Model specification tests

	Model 1		Model 2		Model 3	
Test	***Coef.***	***P-vale***	***Coef.***	***P-vale***	***Coef.***	***P-vale***
Link test						
_hat	0.7692	0.001	0.9471	0.000	0.8108	0.001
	(0.2341)		(0.2291)		(0.2342)	
_hatsq	-0.0322	0.315	-0.0073	0.813	-0.0264	0.41
	(0.0321)		(0.0308)		(0.0320)	
Goodness of fit (gof) test						
Pearson	17061	1.000	13955	0.318	13532	0.982
Hosmer-Lemesho	5.31	0.724	12.74	0.121	6.44	0.598

Standard errors in parentheses

The study also employed proxies to address the endogeneity[4] concerns that may exist. Moreover, the logistic regression model uses the maximum likelihood estimation procedure, which handles endogeneity arising from the omission of unobserved variables; for example, the use of instrumental variable probit regression (Antolín *et al*., 2014; Guevara, 2015; Koemle & Yu, 2020; Louviere *et al*., 2005). Further, the area under Receiver Operating Characteristics (ROC) curve was used to check for classification and model performance. In all the three models, the area under the ROC curve was 0.84, which means the model is good at distinguishing between individuals with health insurance and those without health insurance. From the above diagnostic tests, model 3 was preferred.

Table 6 presents the logistic regression results. The likelihood ratio test was significant at 1% level of significance implying that the regression variables used fit the model well. The empirical results showed that the probability that an individual had a health insurance cover was 4.4% which is still very low. This finding was similar to that of Mhlanga and Dunga (2020) in South Africa and Pettigrew and Mathauer (2016) in the low and middle income countries. The results further indicated that the level of education, age of the individual, wealth index, marital status, region, religion, residence, and access to information were significant and therefore influenced the demand for voluntary health insurance.

Table 6: Determinants of demand for voluntary health insurance: Results from a logistic regression model (odds ratios)

Variables	Model 1	Model 2	Model 3
Age of the respondent	1.0208**	1.2393***	1.0196**
	(0.0094)	(0.0788)	(0.0086)
Age squared		0.7372***	
		(0.0728)	
Level of education			
Primary	0.5934*	0.6385	0.5993*
	(0.1709)	(0.2003)	(0.1726)
Secondary	1.0705	1.2248	1.0898
	(0.3400)	(0.5046)	(0.3462)
Post-secondary	2.8306***	3.1823**	2.9451***
	(0.9318)	(1.6195)	(0.9678)
Marital status: Single (ref)			
Married	1.8056***	1.4864**	1.7444***
	(0.3303)	(0.2404)	(0.2733)
Residence: Rural (Ref)			
Urban	1.1533	1.1361	1.1188
	(0.2133)	(0.2086)	(0.2055)
Religion: Pentecostal & Others (Ref)			
Anglican	1.4182	1.5559	1.3921

[4] Endogeneity includes all effects that are not exogenous and is therefore the same as model specification (Louviere *et al*., 2005).

	(0.3117)	(0.4475)	(0.3054)
Catholic	1.8186***	2.1863*	1.8008***
	(0.3847)	(0.9061)	(0.3805)
Muslim	0.8072	1.0550	0.8050
	(0.2457)	(0.6541)	(0.2450)
Wealth Index: Poorest (Ref)			
Poor	2.2650*	2.7737**	2.2478*
	(1.0371)	(1.3639)	(1.0290)
Middle	2.7580**	4.1631**	2.7246**
	(1.2408)	(2.4726)	(1.2256)
Rich	3.3881***	6.4664**	3.3662***
	(1.5082)	(4.8612)	(1.4988)
Richest	3.7745***	8.3643**	3.7011***
	(1.7712)	(7.5401)	(1.7349)
Region: Kampala (Ref)			
Central	0.7022	1.0416	0.7180
	(0.1578)	(0.4422)	(0.1611)
Eastern	0.3843***	0.8208	0.3865***
	(0.1079)	(0.6170)	(0.1085)
Northern	0.4421**	1.2133	0.4545**
	(0.1481)	(1.2224)	(0.1521)
Western	1.4391	5.0293	1.4549*
	(0.3259)	(6.0682)	(0.3296)
Frequency of reading newspapers: Not at all (Ref)			
Less than once a week	1.0711	1.0819	1.0611
	(0.2202)	(0.2233)	(0.2183)
At least once a week	2.3754***	2.3952***	2.3558***
	(0.4637)	(0.4698)	(0.4588)
Frequency of listening to radio: Not at all (Ref)			
Less than once a week	2.1384***	2.1102***	2.1256***
	(0.5631)	(0.5561)	(0.5595)
At least once a week	1.5214*	1.5013*	1.4984*
	(0.3515)	(0.3469)	(0.3458)
Frequency of watching television: Not at all (Ref)			
Less than once a week	1.0766	1.0824	1.0799
	(0.2686)	(0.2706)	(0.2694)
At least once a week	1.9308***	1.9070***	1.9280***
	(0.4189)	(0.4175)	(0.4192)
Sex of hh head: Male (Ref)			
Female	1.2374		
	(0.1938)		
Age of household head	0.9939		

	(0.0059)		
Education*religion		0.9615	
		(0.0845)	
Wealth *region		0.9355	
		(0.0595)	
Constant	0.0007***	0.0000***	0.0007***
	(0.0005)	(0.0000)	(0.0004)
Observations	18,506	18,506	18,506
LR chi2(25)	435.2	443.1	431.4
P-value	0.000	0.000	0.000
Pseudo R-squared	0.170	0.174	0.169

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The results in table 6 show that the level of education had a positive significant effect on demand for private health insurance. Individuals with post-secondary education were more likely to have health insurance compared to those without formal education. Individuals with post-secondary education were 2.95 times more likely to have a health insurance cover compared to individuals without formal education. This could be attributed to the fact that educated individuals can effectively access information and appreciate the importance of insurance compared to those without formal education. This finding was supported by the results of Abu Bakar *et al*. (2012); Owusu-Sekyere and Chiaraah (2014); Salari *et al*. (2019); Ssempala (2018); Zewde (2014). They argued that education increases the individual's awareness about the benefits of health insurance and one's possibility of obtaining a high paying employment.

The age of the individual positively influenced the demand for health insurance since the odds ratio was greater than one. Older individuals were more likely to have health insurance than their young counterparts. As for age squared, the odds ratio of 0.997 imply that demand for health insurance decreases for each additional unit. Age, therefore, has a positive but non-linear relationship. This finding was supported by study findings of Mpuuga *et al*. (2020); Abu Bakar *et al.* (2012); Duku (2018); Hopkins and Kidd (1996); and Salari *et al*. (2019) who found that age was positively associated enrolment in health insurance schemes.

Marital status was also a significant predictor of demand for private health insurance at 1% level of significance. Married individuals were more likely to have health insurance. Holding other factors constant, married individuals were 1.74 times more likely to have a health insurance cover relative to their single counterparts. This reflects the responsibility of being a spouse or having children. This was in agreement with the findings by Dror *et al.* (2016); Duku (2018) and Owusu-Sekyere and Chiaraah (2014) in Ghana; Mpuuga *et al*. (2020) in Uganda; and Mhlanga and Dunga (2020) in South Africa who found that marital status was a significant determinant of demand for health insurance.

The results further indicated that household welfare was a significant determinant of demand for voluntary health insurance. Individuals in a higher wealth quintile had higher odds of

demand health insurance than those in the poorest wealth quintile. Being in the rich and richest quintiles was positively associated with having health insurance. Individuals in the rich and richest quintiles were 3.37 and 3.70 times respectively more likely to have health insurance than those in the poorest quintile. In addition, individuals in the middle and poor quintile were 2.72 and 2.25 times respectively more likely to demand health insurance than individuals in the poorest quintile. This implies that income increases the likelihood of having health insurance. This finding was consistent with the findings by Nkatha *et al.* (2020) in Kenya; Mpuuga et al. (2020) and Ssempala (2018) in Uganda; Owusu-Sekyere and Chiaraah (2014) and Salari *et al*. (2019) in Ghana who found that higher levels of income and wealth significantly and positively influenced Ghanaians' enrolment in a health insurance scheme.

Further, access to information significantly influenced demand for health insurance at 1% level of significance. The frequency of listening to radio, reading newspapers, and watching television positively influenced demand for voluntary health insurance in Uganda. Individuals who listened to radio less than once a week and at least once a week were 2.13 and 1.50 times respectively more likely to demand health insurance than those who do not listen to radio at all. Individuals who read newspapers or magazines at least once a week were 2.36 times more likely to have health insurance than those who did not read newspapers or magazines at all. More so, individuals who watched television at least once a week were 1.93 times more likely to demand voluntary health insurance than those who did not watch television at all. These results were in agreement with the findings by Nshakira-Rukundo *et al*. (2019); Ssempala (2018); and Takudzwa *et al.* (2020) who found that access to information positively influenced demand for health insurance. Kiplagat *et al*. (2013) noted that lack of awareness hindered many individuals from participating in any form of health insurance scheme.

Region was a significant determinant of demand for private health insurance. Individuals who lived in the eastern and northern regions were respectively 0.39 and 0.45 times less likely to have health insurance compared to those living in Kampala. On the other hand, individuals who lived in the western region increased the odds of having health insurance by 1.45 times compared to those living in Kampala. These findings were consistent with Duku (2018) findings in Ghana and Hopkins and Kidd (1996) in Australia. They found geographical location to be a significant determinant of demand for health insurance.

Further, individuals living in urban areas were more likely to have health insurance than their rural counterparts. Individuals resident in urban areas were 1.12 more likely to have health insurance compared to those in rural areas. This finding was consistent with the results by Jin *et al*. (2016) who found that rural residents were less likely to buy private health insurance in China. In addition, Nsiah-Boateng and Aikins (2018) found that Ghanaians living in urban and peri-urban were more likely to enrol on the national health insurance scheme than those living in rural areas.

Religion also had a significant effect on demand for private health insurance. Catholics were 1.80 times more likely to have a health insurance cover than Pentecostals and other faiths. This result was consistent with the findings by Abu Bakar *et al*. (2012); Dror *et al*. (2016); and Jutting (2003) who found that religion influenced the probability of participation in health insurance schemes.

5. Conclusion and Policy Implications

This study employed a logistic regression model to examine the factors influencing demand for private health insurance in Uganda using the 2016 UDHS data. Only 5% of the individuals aged 15 years and above are covered by health insurance which is still very low. The findings show that the age of the individual, level of education, wealth index, marital status, region, religion, residence, and access to information were significant determinants of demand for private health insurance in Uganda.

Individuals with a higher wealth quintile were more likely to demand health insurance. Therefore, the poor are likely to be left out of any health insurance scheme. This is because majority of the poor are either unemployed or employed in substance farming and the informal sector or are less educated. Therefore, to improve the uptake of private health insurance, poverty reduction strategies are required in order to enhance the incomes of the poor and support the vulnerable groups who may not be able to purchase health insurance. As noted by Mathauer and Kutzin (2018), mandatory contribution or health insurance with government subsidisation of the vulnerable population is a necessary condition for attaining universal health coverage.

Also, Individuals with post-secondary education were more likely to have a health insurance cover compared to those without formal education. Individuals who had access to information through listening to radio, reading newspapers, and watching television were more likely to demand health insurance compared to those without access. It is, therefore, critical for government to provide education interventions in all regions to enhance the levels of awareness and access to information.

Acknowledgements

We thank participants of the PhD Seminars (work in progress presentation) who provided valuable comments to improve this study. We also greatly acknowledge the Uganda Bureau of Statistics for providing us with the 2016 UDHS data.

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