

Evaluating influence of customer and scheme qualities in selecting a medical scheme by using choice and loglinear modelling: Case of healthcare services in Zimbabwe

Desmond Mwembe (✉ desmwembe@gmail.com)

National University of Science and Technology

Harry J Khamis

Uppsala University

Brian Jones

National University of Science and Technology

Wilbert Chagwiza

EOH Information Services

Research

Keywords: Customer qualities, scheme qualities, multinomial, loglinear modelling

Posted Date: January 27th, 2020

DOI: <https://doi.org/10.21203/rs.2.21890/v1>

License:   This work is licensed under a Creative Commons Attribution 4.0 International License. [Read Full License](#)

Abstract

Background

Marketing of medical aid schemes in Zimbabwe after the hyperinflationary period before 2008 has been a mammoth task due to the loss of trust in insurance companies, medical aid companies included. Selecting an affordable scheme that best suits a client's needs is not easy due to the wide variety of medical schemes that are available.

Methods

Purposive sampling of people with medical aid schemes was conducted. Random sampling was done to select the sample from which information was obtained using questionnaires.

Results

A number of factors are considered to understand the behaviour of clients in this industry. Correspondingly, scheme characteristics are examined through a random sample of 1222 Zimbabwean medical aid society clients to understand preferences by clients in relation to the medical schemes. It was established that experience, contribution, sex, family size, employment, education and salary are the main drivers in selecting medical aid schemes. Age was found to be nonsignificant in influencing choice of a medical aid scheme. Type of scheme and quality were also seen to be independent and these two were highly associated with rejection.

Conclusion

It is recommended that, to ease the difficulty of selling medical aid schemes, client characteristics need to be understood so as to increase uptake of medical aid schemes in Zimbabwe. Choosing a low or high premium medical aid scheme is recommended to clients to reduce the rejection rate by medical practitioners, and hence improve access to healthcare services.

Introduction

As in many other developing countries, equity in access to health care has always been and still is a prominent goal of public policy in Zimbabwe. Many scholars have looked at choice of health providers [1] while this study concentrates on choice of medical schemes. In Zimbabwe there are over 30 companies licensed to operate medical aid societies after proving their commitment to paying claims in excess of 60 days to service providers [2].

A number of reports on Zimbabwe's health care services point to the deterioration of the health system [3]. This situation is worrisome, given the knock-on effects that poor health standards are bound to have on all macroeconomic variables and on the performance of Zimbabwe's economy. A case in point is, for instance, a report by USAID Zimbabwe (October, 2009) in which Zimbabwe's health care system was seen to be characterised by reduced accessibility by the general population to healthcare.

Health insurance coverage is generally low in Zimbabwe. According to the Zimbabwe demographic and health survey (2006), 91% of women do not have health insurance. Of the 9% that are covered, 4% have insurance through their employer, 3% are covered under a privately covered commercial plan and the remaining 2% are covered through some other mechanism.

It should be noted that the health insurance market survives on member participation. According to [4], the future of the health insurance market depends on policy interventions to balance supply side and demand side forces. Demand side

forces would naturally involve health insurance participation, and for credible policy interventions it is important that those factors affecting participation be established.

Establishing factors influencing clients' choice of a medical scheme cannot be studied without considering some other factors that are beyond the control of either the service provider or the client. Factors such as politics and price escalations, as indicated by [5], are beyond the control of the provider or the client of health insurance schemes. Clients have different characteristics that make their choice of a scheme differ [6]. These differences in characteristics and expectations of the clients and types of schemes make the choice of scheme a complex area of study.

Problem Statement And Rationale

Clients have to decide on a medical scheme that they anticipate will meet their health requirements. The choice of the scheme depends on a number of factors and their impact on finally settling for a given scheme. This choice is not an easy decision [7]. Clients differ in many different ways. They differ in terms of the resources they have, that is, financial resources and other assets that can easily be converted to money. They also differ in terms of their demographic characteristics, that is, age, health condition, sex and other aspects. Education of an individual, marital status and size of the family are influential in deciding the type of scheme to participate in.

The application of sophisticated scientific tools to investigate these behavioural influences on scheme selection is lacking. Therefore, in this paper we use multinomial logistic regression to investigate the effects of client attributes on the selection of a medical scheme. In addition, the loglinear model is used to analyse the structural associations among scheme choice, quality, and rejection. Each of these statistical models is a generalized linear model, the former using a logit link function and the latter using a logarithmic link function (see, [8], Chap. 4).

Aims

The two related aims of this study are to (i) explore the influence of customer characteristics on choice of a health medical aid scheme, and (ii) analyze the structural associations among the features of medical aid schemes.

Data Collection

Initially, purposive sampling was used to identify individuals with medical aid plans since information is held by these members of the population. After identification of the target population, simple random sampling was used to select individual participants in the survey. A questionnaire was designed and later used to collect data from clients from different medical aid companies in Zimbabwe. Interviews were conducted and most targeted people were the formally employed, such as the teachers, police officers and other clients from the private sector. Some of the questionnaires were sent out, which clients completed and sent back to the researcher. The response rate was 88%. Informally employed clients were also interviewed and these were found in their different variable points of operation. Questionnaires were left to be completed by these clients and were later collected. Most of the informally employed were found to be females.

Methods

With regard to the first study aim, the multinomial logistic regression is a linear regression analysis technique used when the dependent variable is discrete with more than two levels. [9] ascertained that when a dependent variable consists of several discrete categories the ordinary least squares estimator should not be used. Instead, a maximum likelihood estimator should be used. Logistic regression is used to predict the different outcomes of a categorically distributed dependent variable given a set of independent variables. In this model the discrete independent variables

are sex, family size, level of education, salary level, and employment status. There are three continuous predictors used in the model as well, age, experience, and contribution. The dependent variable has three levels, namely, low, medium, and high premium schemes.

With regard to the second study aim, the loglinear model is used to analyze and interpret structural associations among a set of discrete variables. It is used here to study the structural associations among the choice of scheme, quality of scheme, and rejection history of scheme. This analysis is adjusted for the effects of family size and salary level.

The technical details of both the multinomial logistic regression model and the loglinear model are given in the Appendix.

Results: Effects Of Client Characteristics On Scheme Choice

There were 1222 employed respondents from all over Zimbabwe who participated in this research. Of these, 49.3% were males and 50.7% were females. There were many types of schemes considered from different medical companies. Instead of using all different scheme types, three categories for classifying schemes were used. These were categorised into low premium schemes (contributing < USD \$30), medium premium schemes (USD \$30 to \$50) and high premium schemes (> USD \$50). This is generally the 20% of the client's monthly salary excluding 80% contribution by the employer for the formally employed. For the informally employed, it is the total contribution from the client.

Several independent variables were considered in modelling the choice of scheme by an individual. The characteristics considered in this study are sex, age, education, employment status, salary received, family size, monthly contribution (premium) and experience of an individual in his or her workplace.

The three schemes considered show that the most popular category was medium premium scheme (47.6%) in different medical aid companies. This was followed by high premium schemes (29.1%) and lastly low premium schemes (23.3%). In terms of gender, about the same percentage of females and males participated in the survey, 50.7% males and 49.3% females. Family size was also of interest to establish its effect on choice of scheme. It was found that 55.8% of the respondents had families of fewer than seven members.

Employment was also seen as a possible characteristic that influences choice of a medical aid scheme. In Zimbabwe, some people are self-employed (informally employed) while others are employed by the government or registered companies (formally employed), as in any other country. In Nigeria, [10] studied factors influencing choice and satisfaction of schemes under employer-based and private schemes. Similarly, in Zimbabwe schemes can be either private or employer-based. In this study, 87.1% of the respondents used employer-based schemes while the minority 12.9% used private schemes.

Education was one of the respondents' characteristics assumed to have an effect on choice of medical aid scheme, as was also found in previous studies by [11]. There are two education categories in which the respondents could fall. Either a respondent had not gone beyond secondary education or he/she had undertaken tertiary education. In the study, 19.3% had attained education up to secondary level and 80.7% had gone through tertiary institutions. Similar to [12] study, the current research established that choice of plan was influenced by education. Clients with higher education tended to choose high premium schemes rather than low premium schemes.

Choice of a scheme is also assumed to be highly influenced by one's salary. Figure 1 below shows the three categories of income the respondents received every month for those who were formally employed. Those who were not formally

employed estimated the amount they raised as income during the month.

Finally, contribution and experience of an individual were also assessed in terms of how they influence choice of a medical scheme.

The results of a multinomial logistic regression analysis of the data are now presented. First, a test for the presence of multicollinearity among the independent variables is carried out as multicollinearity can severely obscure the results of the analysis. A commonly used measure of the strength of the interrelationships among the independent variables is the Variance Inflation Factor (VIF) (indicating the inflation of the standard errors that could be caused by collinearity). If the VIF exceeds 10 then multicollinearity is indicated, [13]. In this study, the highest VIF among the independent variables is 2.66, thus signalling an absence of multicollinearity. Thus, the results of the logistic regression can be regarded as reliable.

The multinomial logistic regression model describes the overall relationship between the dependent variable and the explanatory variables. This relationship is tested at the 5% level of significance of the final model using the chi-squared test. The chi-squared analysis is a useful and relatively flexible tool for analysing categorical response variables. A *p-value* less than 0.05 reflects a statistically significant relationship that exists between the independent and dependent variables.

A multivariate logistic regression analysis is conducted to determine the overall relationship between:

(i) the independent variables, experience, contribution, gender, family size, employment, education, age, and salary,

and

(ii) the three-level dependent variable, premium scheme (low, medium, high).

Table 1: Goodness-of-Fit

| | Chi-Square | df | Sig. |
|----------|------------|-----|------|
| Pearson | 2219.946 | 374 | .000 |
| Deviance | 1325.161 | 374 | .000 |

The p-values for both the Pearson and deviance statistics from Table 1 of the logistic regression analysis results in $p < 0.001$, thus showing a statistically significant relationship between the independent variables and the three-level dependent variable.

In testing the independent variables separately for a relationship with the dependent variable, the likelihood ratio test provides the results in Table 2.

Table 2: Likelihood Ratio Tests

| Effect | Model Fitting Criteria | Likelihood Ratio Tests | | |
|--------------|------------------------------------|------------------------|----|------|
| | -2 Log Likelihood of Reduced Model | Chi-Square | df | Sig. |
| Intercept | 1325.161 | .000 | 0 | . |
| Experience | 1342.558 | 17.397 | 2 | .000 |
| Contribution | 1372.081 | 46.921 | 2 | .000 |
| Gender | 1409.099 | 83.939 | 2 | .000 |
| Familysize | 1579.412 | 254.251 | 2 | .000 |
| Employment | 1484.438 | 159.277 | 2 | .000 |
| Education | 1537.477 | 212.317 | 2 | .000 |
| Salary | 1482.264 | 157.104 | 4 | .000 |
| Age | 1325.161 | 3.319 | 4 | .506 |

The chi-square statistic is the difference in -2 log-likelihoods between the final model and a reduced model. The reduced model is formed by omitting an effect from the final model. The null hypothesis is that all parameters of that effect are 0.

It can be seen from Table 2 that experience, contribution, sex, family size, employment, education, and salary are highly statistically significant in influencing choice of a medical aid scheme. Age is found to be statistically nonsignificant in influencing choice of a medical aid scheme (P = 0.506).

Table 3 provides the estimated odds of choosing either a low or medium premium scheme as compared to a high premium scheme given the characteristics of an individual. Results will be presented for each case (low versus high premium schemes and medium versus high premium schemes) separately. The results for the effect of each independent variable on the odds of a given scheme are conditional on all other predictors being fixed (“*ceteris paribus*”).

Low versus high premium scores

Experience: the odds ratio corresponding to a one-unit increase in experience is 1.11. This implies that for a one year increase in experience the odds of having a high premium scheme (compared to a low premium scheme) go up 11%.

Contribution: the odds ratio corresponding to a one-unit increase in contribution is 1.06. This implies that for a one dollar increase in contribution the odds of having a high premium scheme (compared to a low premium scheme) go up 10.6%.

Gender: the odds that a female client selects a low premium scheme (rather than a high premium scheme) are 43.4 times that of a male client. This indicates that females are more likely to select a low premium scheme as compared to their male counterparts. As in previous research by [14, 15], choice of a plan is dependent on the gender of the person selecting the plan.

Family Size: the odds that a respondent with a small family (6 members) selects a high premium scheme (rather than a low premium scheme) are 138.4 times that of a respondent with a large family (> 6 members).

Employment: the odds that a respondent who is formally employed has a high premium scheme (compared to a low premium scheme) are 206.4 times that of an informally employed client.

Education: the odds that a client who has gone beyond secondary education (tertiary) has a high premium scheme (rather than a low premium scheme) are 43.5 times that of a client who attained up to secondary education. This indicates that as one attains more education, one has higher odds of selecting a high premium scheme. This is consistent with previous research findings by [16].

Salary: the odds that clients with salary less than \$500 have a high premium scheme (rather than a low premium scheme) are 38.1 times that of clients with salary above \$1000. The odds that clients with salary between \$500 and \$1000 have a high premium scheme (compared to a low premium scheme) does not differ significantly from that of clients with salary above \$1000 ($P = 0.628$). That is, low salary clients tend to select high premium schemes proportionately more often than high salary clients, but medium and high salary clients tend to select high premium schemes at about the same rate.

Age: was found to be nonsignificant influencing choice of a medical scheme ($p > 0.05$). This implies that choice of medical scheme was independent of client's age.

Medium versus high premium schemes

Experience: the odds ratio corresponding to a one-unit increase in experience is 1.106. This implies that for a one year increase in experience the odds of having a high premium scheme (compared to a medium premium scheme) go up 6%.

Contribution: the odds ratio corresponding to a one-unit increase in contribution is 1.05. This implies that for a one dollar increase in contribution the odds of having a high premium scheme (compared to a medium premium scheme) go up 5%.

Gender: the odds that a female client selects a medium premium scheme (rather than a high premium scheme) are 3.2 times that of a male client. This indicates that females are more likely to prefer a medium premium scheme as compared to their male counterparts.

Family Size: the odds that a respondent with a small family (6 members) has a high premium scheme (rather than a medium premium scheme) are 11.2 times that of a respondent with a large family (> 6 members).

Employment: the odds that a respondent who is formally employed has a high premium scheme (compared to a medium premium scheme) are 3.0 times that of an informally employed client.

Education: the odds that a client who has gone beyond secondary education (tertiary) has a high premium scheme (rather than a medium premium scheme) are not statistically significantly different than a client who attained up to secondary education ($p = 0.245$).

Salary: the odds that clients with salary less than \$500 have a high premium scheme (rather than a medium premium scheme) are 4.0 times that of clients with salary above \$1 000. However, the odds that clients with salary between \$500 and \$1,000 have a high premium scheme (rather than a medium premium scheme) are 0.4 times that of clients with salary above \$1 000. Thus, interestingly, low salary clients select the high premium scheme rather than the medium premium scheme proportionately more often than high salary clients, but medium salary clients do so proportionately less often.

As a summary of the above results, the following types of clients tend to select the high premium scheme (compared to the low premium scheme):

- those with increased experience
- those with increased contribution
- males
- those with small families
- those who are formally employed
- those with higher education
- those with lower salaries.

The same comparisons are seen for the comparison between high and medium premium schemes, except with respect to education and salary. The odds of selecting a high premium scheme (compared to a medium premium scheme) are about the same for the higher educated clients as for the lower educated clients. The odds that low salary clients select the high premium scheme (compared to the medium premium scheme) are four times that of high salary clients. But the odds that medium salary clients select the high premium scheme (compared to the medium premium scheme) are 0.4 times that of high salary clients. Age was nonsignificant in the choice of medical schemes.

Table 3: Parameter Estimates

| Scheme ^a | Client characteristic | B | Std. Error | Wald | df | Sig. | Exp(B) | 95% Confidence Interval for Exp(B) | |
|--|-----------------------|---------|------------|---------|----|------|---------|------------------------------------|-------------|
| | | | | | | | | Lower Bound | Upper Bound |
| Low Premium | Experience | .105 | .052 | 4.174 | 1 | .041 | 1.111 | 1.004 | 1.229 |
| | Contribution | .101 | .026 | 14.520 | 1 | .000 | 1.106 | 1.050 | 1.165 |
| | Gender(F) | 3.770 | .760 | 24.597 | 1 | .000 | 43.372 | 9.777 | 192.406 |
| | Family size(>6) | 4.930 | .714 | 47.726 | 1 | .000 | 138.432 | 34.179 | 560.688 |
| | Employment(I) | 5.330 | 1.082 | 24.279 | 1 | .000 | 206.418 | 24.775 | 1.720E3 |
| | Education(>S) | -3.755 | .889 | 17.829 | 1 | .000 | .023 | .004 | .134 |
| | Salary | | | 34.679 | 2 | .000 | | | |
| | Salary(<\$500) | -3.639 | 0.924 | 18.640 | 1 | .006 | .026 | .004 | .161 |
| | Salary(\$500-\$1000) | -.630 | 1.300 | .235 | 1 | .628 | .532 | .042 | 6.808 |
| | Age | | | 6.534 | 2 | .038 | | | |
| | Age(<30) | -.432 | .632 | .468 | 1 | .494 | .649 | .188 | 2.239 |
| | Age(30-50) | 1.164 | .632 | 3.390 | 1 | .066 | 3.202 | .928 | 11.053 |
| | Constant | -15.973 | 2.775 | 33.126 | 1 | .000 | .000 | | |
| Medium Premium | Experience | .061 | .016 | 14.518 | 1 | .000 | 1.063 | 1.030 | 1.096 |
| | Contribution | .053 | .010 | 29.994 | 1 | .000 | 1.054 | 1.034 | 1.074 |
| | Gender(F) | 1.162 | .185 | 39.631 | 1 | .000 | 3.197 | 2.226 | 4.590 |
| | Family size(> 6) | 2.420 | .228 | 112.810 | 1 | .000 | 11.242 | 7.193 | 17.569 |
| | Employment(I) | 1.110 | .550 | 4.074 | 1 | .044 | 3.034 | 1.033 | 8.915 |
| | Education(>S) | -.431 | .371 | 1.349 | 1 | .245 | .650 | .314 | 1.345 |
| | Salary | | | 109.675 | 2 | .000 | | | |
| | Salary(<\$500) | -1.397 | .319 | 19.235 | 1 | .000 | .247 | .132 | .462 |
| | Salary(\$500-\$1000) | .831 | .347 | 5.728 | 1 | .017 | 2.296 | 1.163 | 4.532 |
| | Age | | | .270 | 2 | .874 | | | |
| | Age(<30) | .070 | .224 | .099 | 1 | .753 | 1.073 | .692 | 1.663 |
| | Age(30-50) | -.039 | .213 | .033 | 1 | .856 | .962 | .633 | 1.461 |
| | Constant | -8.084 | .940 | 73.922 | 1 | .000 | .000 | | |
| a. The reference category is: High Premium | | | | | | | | | |

B= coefficient of the independent variable.

Exp(B) = e^(B) = odds ratio corresponding to the independent variable.

Gender(F) = Females with reference to males.

Familysize(>6) = family with more than 6 members.

Employment(I)= Informally employed.

Education(>S) = beyond secondary education (Tertiary education)

Results: Analysis Of Scheme Characteristics

Three types of schemes are under study. These are low, medium, and high premium schemes. These schemes rate differently in terms of affordability, adequacy and acceptability by medical practitioners. A scheme that is of “good” quality is deemed to be affordable, adequate and acceptable to the majority of the medical practitioners. Schemes, irrespective of their type and quality, can be rejected by medical practitioners depending on other factors such as promptness of the medical company offering the scheme in paying the medical practitioner. This leads to rejection of schemes regardless of whether they are of low, medium or high premium and whether or not they are affordable, adequate or acceptable by some practitioners. Quality of schemes was grouped under affordability, adequacy and acceptability by the medical practitioners. Clients usually go for schemes with higher quality [17, 18].

A scheme can be affordable but if it is not adequate and is frequently rejected, then it does not accomplish its purpose. Similarly, an expensive (not affordable) and rarely rejected scheme has few members belonging to it. This implies that very few people will have access to medical services. This shows that the three qualities are vital in choosing a medical scheme.

Participation rates among the scheme levels are statistically not the same ($p = 0.000$). There are more participants in the medium premium scheme as compared to the other two schemes. As outlined in Table 4, in general, the medium premium scheme has 47.6% of the participants, the high premium scheme has 29.1% of the participants, and the low premium scheme has 23.3% of the participants. This shows that there are fewer participants in the high premium scheme than in the medium premium scheme and this has an impact on access to medical services in Zimbabwe.

Table 4
Number of participants per scheme

| Scheme type | Frequency | Percent | Cumulative Percent |
|----------------|-----------|---------|--------------------|
| Low Premium | 285 | 23.3 | 23.3 |
| Medium premium | 582 | 47.6 | 70.9 |
| High premium | 355 | 29.1 | 100.0 |
| Total | 1222 | 100.0 | |

Table 5 indicates that the quality domains are not statistically different from each other

($p = 0.4724$). Clients preferred the schemes without putting different emphases on the three quality characteristics. As will be shown below, the association between scheme and quality is not statistically significant ($p = 0.661$). This means that schemes were chosen irrespective of whether they are affordable, adequate or acceptable to medical practitioners. This could be due to what Zimbabweans went through before the dollarization era. People lost trust in medical aid companies and insurance companies, for they lost all they had saved before the dollarization of the economy in 2009.

Table 5
Quality preferences of participants

| Quality indicator | Frequency | Percent | Cumulative Percent |
|-------------------|-----------|---------|--------------------|
| Affordability | 407 | 33.3 | 33.3 |
| Adequacy | 425 | 34.8 | 68.1 |
| Acceptability | 390 | 31.9 | 100.0 |
| Total | 1222 | 100.0 | |

With regard to rejection, 37.1% of the schemes were rejected and 62.9% of the schemes were not rejected by medical practitioners. It is found that the rejection rate of the medium premium scheme (42.3%) is different from the low premium scheme (33.3%) and the high premium scheme (31.5%), $p = 0.000$ for both. The rejection rate of the low premium scheme is comparable to that of the high premium scheme ($p = 0.342$).

A deeper analysis of these relationships can be obtained with the loglinear model. The structural associations among scheme, quality, and rejection are analysed after adjusting for the effects of salary and family size. This leads to the loglinear model analysis of a five-way $3 \times 2 \times 2 \times 3 \times 2$ contingency table. The best-fitting loglinear model is obtained through a backward elimination model selection procedure (see, e.g., [8], Chap. 10). The best-fitting loglinear model thus obtained reveals that scheme choice is independent of quality conditional on family size, salary, and rejection. According to the collapsibility theorem (see, e.g., [8], Chap. 10 or [19], Chap. 5) we may collapse over the quality variable and re-run the loglinear model analysis on the resulting 4-way marginal table. The results of this analysis reveal that:

- (i) scheme choice is directly associated with rejection, and
- (ii) scheme choice is associated with salary, but the scheme-salary association is different for the two different family sizes.

These two structural association patterns are quantified as follows.

- (i) The rejection-scheme two-way contingency table is given below in Table 6.

Table 6: 2 x 3 contingency table for REJECTION by SCHEME PREMIUM (column percentages are in parentheses)

SCHEME PREMIUM

| REJECTION | Low | Medium | High |
|-----------|----------------|----------------|----------------|
| No | 190 (66.7%) | 336 (57.7%) | 243 (68.5%) |
| Yes | 95 (33.3%) | 246 (42.3%) | 112 (31.5%) |

A comparison of the column percentages reveals that the risk of rejection is higher for the medium premium scheme than for either of the other two schemes ($p = 0.0003$). The rejection rate is comparable for Low and High premium

schemes ($p = 0.6316$). This deviates from the common belief that low premium schemes are most frequently rejected and high premium schemes are less frequently rejected. This result may be due to the fact that, in Zimbabwe, rejection depends on how promptly the medical aid company pays irrespective of whether is a high or low premium scheme. A low premium scheme from a company that pays promptly can be preferred by a medical practitioner over a high premium scheme from a company that delays.

(ii) The scheme-salary two-way tables for each family size are given below in table 7.

In each 3 x 3 table given in table 7, the association between salary and scheme is statistically significant ($p < 0.001$ in each case), and is negative. This is basically due to the fact that with increased salary, clients feel that they can afford to cover medical costs themselves and hence are willing to risk a lower level of coverage. In fact, the test for linear trend in each case is statistically significant ($p < 0.000$ in each case; Mantel-Haenszel chi-squared test for linear trend; [8], chapter 3). However, the linear trend component is statistically significantly stronger for small families than for large families (the observed chi-squared statistic values are 82.7 and 35.0, respectively, each based on one degree of freedom).

Table 7: 3 x 3 contingency tables for SALARY by SCHEME PREMIUM for each FAMILY SIZE (column percentages are in parentheses)

SMALL FAMILY SIZE

SCHEME PREMIUM

| SALARY (Column Percentage) | Low | Medium | High |
|--------------------------------------|---------------|----------------|----------------|
| ≤ \$500 | 19 (37.3%) | 123 (39.4%) | 252 (79.0%) |
| \$500 - \$1000 | 14 (27.5%) | 159 (51.0%) | 43 (13.5%) |
| > \$1000 | 18 (35.3%) | 30 (9.6%) | 24 (13.5%) |

LARGE FAMILY SIZE

SCHEME PREMIUM

| SALARY (Column Percentage) | Low | Medium | High |
|--------------------------------------|----------------|----------------|--------------|
| ≤ \$500 | 96 (41.0%) | 148 (54.8%) | 36 (100%) |
| \$500 - \$1000 | 102 (43.6%) | 98 (36.3%) | 0 (0%) |
| > \$1000 | 36 (15.4%) | 24 (8.9%) | 0 (0%) |

From the column percentages it can be seen that the linear relationship is negative, i.e., generally the highest column percentage among the three schemes is for the higher salary among low premium scheme clients, medium salary among medium premium scheme clients, and low salary among the high premium scheme clients.

That is, as salary goes up, the level of premium scheme goes down. This conclusion is consistent with the logistic regression results presented above. The added information provided by the loglinear model analysis is that this linear relationship is stronger among small families than among large families.

Discussion Of Results

The research results show that, just as [20, 21, 22] also found, experience, contribution, sex, family size, employment, education and salary are significant in influencing choice of a medical aid scheme, although age was found to be statistically nonsignificant in influencing choice of a medical aid scheme. This is possibly due to the fact that clients had no trust in medical aid providers because of what had happened in Zimbabwe before the dollarization era.

If a low premium scheme is taken, more disposable income is realised but once sickness occurs, access to medical care is endangered. Most of the clients were using employer-based medical schemes compared to private medical aid schemes, which is consistent with what [23] found in Nigeria. This is due to the expensive nature of private schemes in Zimbabwe. The advantage of employer-based schemes is that of being partially paid by the employer unlike private schemes where the whole amount is paid by the client.

Analysis shows that as clients acquire more education, as was found by [24], a move to high premium schemes (compared to low premium schemes) is more likely. This is possibly due to the fact that clients are more informed about the schemes and understand the advantages of having high premium schemes over low premium schemes. Income was found to be significant in influencing choice of a medical aid scheme.

Surprisingly in the Zimbabwean medical aid companies, clients with low income are more likely to be in high premium schemes (compared to low premium schemes) than high income clients. Clients with medium income are more likely to be in a medium premium scheme (compared to a high premium scheme) than high income clients. These results contradict [25, 26], whose findings show that as salary increases, the propensity to be in a higher premium scheme also increases. This is possibly due to reasons outlined above of preference of low coverage since clients are in a position to pay for their medical bills. This could also be due to the fact that clients lost money in insurance industry during the dollarization era. This discourages clients from investing more money in the industry in fear of history repeating itself.

This study shows that with increased experience or contribution, there is increased likelihood of being in a high premium scheme.

It is also established that families with few dependants or small family size prefer high premium schemes, this is in line with what [27] found in their research that large family sizes find affordability of full insurance a burden. This is influenced by the fact that small families have low expenditure and have extra income to invest in health. Unlike in large families, where more money is spent on other necessities like education, food and accommodation, this reduces their capacity to put more money into medical aid coverage.

In general, males prefer high premium schemes more than females. Women's investment in medical schemes, as also established by [28] in Zambia, is minimal. This may be due to the females relying on their husbands' medical schemes. If the husband has a scheme, a woman becoming well insured will be unlikely and hence they go for cheaper schemes to allow more income for other provisions for the family. This is in agreement with what [20] found out in Nigeria: women are less likely to participate in insurance.

Surprisingly, age was found to be nonsignificant in influencing choice of a medical aid scheme (p -value = 0.506). The initial assumption was that as people grow older, more ailments are likely and hence older people are more likely to choose high premium schemes, which are more adequate and better accepted, than young people. The reason for such a result could be, as people say, experience is the best teacher. Most Zimbabweans lost a lot of money in insurance during the hyperinflationary era. The trust in insurance companies had declined and hence the choice of a medical aid scheme did not vary according to age.

Further analysis focused on the association among the three discrete variables rejection, quality, and scheme after adjusting for family size and salary.

There is a statistically significant direct association between scheme type and rejection. The rejection rates among scheme levels are not comparable for the three schemes. The rejection rate is significantly higher for the medium premium scheme than for the low or high premium schemes (the latter two do not differ significantly). The rejection is high in medium premium schemes because clients have a belief of accessing better healthcare facilities for an extra charge, while the scheme does not cover these more expensive services. Because the medium premium scheme is the most popular (almost half of participants fall into this scheme), this has an implication for the inability to access healthcare even though you have a will to participate in health insurance, just as [29] found in Kenya.

There is a statistically significant association between quality and rejection ($p < 0.000$; data not shown). Research findings show that the rejection rate is comparable for adequate and acceptable quality characteristics (p -value = 0.721), but it is significantly higher for the affordable quality characteristic. Rejection is high among affordable schemes due to the fact that there is low premium paid towards these schemes. In previous research, [30] found that coverage with basic health insurance declined steeply with the premium contribution at low contribution levels. This means medical practitioners are reluctant to take such schemes for they will not cover the charges made by doctors. On the other hand, adequate and acceptable schemes are generally high in terms of premium. This implies that a scheme that is adequate and acceptable is likely to be more expensive than the affordable scheme. This means medical practitioners are more likely to accept the scheme as compared to just an affordable scheme. As stated by [31], quality of medical schemes from the clients' perspective is becoming increasingly more important in recent research as it has an implication on accessing health services.

Conclusion And Recommendations

Most of the factors analysed in this study were found to be significant in influencing choice of a medical aid scheme in Zimbabwe. Age was the only characteristic of clients that was statistically nonsignificant in influencing choice of a medical aid scheme. Generally, as education, contribution and experience increases, the inclination for higher premium schemes (compared to a low premium scheme) also increases. Small families are more likely to take high premium schemes as compared to families of more than six members. As salary increased, the inclination for high premium schemes decreased and this was more pronounced in small families than in large families.

Most of the clients in Zimbabwe are on employer-based schemes as compared to private schemes and males prefer high premium schemes more than their female counterparts. In terms of scheme characteristics, it was noted that scheme and quality are conditionally independent of each other while rejection was dependent on scheme type and quality of the scheme. Rejection was greater in medium premium schemes than in low and high premium schemes.

It is recommended that when approaching clients to advertise the medical schemes, characteristics of clients should be understood. Subdividing the population or clients into homogeneous sections could help improve the uptake of medical schemes.

In terms of rejection rate, clients should choose a low or high premium scheme where the rejection rate is 32%, instead of the medium premium scheme where the rejection rate is 42%. Choosing a plan that has a lower rejection rate increases clients' access to health care.

Declarations

Ethics approval and consent to participate

There were no ethical considerations and formal consent needed to participate in the research.

Consent for publication

All research participants agreed to the work being submitted for publication.

Availability of data and material

You can contact authors to enquire on the availability of the data and tools used in capturing of data.

Competing interests

There are no competing interests that authors are aware of.

Funding

None

Authors' contributions

DM is the PhD student who conceived the idea, collected data and wrote the first draft. HJK gave the critical analysis of the methodology. BJ and WC are PhD supervisors. All authors reviewed and agreed to the final draft.

Acknowledgements

Authors would want to thank participants for providing information which made the research a success.

References

1. Halasa, Y and Nandakumar, A.K., (2009), Factors determining choice of health care provider in Jordan, *Eastern Mediterranean Health Journal*, 15 (4): 959-968.
2. Shamu, S., Loewenson, R., Machedmedze, R and Mabika, A (2010), Capital flows through Medical Aid Societies in Zimbabwe's health sector, *EQUINET Discussion Paper Series 82*. Training and Research Support Centre, SEATINI, Rhodes University, EQUINET: Harare
3. Zimbabwe Demographic and Health Survey. 2005-2006. Calverton, Maryland: CSO and Macro International Inc, 1-467.
4. Buntin, M.B., Damberg, C., Haviland, A., Kapur, K., Lurie, N., McDevitt, R., and Marquis, S.M. (2006), Consumer-directed health care: early evidence about effects on cost and quality, *Health affairs*, 25 (1): 516-530.
5. Alhassan RK, Nketiah-Amponsah E, Arhinful DK (2016) A Review of the National Health Insurance Scheme in Ghana: What Are the Sustainability Threats and Prospects? *PLoS ONE* 11(11): e0165151. <https://doi.org/10.1371/journal.pone.0165151>
6. Harris, K. M., & Keane, M. P. (1999). A model of health plan choice: Inferring preferences and perceptions from a combination of revealed preference and attitudinal data. *Journal of Econometrics*, 88(1/2), 131-157.
7. Caroline C., and Town R., (2008). "Adverse Selection, Welfare and Optimal Pricing of Employer-Sponsored Health Plans." Unpublished
8. Agresti, A. (2013). *Categorical Data Analysis*, third edition. John Wiley & Sons.
9. Kwak, C and Clayton-Matthews, A. (2002), Multinomial logistic regression, *Nursing research methods*, 51(6):404-410.
10. Uchendu, O.C., Ilesanmi, O.S. and Olumide, A.E. (2013), Factors influencing the choice of health care providing facility among workers in a local government secretariat in South Western Nigeria, *Annals of Ibadan Postgraduate Medicine*, 11 (2): 87-95.
11. Hibbard, J.H., and Jewett, J.J. (1995), Using Report Cards to Inform and Empower: Consumer understanding of Quality of Care Information. Paper presented at Annual meeting of American Public Health Association, San Diego, CA. October 1995.
12. Schur, C.L and Berk, M.L (1998), Choice of Health Plan: Implications for Access and Satisfaction, *Health care financing review*, 20(1): 29-43
13. Myers R.H. (1990), *Classical and Modern Regression With Applications*, Second Edition, PWS-Kent Publishing Co., Boston, MA., 1990, page 369.
14. Tumlinson, A., Bottigheimer, H., Mahoney, P., Stone, E. M., & Hendricks, A. (1997). Choosing a health plan: What information do consumers use? *Health Affairs*, 16, 229-238.
15. Kolstad, J.T., Chernew, M.E. (2009). Quality and Consumer Decision Making in the Market for Health Insurance and Health Care Services. *Med Care Res Rev.*, 66, 28S-52S.
16. Mukamel, D. B., Weimer, D. L., Zwanziger, J., Gorthy, S. H., & Mushlin, A. I. (2004). Quality report cards, selection of cardiac surgeons, and racial disparities: A study of the publication of the New York State cardiac surgery reports. *Inquiry-Excellus Health Plan*, 41, 435-446.
17. Jin, G. Z., and Sorensen, A. T. (2006). Information and consumer choice: The value of publicized health plan ratings. *Journal of Health Economics*, 25, 248-275.

18. Dafny, L., and Dranove, D. (2005). *Do report cards tell people anything they don't already know?The case of Medicare HMOs* (Working Paper No. 11420). Cambridge, MA: NBER.
19. Khamis, H. J. (2011). *The Association Graph and the Multigraph for Loglinear Models*. SAGE, Quantitative Applications in the Social Sciences, 167.
20. Aregbeshola, B.S and Khan S.M (2018), Predictors of enrolment in the National Health Insurance Scheme among women of reproductive age in Nigeria. *International Journal of Health Policy and Management*.7(11):1015–1023. doi:10.15171/ijhpm.2018.68
21. Kiplagat, I., Muriithi, M and Kioko, U (2013), Determinants of health insurance choice in Kenya, *European Scientific Journal*, 9(13):452-468.
22. Kirigia, J.M., Sambo, L.G., Nganda, B., Mwabu, G.M., Chatora, R and Mwase, T(2005), Determinants of health insurance ownership among South African women. *BMC Health Services Research*,5(1):17. doi:10.1186/1472-6963-5-17
23. Kimani, J.K., Ettarh, R., Kyobutungi, C., Mberu, B and Muindi, K.(2012), Determinants for participation in a public health insurance program among residents of urban slums in Nairobi, Kenya: results from a cross-sectional survey. *BMC Health Serv Res*. 12:66. doi:10.1186/1472-6963-12-66
24. Abraham, J. M., Feldman, R., Carlin, C., & Christianson, J. (2006). The effect of quality information on consumer health plan switching: Evidence from the Buyers Health Care Action Group. *Journal of Health Economics*, 25, 762-781.
25. Asenso-Okyere, W.K., Osei-Akoto, I., Anum ,A and Appiah, E.N (1997), Willingness to pay for health insurance in a developing economy. A pilot study of the informal sector of Ghana using contingent valuation, *Health Policy*, 42(3):223-37.
26. Willie, M.M (2011), Preferences and Selection of Health Plans by members of an employer- based medical scheme, *American Journal of Tropical Medicine and Public health*, 1(3): 117-129.
27. Kusi, A., Enemark, U., Hansen, K.S and Asante, F.A. (2015), Refusal to enrol in Ghana's national health insurance scheme: is affordability the problem? *International journal for equity in health*, 14:2
28. Mulenga J.N., Bwalya, B.B., Gebremeskel Y. (2017), Demographic and Socio-economic determinants of maternal health insurance coverage in Zambia. *Epidemiol Biostat Public Health*. 2017;14(1):e12094-1- e12094-9. doi:10.2427/12094
29. Mathauer, I., Schmidt, J.O. and Wenyaa, M.(2008), Extending social health insurance to the informal sector in Kenya. An assessment of factors affecting demand, *International Journal of Health Plann Manage*, 23(1):51-68. doi:10.1002/hpm.914
30. Barnighausen, T., Liu, Y., Zhang, X and Sauerborn, R (2007), Willingness to pay for social health insurance among informal sector workers in Wuhan, China: a contingent valuation study, *BMC Health services Research*, 7:114
31. Devadasan, N.,Criel, B., Van Damme, W., Lefevre, P.,Manoharan, S and Van der Stuyft, P (2011), Community health insurance schemes & patient satisfaction - evidence from India, *Indian Journal of Medical Research*, 133(1): 40–49.
32. Feldman, R., M. Finch, B. Dowd, and S. Cassou, (1989), "The Demand for Employment-based Health Insurance Plans." *Journal of Human Resources*, 1989, 24(1):117-42.

Figures

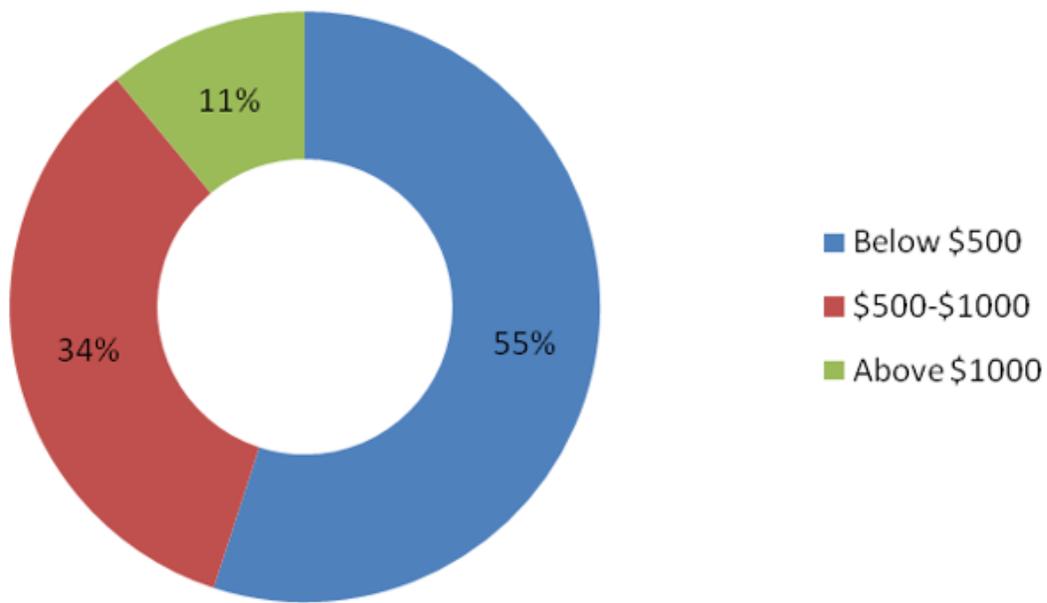


Figure 2

Income categories of formally employed respondents

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [APPENDIX.pdf](#)
- [APPENDIX.pdf](#)