



Whether or not to enroll, and stay enrolled? A Tanzanian cross-sectional study on voluntary health insurance



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ABSTRACT

Lower-middle income countries (LMICs) have invested significant effort into expanding insurance coverage as a means of improving access to health care. However, it has proven challenging to fulfill these ambitions. This study investigates to what extent variables associated with the enrollment decision (stay never-insured or enroll) differ from variables associated with the dropout decision (stay insured or drop out). A cross-sectional survey that included 722 households from rural districts in Tanzania was conducted and multinomial logistic regressions were performed to determine the associations between independent variables and membership status (never-insured, dropouts, or currently insured). Both the decision to enrollment and the decision to drop out were significantly associated with the presence of chronic disease and perceptions about the quality of services provided, insurance scheme management, and traditional healers. The effect of other variables, such as age, gender and educational level of the household head, household income, and perceptions about premium affordability and benefit-premium ratios, varied across the two groups. To improve voluntary health insurance coverage, policymakers must simultaneously increase the enrollment rate among the never-insured and reduce the dropout rate among the insured. Our conclusions suggest that policies to increase insurance scheme enrollment rates should differ for the two uninsured groups.

1. Introduction

Health financing mechanisms in lower-middle income countries (LMICs) are insufficient since out-of-pocket payments (OOPs) relative to income are high [1,2]. On average, OOPs constitute about 40 % of the total health expenditure in LMICs which is high compared to higher-income countries [3]. One way of protecting households from OOPs in LMICs has been the implementation of voluntary insurance schemes known as community-based health insurance (CBHIs) [4–6]. Such non-profit schemes, primarily targeting rural and informal sectors, are typically subsidized by governments and premiums are set independent of ability to pay and individual health risks [7,8].

CBHIs are often characterized by low coverage rates due to low enrollment rates (recruitment rates) in combination with high and fluctuating dropout rates. In Senegal, Uganda and Nigeria, coverage has remained low over time [9–11], while in Ethiopia coverage has declined from 48 % (2013) to 36 % (2017) [12]. In Uganda the dropout rate was 25 % in 2021 [13]; in Burkina Faso the rate varied

between 31 and 46 % in the period 2005–2006 [14] while in Ghana it varied between 35 and 53 % in the period 2015–2016 [15,16]. In view of this, it is of interest to understand what mechanisms are important for households choosing to stay without health insurance to be able to launch effective policies.

The Tanzanian CBHI scheme, known as the Community Health Fund (CHF), was introduced in 1996 to improve access to primary care services for people working in informal sectors and those residing in rural areas. However, the enrollment rate has remained low (below 10 %) despite concerted governmental efforts to promote the scheme [8,17–19]. In 2011, the government reformed the scheme by introducing an “improved Community Health Fund” (iCHF). The iCHF was introduced as a pilot in the Dodoma region and five additional regions (Shinyanga, Singida, Arusha, Manyara and Kilimanjaro). Since then, the scheme has been gradually extended to other regions of Tanzania. By 2019, it had been introduced into 19 of Tanzania's 31 regions. In 2016 the iCHF enrollment rate was 9.2 % [20] while in 2013 the dropout rate was 7.3 % [21].

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The reforms included the introduction of a uniform annual premium for all rural districts of TZS 30,000 (\$ 15) per household of six members (households larger than six may opt to form two separate households). The premiums, however, are higher in urban areas: in Dar es Salaam the premium amounts to TZS 150,000 (\$ 65) per household of six members [22]. Households pay the premium annually and are free to renew the membership or drop out when the membership period expires. In general, there are no premium exemptions; however, children younger than 5 years, pregnant women and elderly people (60+ years), independent of membership status, do not pay co-payments for visits at public health facilities. Additional iCHF reforms included (i) additional scheme benefits such as X-rays, ultrasounds, and some in-patient services; (ii) the facilitation of the registration process by appointing enrollment officers at the village level (close to the community) and by making it possible to use mobile phones for registration and membership renewal; and (iii) improvement of the regional hospital referral systems [19,22,23].

Several studies have explored factors that influence enrollment decisions and/or willingness to pay for insurance. A systematic review by Nosratnejad et al. [24] that included 18 quantitative studies in LMICs published between 2003 and 2013 concluded that low-income levels, poor provider quality, and low levels of trust are factors that affect enrollment negatively. A systematic review by Dror et al. [25] that included 42 studies (36 quantitative and 6 mixed methods) mainly from sub-Saharan Africa and Asia found that enrollment was positively associated with household income, education, age, household size, gender, and chronic illness episodes. Recent studies have confirmed that perception variables are important in explaining enrollment decisions in LMICs [26–28]. In addition, there are experimental studies that examine the impact of various interventions on the adoption of CBHIs. Interventions that have been analyzed are premium subsidies and premium costs [29–33], more intensive information campaigns [30,31,34], registration assistance [29,30], enrollment locations [32], and the possibility of making lower but more frequent premium payments [30].

The quantitative literature concerned with the effects of background characteristics on enrollment decisions in LMICs typically studies binary dependent variables. Such approaches, however, ignore household subgroups, for example, the never-insured or dropouts, or they treat these subgroups as a single one. Both approaches might leave out valuable information. In this work, we extend such approaches by using an outcome variable that can take three different values (never-insured, previously insured, and currently insured). Doing this enables us to investigate to what extent determinants vary across subgroups. In doing so, we include socio-demographic, health-related and perception variables. Health-related variables applied in the literature typically include self-reported health state, chronic disease status, or disease history. In this study, we include health state, chronic disease status, and a variable that measures risk exposure and risk perceptions (the fear of future disease). Health state is measured by an instrument that, to our knowledge, has not been previously applied in the insurance literature that analyzes household survey data from LMICs (the EQ-5D instrument). The choice of perception variables is based on previous studies [26–28].

2. Material and methods

2.1. Study design and setting

The Tanzanian government has invested much effort in increasing enrollment in rural areas where the majority of the Tanzanian population resides (70 %). For this reason, we chose to undertake a cross-sectional study based on a rural household survey carried out in the Dodoma region (central Tanzania) between June and August 2019. Dodoma was selected as a study region because it was one of the six

pilot regions where the iCHF insurance scheme was first introduced. Hence, the focus was on a region where the iCHF scheme had been in place for several years, implying that households had some experience with the scheme. Two rural districts (Bahi and Chamwino) were selected out of Dodoma's seven rural districts. Chamwino was the most populated district of Dodoma with a population of 330,000, of which 17.4 % were iCHF members by 2019, while Bahi was the least populated district with 220,000, of which 16.5 % were members [35]. The primary economic activities in both districts are peasantry agriculture and livestock keeping [36]. Bahi district consists of 4 divisions, 22 wards and 59 villages while Chamwino consists of 5 divisions, 36 wards and 107 villages.

2.2. Sampling techniques and sample size

A three-stage sampling procedure was used to select households. In the first stage, two wards were randomly selected from each division of both Bahi and Chamwino, resulting in 8 and 10 wards, respectively. In the second stage, purposive sampling was used to select two villages (from each ward) that differed with respect to health facility availability and accessibility, providing us with a total of 16 (Bahi) and 20 (Chamwino) villages. In the third stage, we employed systematic random sampling by selecting every third household in each village (see [15,37]). The total sample size of 722 households (303 for Bahi and 419 for Chamwino) was calculated following the probability-proportional-to-size sampling approach (given a 95 % confidence level and a margin of error equal to 3 %) [38]. The study unit (the household) was defined as one or more individuals, related or unrelated, who share meals and who live in the same dwelling unit [39,40]. The interviewers asked for an interview with the household head (60 % were female); however, in rare cases, the household head was absent and the interview was done with a household member aged 18 years or older. The response rate was 100 %.

2.3. Variables

A household is free to renew or drop out once the membership period has expired. The respondents who had not renewed their membership before the data collection were classified as *dropouts*, those never been enrolled into the scheme were classified as *never-insured*, and those with a valid membership card were classified as *currently insured*.

The independent variables belong to the following three groups: health-related variables, socio-demographic variables, and perception variables. The respondents were asked to report their health state using the EQ-5D instrument, a generic instrument that uses five dimensions (mobility, self-care, usual activities, pain/discomfort, and anxiety/depression), where each dimension is divided into three levels. The EQ-5D index was generated as a continuous variable with values ranging from 1 (full health state) to 0 (worst possible health). This conversion process is common in the economic evaluation literature [41,42] and is performed using statistical software such as STATA. Two additional health-related variables followed from asking (i) whether any household member had a chronic disease (yes or no) and (ii) to what extent the respondent feared the future occurrence of diseases (yes or no).

The socio-demographic variables included household income, household size, gender, marital status, education, and age. The reported monthly income (y) was grouped into the following three income categories (using the poverty line definition (Z), per adult for the mainland of Tanzania [43] where $Z = \text{TZS } 49,320 (\text{\$}22.4)$): (i) low income ($y < Z$), (ii) medium income ($Z \leq y < \text{TZS } 499,999$), and (iii) high income ($Z \geq \text{TZS } 500,000$). Age was recorded as a continuous variable; thereafter it was grouped into 4 categories (18–25, 26–39, 40–59, and 60 +) following the Tanzanian 2012 population survey reports [36]. Education was classified into three cate-

gories (no education, primary education, or secondary education and higher).

The third group of independent variables, the perception variables, were elicited by asking to what extent the respondents agreed with five statements ranked on a Likert scale from 1 to 5 with 1 being “strongly disagrees” and 5 being “strongly agrees.” The statements were concerned with the quality of services, the insurance scheme benefit package, premium affordability, scheme trustworthiness, and attitudes towards traditional healers. The selection of the statements was based on previous literature from Tanzania [44,45]. For the purpose of the descriptive analysis, we grouped the responses into three categories with 1 being “Disagrees,” 2 being “Neutral,” and 3 being “Agrees.” For regression analysis we treated the variables as being continuous, moving from strongly disagree to strongly agree.

2.4. Data analysis

Our analysis applies a multinomial logistic regression model with the *currently insured* as the reference category (base outcome); thus, the probability of being *never-insured* or a *dropout* is compared with the probability of being *currently insured*. To address potential multicollinearity problems, tests using Spearman’s rank (rho) correlation coefficient matrix methods and the variance inflation factor (VIF) were applied. Neither of the independent variables had a Spearman’s rho correlation coefficient greater than 0.4 for the correlation matrix [46] and the VIF mean value was 1.32 (see Table A2 in the appendices), suggesting no multi-collinearity [47]. Data cleaning, validation, and all statistical analysis were performed using STATA 17.0 software.

Table 1
Descriptive statistics for sociodemographic and health-related variables across iCHF membership status. Number of observations (column percentage).

Variables	Membership status				p-value
	Never insured N = 109	Currently insured N = 218	Dropouts N = 395	Total N = 722	
Socio-demographic variables					
Age (in years)					0.008
18–25	12(11.0)	13(6.0)	17(4.3)	42(5.8)	
26–39	45(41.3)	63(28.9)	131(33.2)	239(33.1)	
40–59	39(35.8)	103(47.3)	199(50.4)	341(47.23)	
60+	13(11.9)	39(17.9)	48(12.2)	100(13.9)	
Gender					0.006
Male	61(56.0)	84(38.5)	159(40.1)	304(42.1)	
Female	48(44.0)	134(61.5)	236(59.8)	418(57.9)	
Educational level					0.366
No formal education	21(19.3)	36(16.5)	70(17.6)	127(17.6)	
Primary education	74(67.9)	154(70.6)	292(73.9)	520(72.0)	
Secondary education +	14(12.8)	28(12.8)	33(8.4)	75(10.4)	
Marital status					0.668
Married	79(72.5)	163(74.8)	282(71.4)	524(72.6)	
Unmarried	30(27.5)	55(25.2)	113(28.6)	198(27.4)	
Household size					0.901
1–3	25(22.9)	40(18.4)	76(19.2)	141(19.4)	
4–6	58(53.2)	112(51.4)	203(51.4)	373(51.7)	
7–9	23(21.1)	56(25.7)	99(25.1)	178(24.7)	
10+	3(2.8)	10(4.6)	17(4.3)	30(4.2)	
Income					0.034
Low	40(37.0)	61(28.6)	156(40.3)	257(36.3)	
Medium	61(56.5)	135(63.4)	215(55.6)	411(58.1)	
High	7(6.5)	17(8.0)	16(4.1)	40(5.7)	
HEALTH-RELATED VARIABLES					
Fear of diseases					0.631
No	54(49.5)	109(50.0)	211(53.4)	374(51.8)	
Yes	55(50.5)	109(50.0)	184(46.6)	348(48.2)	
Chronic diseases					0.043
No	70(64.2)	127(58.3)	270(68.4)	467(64.7)	
Yes	39(35.8)	91(41.7)	125(31.7)	255(35.3)	
EQ-5D					0.781
Poor	9(8.3)	27(12.4)	47(11.9)	83(11.5)	
Fair	18(16.5)	39(17.9)	64(16.2)	121(16.8)	
Good	82(75.2)	152(69.7)	284(71.9)	518(71.8)	

Since our independent variable had multiple responses (3 categories), a multinomial logistic regression method was used to predict the relationship between the dependent and independent variables. Two multinomial logistic regressions were run. In the first, age and income were treated as categorical variables to account for the possibility of non-linearity and measurement errors (see Table 2). In the second regression, age and income were treated as continuous variables (see Table 2B in the appendix).

3. Results

Our results are presented in two subsections. The first presents descriptive statistics for the independent variables across membership groups, while the second presents the regression results.

3.1. The distribution of independent variables across membership groups

As indicated in Table 1, *dropouts* are by far the largest membership group (54.7 %) while the *currently insured* are the second largest (30.2 %). The *never-insured* differ from the *currently insured* and *dropouts* with respect to age and gender. Educational level and marital status were distributed relatively equally between the groups but there is a difference in household income. The percentage of respondents classified as having a medium or high income amounted to 71 % for *currently insured*, while being 63 % and 59.7 %, for the *never-insured* and the *dropouts*, respectively. Concerning age, the *never-insured* are younger on average compared to the other two groups. Our sample is somewhat skewed towards older age groups compared to the Tanza-

Table 2
Multinomial logistic regression (age and income as categorized variables).

Variables	Never-insured (N = 109)		Drop-outs (N = 395)	
	RR (95 % CI)	p-value	RR (95 % CI)	p-value
Base outcome (currently insured)				
Socio-demographic variables				
Age (40–59 years)				
18–25	2.33 (1.49–3.65)	0.000***	0.58 (0.21–1.59)	0.289
26–39	1.64 (0.50–5.40)	0.418	1.07 (0.52–2.22)	0.852
60+	0.82 (0.56–1.21)	0.323	0.66 (0.39–1.10)	0.112
Income (Low)				
Medium	0.77 (0.22–2.67)	0.684	0.64 (0.60–0.69)	0.000***
High	0.57 (0.11–2.85)	0.495	0.38 (0.15–0.93)	0.033**
Gender (Male)				
Female	0.52 (0.30–0.89)	0.018**	0.93 (0.48–1.82)	0.838
Education level (no education)				
Primary education	0.84 (0.84–0.85)	0.000***	1.10 (1.08–1.12)	0.000***
Secondary education +	0.72 (0.68–0.77)	0.000***	0.82 (0.67–1.01)	0.056*
Household size (1–3 members)				
4–6	1.02 (0.67–1.56)	0.926	0.97 (0.64–1.46)	0.885
7–9	0.85 (0.43–1.65)	0.622	0.99 (0.36–2.79)	0.998
10+	0.74 (0.47–1.16)	0.184	0.99 (0.40–2.50)	0.994
Marital status (unmarried)				
Married	0.75 (0.49–1.14)	0.178	0.90 (0.51–1.59)	0.723
Health-related variables				
EQ-5D				
Fear of sickness (No)	2.62 (0.23–30.45)	0.441	1.43 (0.47–4.31)	0.530
Yes	1.43 (0.41–4.96)	0.572	1.08 (0.90–1.29)	0.421
Chronic diseases (No)				
Yes	0.81 (0.69–0.95)	0.010***	0.58 (0.34–0.99)	0.045**
Perception variables				
Quality of care	0.68 (0.53–0.87)	0.003***	0.86 (0.81–0.91)	0.000***
Benefit-premium ratio	0.93 (0.85–1.01)	0.065*	1.16 (0.85–1.60)	0.345
Premium affordability	0.89 (0.43–1.86)	0.766	0.69 (0.51–0.95)	0.021**
Scheme leader trust	0.47 (0.24–0.88)	0.020**	0.76 (0.55–1.06)	0.094*
Traditional healers	1.84 (1.19–2.84)	0.006***	1.20 (1.18–1.23)	0.000***

Notes: ***, ** and * denote 1%, 5% and 10% significance level (p-value), respectively.

Reference category: Currently insured.

nian population as a whole, while the age distribution fits well with the Dodoma region (see Table A3 in the appendix) [36]. Respondents reporting poor health based on the EQ-5D represented about 11 % of the sample and the *never-insured* reported a somewhat better health state than the two other groups. Concerning chronic diseases, about one third of respondents confirmed the presence of at least one household member having a chronic disease while almost 50 % stated that they feared the future onset of disease.

Concerning the five perception variables (see Table A1 in the appendix), the *currently insured* have the most positive perceptions of the insurance scheme (premium affordability, quality of service providers, and trust in scheme leaders) while being the most skeptical about the use of traditional healers. The *never-insured*, on the other hand, are most in favor of visiting traditional healers and have the most distrust when it comes to service quality and the performances of scheme leaders. The *dropouts* are somewhere in between the *never-insured* and the *currently insured* except they are significantly more dissatisfied with the benefit-premium ratio (51.7 %) compared to the *currently insured* (41.7 %) and the *never-insured* (39.5 %).

3.2. Regression results

The multinomial logistic regression results are presented in Table 2 as adjusted relative risk ratios (RR). The probability of being *never-insured* (RR = 0.81, CI: 0.69–0.95) or a *dropout* (RR = 0.58, CI: 0.34–0.99), relative to being *currently insured*, is lower (since P -value < 0.05) when the household reports having at least one member with a chronic disease. Self-reported health (EQ-5D) and the fear of sickness, on the other hand, are insignificant for both groups (*never-insured* and *dropouts*).

As for socio-demographic variables, the variables that are insignificant for both decisions are household size and marital status. Concerning income and age, the probability of being *never-insured*, relative to being *currently insured*, is insignificant for income while age is significant for the youngest (18–25 yrs.) relative to the reference category (40–59 yrs.). The probability of being *never-insured* (RR = 2.33, CI: 1.49–3.65) relative to being *currently insured*, decreases as age increases. Furthermore, the same probability decreases if the household is headed by a female and for higher educational levels. The probability of being a *dropout*, relative to being *currently insured*, decreases with a higher income but is insignificant for all age categories. Concerning educational level, both categories are significant; however, the effects differ. Having secondary education (relative to no education) corresponds to a lower probability of being *never-insured* and of being a *dropout*, while having primary education (compared to no education) only increases the probability of being *never-insured*. Concerning the perception variables, quality of care, scheme leader trust and the use of traditional healers are important for both decisions while premium affordability and benefit-premium ratio significantly impact the *dropout* decision and the *never-insured* decision, respectively ($p < 0.10$). Finally, when introducing the continuous versions of age and income, we found that age is only significant for the decision to stay *never-insured*: a lower age was associated with the decision to stay *never-insured*. Income, on the other hand, was only significant for the *dropout* decision, with a lower income being associated with the decision to leave the scheme.

To simplify the presentation of the impact of the variables relative to our research question, the significant variables ($p < 0.10$) from Table 2 have been classified into three groups (see Table 3) and interpreted in relation to the types of changes that are associated with a

Table 3
Type of changes in significant variables that are associated with a non-insurance status ($p \leq 0.09$).

Groups	Type of decisions	Type of variable changes
1.	Changes that are associated with a non-insurance status (staying never-insured and dropping out)	Higher education (secondary education relative to no education) The absence of chronic disease Negative perceptions of the quality of services Positive perceptions of traditional healers Negative perceptions of scheme leaders
2.	Changes that are associated with the decision to stay never-insured	Younger age (being 18–25 yrs. relative to being 40–59 yrs.) Higher education (primary education relative to no education) Being a male household head Positive perceptions of the benefit-premium ratio
3.	Changes that are associated with the decision to leave the scheme (dropout)	Lower education (no education relative to primary education) Lower income (a low income relative to medium and high income) Negative perceptions of premium affordability

non-insurance status (*never-insured* and *dropouts*). The first group consists of variables that show a positive correlation for both decisions while the second and third groups refer to changes that are unique to each decision. For Group 1 it follows that three of the perception variables, the absence of a chronic disease, and having secondary education all are associated with a non-insurance status. Furthermore, being younger and male and having primary education and a positive perception of the benefit-premium rate increase the probability of being *never-insured* (Group 2) only, while having no primary education, a lower income, and a negative perception of premium affordability increase the probability of being a *dropout* (Group 3). From this we can conclude that age, education, gender, income, and two perception variables differ across the two decisions.

4. Discussion

4.1. Discussion of study findings

Of the three health-related variables, only chronic diseases were found to be significant in the sense that the absence of such disease promoted the decision to opt for a non-insurance status. This finding may appear surprising but is expected considering that the insurance scheme in question only covers primary healthcare services, thus excluding treatments for non-communicable diseases, such as cancer, kidney disease, cardiovascular disease and diabetes, as well as for HIV/AIDS. The insignificant role of health state (EQ-5D) and of fear of future disease suggests that self-selection into an insurance scheme is not based on an individual's health state. However, such a conclusion ignores that the health condition of other household members is not taken into account. Furthermore, the role of chronic diseases suggests the opposite conclusion with regard to self-selection.

A possible explanation for why being young, relative to being old, increases the probability of being *never-insured* might be the positive association between increasing age and the need for healthcare. Another possible explanation could be that those in the youngest group (18–25 yrs.) have less purchasing power compared to those in an older age category (40–59 yrs.) However, we observed that among the younger age groups, becoming older increased the probability of

dropping out, although the effect was insignificant. This finding may be explained by the fact that some households withdraw from the scheme after some years of membership.

Concerning education, having secondary education (relative to non-education) increased the probability of both being never-insured and being a dropout while having primary education increased the probability of being never-insured but decreased the probability of being a dropout. The effect on the decision to stay *never-insured* might follow from those with more education having a greater awareness of the scheme; at the same time, those with more education might have higher expectations and thus be more easily disappointed with the scheme, leading them to drop out.

Surprisingly, income is not associated with the decision to stay *never-insured* while lower income increases the probability of leaving the scheme (*dropout*). Interestingly, economic factors such as income and perceptions about premium affordability are not important (insignificant) while positive perceptions of the benefit-premium ratio pull in the direction of staying *never-insured*. Furthermore, we know that perceptions about premium affordability and the benefit-premium ratio are more positive among *never-insured* relative to *dropouts*. On the other hand, economic factors play an important role for *dropouts* since lower income and negative perceptions of premium affordability promote the decision to leave the scheme. In sum, these findings suggest that the *never-insured* are more concerned with the quality of services and the performances of scheme leaders, while purchasing power (income relative to prices) and “value for the money” (benefit-price ratio) are important for those who have left the scheme. These findings point to structural differences between the two decisions and this interpretation is reinforced by the presence of different effects from age and education and from the descriptive statistics confirming that the *never-insured*, relative to the *dropouts*, have more positive perceptions of the benefit-premium ratio and premium affordability. The *never-insured*, on the other hand, are more positive towards outside options (traditional medicine) and have less confidence in the performance of scheme leaders. In addition, this group is more sensitive to negative perceptions of the quality of care. A more general explanation for the structural differences may be that *dropouts* have personal experience with the scheme in question when making their decision while the *never-insured*, to a greater extent, make their decision based on expectations about the scheme in combination with information provided to them by others.

The literature on enrollment-related decisions in LMICs is extensive and includes different designs and settings. In the following, we compare our findings with previous cross-sectional analyses performed in sub-Saharan African countries. This literature can be classified into the following three groups base on the outcome variables used: (i) currently insured and dropouts; (ii) currently insured and currently non-insured; and (iii) currently-insured, never-insured, and dropouts.

Several studies have analyzed a binary dependent variable with the outcomes *currently insured* and *dropouts* [6,9,13–15,48]. Since the *never-insured* are ignored, a comparison with our findings must look at *dropouts*. In contrast to Mladovsky [9] and our study, Dong et al. and Mebratie et al. [14,48] did not identify any significant effects of age and gender. These two studies [14,48] identified an effect from education, as we did, but neither included income as an independent variable. Two of the studies [9,14] included perception variables that resemble ours. For example, Mladovsky [9] found both “trustworthy of scheme leader” and “satisfactory scheme operation” to increase the probability of being insured, while Dong et al. [14] reached the same conclusion when “scheme quality” was perceived as being satisfactory.

The second group of studies that analyze binary dependent variables looks at members and non-members, which means that the *never-insured* and the *dropouts* are treated as one group. More recent work within this tradition includes [24,26,45,49,50]. Three of the studies found that being a female and being older significantly increased the probability of being a member [24,45,50]. Two of the

studies included perception variables, with both finding that positive perceptions of the insurance scheme were important [24,45]. These studies [24,45] included education, wealth (income), marital status, and household size, with the latter two variables found to be insignificant. However, Duku [49], in contrast to Kagaigai [26], found that a higher wealth status and higher education level promoted membership.

The study by Kagaigai et al. [26] is particularly interesting since it analyzed the same dataset as ours. Interesting differences concerning gender, education, and income can be observed. The probability of being a non-member decreased when the head of household was female, while in our study, the same effect was found for the *never-insured* only. Furthermore, they found the effects of education to be insignificant, which was not the case in our study. They also found that a lower income (from high to low income) increased the probability of being a non-member, while our study found this to be the case for *dropouts* only.

We have identified two multinomial studies, both from Ghana, in which the outcomes of the dependent variable are (i) currently insured, (ii) never-insured, and (iii) previously insured [27,51]. In contrast to our paper, both papers identify effects that pull in the same direction for the *never-insured* and *dropouts* but the effects are somewhat stronger for the first group. A direct comparison with Jehu-Appiah et al. [27] is complicated since their choice of baseline differs from ours (the never-insured). Their main conclusion is that the perception factors (scheme benefits, scheme convenience, and scheme price) have the strongest associations with the enrollment decision and the dropout decision [27]. Van der Weilen et al. [51] do not include perception factors but find that lower education level, being younger, and lower wealth level (income) increase the probability of being never-insured and previously insured. Furthermore, this study finds, as we do, that self-reported health is not important for either group.

The two systematic reviews commented upon in the introduction, refer to higher income as the most important factor for the enrollment decision, while, in our study, this variable is relevant for the *dropouts*, only [24] finds that perceptions towards health care quality and scheme leader trust as important. Our analysis reaches similar conclusions since both perceptions are relevant for both decisions (*never-insured* and *dropouts*) [24,25] find that lower age, fewer chronic illness episodes and lower education, all pull in the direction of not being insured. Our study, as concerning the never-insured, found the same results for age and chronic disease while education has the opposite effect. Concerning the dropouts, we found that chronic diseases had the same effect, while age was insignificant and the effects of age were opposite across the two age categories.

4.2. Limitations and strengths

This study has limitations. First, the study was conducted in two districts in the same region of Tanzania, which makes it difficult to generalize our findings to the entire country (for example the age distribution of the sample is skewed towards older age groups). Second, several variables, such as age, gender, education, self-reported health state and the perceptions variables, are associated with the household head, or in some cases another adult household representative, thus ignoring other household members that potentially have a say in insurance decisions. Third, our analysis leaves out some variables (e.g. risk preferences and household wealth) that are potentially important for enrollment decisions. Fourth, our analysis does not capture the full dynamics of insurance decisions since households might enroll and drop out repeatedly over time. However, our survey had a participation rate of 100 %, meaning that we are not confronted with any selection bias.

5. Conclusions

The main purpose was to investigate to what extent variables associated with the decision to enroll differ from those associated with the decision to leave (dropout). Our findings show that several variables play different roles across the two decisions because they have significant but opposite effects (i.e. education) and because some are significant for only one of the decisions (i.e. gender, income and some perception variables). These conclusions contrast with those of previous studies that also compared groups with different membership status, since they identified variables that typically pull in the similar direction.

The knowledge gained in this study might be important for policy reasons since it suggests the use of discriminatory measures in promoting insurance coverage. Policies targeting the never-insured should be concerned with changing expectations about the scheme while policies targeting dropouts should pay attention to “value for money.” A policy that improves the quality of care and extends the benefits package is likely to make membership more attractive for both groups; however, such improvements, in combination with lower premiums, are difficult to achieve without additional funding. In the absence of external funding (e.g., government subsidies and donor contributions), one possibility would be to finance improvements through higher introductory premiums, with premium discounts being contingent upon on membership duration. Another possibility would be to offer a menu of benefit packages that differ in price depending on the services provided.

In our study area, the share of dropouts far exceeds the share of never-insured, which might suggest that policies targeted at dropouts should be given priority. On the other hand, the never-insured are younger and have better overall health than dropouts, meaning that recruiting the never-insured, in relative terms, might provide more financial resources that can be invested into scheme improvements. Finally, more knowledge about how sensitive households are to changes in quality, scheme benefits and premiums is clearly needed. In addition to quantitative studies, future qualitative studies will be important for reducing the knowledge gap regarding the design of effective policy measures.

CRedit authorship contribution statement

Kagaigai Alphoncina: Conceptualization, Data curation, Formal analysis, Methodology, Writing – original draft. **Mori T. Amani:** Conceptualization, Review & editing, Supervision. **Amani Anaeli:** Conceptualization, Review and Editing, Supervision. **Sverre Grepperud:** Conceptualization, Methodology, Formal analysis, Writing – original draft, Writing – review & editing, Supervision.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A

See Tables A1–A3 and Table 2B.

Table A1
Distribution of the perception variables across membership status.

Variables	Response categories	Membership status			Total N = 722	p-value
		Never-insured N = 109	Currently-insured N = 218	Dropouts N = 395		
Quality of services iCHF members receive quality services from the providers.	Disagree	43(39.5)	51(23.4)	137(34.7)	231(32.0)	0.000
	Neutral	29(26.6)	15(6.9)	28(7.1)	72(10.0)	
	Agree	37(33.9)	152(69.7)	230(58.2)	419(58.0)	
Benefit-premium ratio The iCHF benefit package is too low relative to the premium charged.	Disagree	45(41.3)	120(55.1)	172(43.5)	337(46.7)	0.000
	Neutral	21(19.3)	7(3.2)	19(4.8)	47(6.5)	
	Agree	432(39.5)	91(41.7)	204(51.7)	338(46.8)	
Premium affordability The iCHF premiums are affordable.	Disagree	33(30.3)	47(21.6)	159(40.3)	239(33.1)	0.000
	Neutral	10(9.2)	6(2.8)	10(2.5)	26(3.6)	
	Agree	66(60.6)	165(75.7)	226(57.2)	457(63.3)	
Scheme leader trust iCHF leaders are trustworthy.	Disagree	27(24.8)	19(8.7)	65(16.5)	111(15.4)	0.000
	Neutral	39(35.8)	26(11.9)	66(16.7)	131(18.1)	
	Agree	43(39.5)	173(79.4)	264(66.8)	480(66.5)	
Traditional healers I prefer to visit traditional healers rather than enrolling in iCHF.	Disagree	84(77.1)	197(90.4)	342(86.6)	623(86.3)	0.001
	Neutral	3(2.8)	10(4.6)	17(4.3)	30(4.2)	
	Agree	22(20.2)	11(5.1)	36(9.1)	69(9.6)	

Table A2
Variance inflation factor (VIF) for independent variables.

Variable	VIF	1/VIF
Fear of sickness	1.22	0.818
Chronic diseases	1.26	0.793
EQ-5D	1.31	0.766
Age	1.28	0.780
Sex	1.19	0.837
Education level		
Primary education	1.57	0.635
Secondary education and above 1	1.69	0.593
Household size		
3–6	1.85	0.539
7–9	1.87	0.536
10+	1.22	0.819
Marital status	1.24	0.809
Income		
Medium income	1.2	0.834
High Income	1.19	0.843
Quality of care	1.2	0.836
Benefit-premium ratio	1.08	0.925
Premium affordability	1.12	0.893
Scheme leader trust	1.17	0.855
Traditional healers	1.05	0.948
Mean VIF	1.32	

Table A3
Population distribution by age in Dodoma region and Tanzania.

Age group	Number of Persons	
	Dodoma	Tanzania
20–39	543,519 (57.9 %)	13,278,557 (62.6 %)
40–59	255,903 (27.3 %)	5,805,004 (27.4 %)
60+	139,363 (14.8 %)	2,125,942 (10.02 %)
Total	938 785	21 209 503

Source: Tanzania Population and Household Census Report of 2012 [36].

Table 2B
Multinomial logistic regression: Age and Income treated as continuous variables.

Variables	Never-insured (N = 109)		Dropouts (N = 395)	
	RR (95 % CI)	P > z	RR (95 % CI)	P > z
Base outcome (currently insured)				
Socio-demographic variables				
Age	0.98 (0.96–0.99)	0.028**	0.99 (0.98–0.99)	0.19
Monthly income	0.83 (0.47–1.46)	0.515	0.79 (0.69–0.91)	0.001***
Gender (Male)				
Female	0.53 (0.28–0.97)	0.04**	0.94 (0.49–1.80)	0.846
Education level (no education)				
Primary education	0.77 (0.64–0.93)	0.007***	1.10 (0.90–1.36)	0.341
Secondary education +	0.73 (0.60–0.90)	0.003***	0.83 (0.80–0.85)	0.000***
Household size (1–3 members)				
4–6	0.94 (0.66–1.36)	0.752	1.03 (0.76–1.40)	0.841
7–9	0.87 (0.59–1.28)	0.473	1.08 (0.45–2.62)	0.86
10+	0.68 (0.33–1.38)	0.284	1.03 (0.50–2.10)	0.939
Marital status (unmarried)				
married	0.74 (0.47–1.17)	0.205	0.84 (0.43–1.63)	0.600
Health-related variables				
Fear of sickness (No)				
Yes	1.47 (0.45–4.86)	0.525	1.20 (0.86–1.67)	0.292
Chronic diseases (No)				
Yes	0.81 (0.76–0.85)	0.000***	0.58 (0.33–1.02)	0.060*
EQ-5D	2.49 (0.31–20.24)	0.395	1.40 (0.72–2.72)	0.320
Perception variables				
Quality of care	0.70 (0.56–0.88)	0.002***	0.85 (0.78–0.92)	0.000***
Benefit-premium ratio	0.93 (0.84–1.02)	0.132	1.16 (0.85–1.57)	0.342
Premium affordability	0.89 (0.47–1.70)	0.734	0.70 (0.54–0.90)	0.005***
Scheme leader trust	0.46 (0.26–0.83)	0.01***	0.76 (0.52–1.10)	0.149
Traditional healers	1.80 (1.10–2.96)	0.02***	1.17 (1.14–1.20)	0.000***

Notes: ***, ** and * denote 1%, 5% and 10% significance level (p-value), respectively.

Reference category: Currently insured.

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