

1 **Utilization of health insurance by patients with diabetes or hypertension in**  
2 **urban hospitals in Mbarara, Uganda**

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14 **Abstract**

15 **Background:** Diabetes and hypertension are among the leading contributors to global  
16 mortality and require life-long medical care. However, many patients cannot access quality  
17 healthcare due to high out-of-pocket expenditures, thus health insurance would help provide  
18 relief. This paper examines factors associated with utilization of health insurance by patients  
19 with diabetes or hypertension at two urban hospitals in Mbarara, southwestern Uganda.

20 **Methods:** We used a cross-sectional survey design to collect data from patients with diabetes  
21 or hypertension attending two hospitals located in Mbarara. Logistic regression models were  
22 used to examine associations between demographic factors, socio-economic factors and  
23 awareness of scheme existence and health insurance utilization.

24 **Results:** We enrolled 370 participants, 235 (63.5%) females and 135 (36.5%) males, with  
25 diabetes or hypertension. Patients who were not members of a microfinance scheme were  
26 76% less likely to enrol in a health insurance scheme (OR = 0.34, 95% CI: 0.15 – 0.78, p =  
27 0.011). Patients diagnosed with diabetes/hypertension 5 – 9 years ago were more likely to  
28 enrol in a health insurance scheme (OR = 2.99, 95% CI: 1.14 – 7.87, p = 0.026) compared to  
29 those diagnosed 0 – 4 years ago. Patients who were not aware of the existing schemes in their  
30 areas were 99% less likely to take up health insurance (OR = 0.01, 95% CI: 0.0 – 0.02, p <  
31 0.001) compared to those who knew about health insurance schemes operating in the study  
32 area. Majority of respondents expressed willingness to join the proposed national health  
33 insurance scheme although concerns were raised about high premiums and misuse of funds  
34 which may negatively impact decisions to enrol.

35 **Conclusion:** Belonging to a microfinance scheme positively influences enrolment by patients  
36 with diabetes or hypertension in a health insurance program. Although a small proportion is  
37 currently enrolled in health insurance, the vast majority expressed willingness to enrol in the  
38 proposed national health insurance scheme. Microfinance schemes could be used as an entry  
39 point for health insurance programs for patients in these settings.

40 **Key words:** Health insurance, universal health coverage, diabetes, hypertension, Uganda

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## 45 **Introduction**

46 Chronic diseases like hypertension and diabetes rank among the leading causes of illness for  
47 all ages in Uganda (MoH, 2018). In urban Mbarara and rural southwest Uganda, many  
48 patients often fail to keep up with the treatment regime because they are unable to meet the  
49 high costs of health care (Okello *et al.*, 2016). Sadly, the national health insurance scheme  
50 (NHIS) which would have offered protection against the risk of incurring high costs of health  
51 services has not yet been established in the country. More critically, there has been limited  
52 participation of potential contributors and beneficiaries of the scheme, including patients with  
53 diabetes or hypertension, in the search for best approaches to ensure that the goals of the  
54 proposed NHIS are achieved and sustained. This study thus sought to provide information on  
55 the views and inputs of a critical group of intended beneficiaries when the country is still  
56 debating how to design its universal health coverage (UHC) roadmap (GoU, 2019).

57 Treatable and chronic diseases reduce a household's income if people are not able to work. If  
58 they fail to raise the funds to pay for medical fees, people in rural and urban areas may end up  
59 foregoing treatment even when they know that this behaviour may negatively impact their  
60 long-term health. Also, households may be forced to sell their productive assets and take  
61 expensive loans so as to be able to pay for medical care. In a study of coping strategies in  
62 Uganda, Leliveld (2006) reported how households sold land, cattle, or goats or used their  
63 savings to respond to long-term illness. Other studies in Uganda, Kenya and Ethiopia have  
64 gone further and demonstrated how the costs of illness contribute significantly to the  
65 impoverishment of households in rural and urban areas (Ajwang, 2013; Bogale *et al.*, 2005;  
66 Krishna *et al.*, 2006). Such huge medical expenses which ultimately impoverish people are  
67 referred to as catastrophic out-of-pocket expenditures (OOP) and are known to constitute a  
68 critical impediment to achieving universal health coverage (Kwesiga *et al.*, 2015; Xu *et al.*,  
69 2005; Xu *et al.*, 2007).

70 Health insurance is a form of insurance that covers the whole or a part of the risk of a person  
71 incurring medical expenses, spreading the risk over numerous people (Fadlallah *et al.*, 2018;  
72 Nyman, 2001; Preker and Carrin, 2004). It is a critical pillar in resource mobilization for  
73 achieving universal health coverage since individuals or households that pay a certain  
74 predetermined amount of money in return receive a health-care benefit package covering  
75 them and their dependants. This prepayment mechanism is particularly useful for cushioning  
76 households from catastrophic poverty, injury and death resulting from treatable and chronic  
77 diseases (Nshakira-Rukundo *et al.*, 2019; Shigute *et al.*, 2017; WHO, 2013).

78 To date, no study has been undertaken to ascertain the proportion of patients with diabetes or  
79 hypertension in urban Mbarara who are currently enrolled in social, private and community-  
80 based health insurance schemes and those who are willing to enrol in the proposed NHIS.  
81 Further, an in-depth inquiry into how demographic factors, socio-economic factors and  
82 awareness of scheme existence influence utilization of health insurance has not been  
83 undertaken. Therefore, this study aimed to fill the identified knowledge gaps by assessing the  
84 factors affecting the utilization of health insurance by patients receiving diabetes and  
85 hypertension care in the study area.

## 86 **Methods**

### 87 **Ethics statement**

88 Approval to conduct the study was obtained from the directorate of graduate studies,  
89 research, and innovations at Bishop Stuart University. Further approval was obtained from  
90 the hospital directors of Mbarara Regional Referral Hospital and Divine Mercy Hospital.  
91 Informed consent was obtained and assurance given that the information obtained will be  
92 treated with confidence and that at all times we will present the data in such a way that the  
93 identity of study participants cannot be connected with any specific responses.

## 94 **Study setting**

95 The study was based at Mbarara Regional Referral Hospital (MRRH) and Divine Mercy  
96 Hospital (DMH), two hospitals, both located in urban Mbarara. MRRH is public and DMH is  
97 a private facility and both serve as referral sites for a large number of patients with diabetes  
98 or hypertension in south-western Uganda, a region of at least 5 million people. Health facility  
99 records show that about 5,000 patients seek diabetes and hypertension care at these hospitals  
100 each month. When compared to other regions, western Uganda has the second highest  
101 prevalence of hypertension in the country estimated at 32.5% (Lunyera *et al.*, 2018). The  
102 prevalence of diabetes has been estimated at 8.1% and 9.0% for Kampala in the central  
103 region and Kasese in mid-western Uganda, respectively (Maher *et al.*, 2011; Mondo *et al.*,  
104 2013).

## 105 **Participant recruitment**

106 Study participants were selected using systematic sampling. First, we estimated the  
107 population seeking diabetes and hypertension care in each hospital per month, and then  
108 dividing this number by the required sample size to obtain the sampling interval. Preliminary  
109 review of the available medical records led to a sampling interval of every 3<sup>rd</sup> patient from  
110 each diabetes/hypertension clinic being selected to participate in the study, with the first  
111 patient who came for care each day being the starting point.

112 We used a sample size estimation formula by Slovin (1960) to determine the required sample  
113 size since the estimated population of patients with diabetes or hypertension was known. We  
114 assumed the population size to be 5,000, and 0.05 as the level of precision. The calculation  
115 yielded a sample size of 370 participants.

## 116 **Data collection**

117 Data were collected from study participants for a period of three months, namely, between  
118 May and July 2020. At MRRH the hypertension and diabetes clinics are operated once a

119 week on Tuesdays and Thursdays, respectively, while at DMH the clinics have no specific  
120 days. We deployed two research assistants at each clinic to identify eligible participants and  
121 administer questionnaires to them.

122 *Study tool:* Each questionnaire comprised both closed and open ended questions regarding  
123 demographic factors, socio-economic factors and awareness of scheme existence. It also  
124 comprised questions about the proposed NHIS. Specifically, the study participants were  
125 asked whether they believed it was important to have a NHIS in Uganda, if they would be  
126 willing to join the proposed scheme. Participants were also asked about what they thought  
127 should be options for those who would not be able to join the scheme due to their inability to  
128 pay. The participants were also asked if they were willing to contribute to the proposed  
129 scheme, how much they would be willing to contribute and how frequently they would want  
130 to make contributions.

131 *Quality control:* Prior to data collection, we pre-tested the questionnaire for consistency and  
132 suitability at a non-participating hospital in Mbarara town. Thirty seven pilot respondents,  
133 representing 10% of sample size of 370, were interviewed. The comments and suggestions  
134 from the pilot study were used to revise the tool and ensure questions were understandable.  
135 During data collection, debriefing meetings were held at the end of each day to review data  
136 and identify any omissions and errors.

### 137 **Data management and analysis**

138 The completed questionnaires were examined by the first author to confirm completeness and  
139 consistency. The data were then entered and cleaned using Microsoft Excel and then backed  
140 up on an external hard drive. The qualitative data were coded, themes generated and a  
141 thematic analysis carried. Quantitative data were analysed using Microsoft Excel and Minitab  
142 software package version 14.

143 The primary outcome for this study was utilization of health insurance. We defined this as the  
144 proportion of diabetes/hypertension patients enrolled in any health insurance scheme at the  
145 time of conducting this study. The secondary outcome was willingness to participate in the  
146 NHIS, which refers to whether or not people were willing to join the proposed NHIS.  
147 Univariate, bivariate and multivariable analyses were used to examine the association  
148 between utilization of health insurance and the demographic and socio-economic factors and  
149 awareness of scheme existence. Variables with a p-value less than 0.05 in bivariate analyses  
150 were selected for inclusion in multivariate logistic regression models. The odds ratios  
151 associated with these factors were then reported as a measure of strength, together with the  
152 respective 95% confidence intervals and p-values.

## 153 **Results**

### 154 **Demographic and socio-economic factors**

155 A total of 370 diabetes and hypertension patients attending Mbarara Regional Referral  
156 Hospital and Divine Mercy Hospital participated in the study. Out of 370 participants, 135  
157 (36.5%) were male and 235 (63.5%) were female. Participants who had attained primary  
158 education were the majority (41.6%) followed by those who had never had formal education  
159 (24.9%). Their mean age was 57.3 years, with the youngest aged 18 and the oldest 89 years.  
160 Household size ranged between one and 20 members and consisted of an average of 6.3  
161 members (see Table 1).

### 162 **Awareness of and enrolment in health insurance schemes**

163 As shown in Table 2, the majority of respondents (50.6%) had never heard about health  
164 insurance schemes operating in the study area. A larger majority (59.2%) had never been  
165 enrolled in any health insurance scheme and even had not currently been enrolled in any  
166 health insurance scheme (58.0%) at the time of conducting this study. Most of those who  
167 currently had health insurance cover were members of patient-driven associations (88.7%),

168 Jubilee (2.6%) and UAP (2.0%) insurance schemes. Asked how frequently they were  
169 required to pay premiums, the majority (96.1%) indicated that annual contribution was the  
170 most commonly used frequency of making contributions to insurance schemes. They also  
171 cited the reduced cost of drugs (88.7%) as the main reason for their choice of a particular  
172 health insurance scheme. In terms of persons covered by insurance, most of the respondents  
173 (92.2%) said that only the insured person was covered. The majority of those who had not  
174 been enrolled in any health insurance scheme (63.9%) cited lack of information as the main  
175 impediment. When asked how they were coping, the non-enrolled (45.3%) cited help from  
176 family and friends as the main fall-back alternative.

### 177 **Factors associated with utilization of health insurance**

178 Logistic regression at a bivariate level revealed that utilization of health insurance was  
179 significantly associated with household size, income source, monthly income, membership of  
180 a microfinance scheme, years since the first time when the patient was first diagnosed with  
181 diabetes or hypertension and awareness about the existence of health insurance schemes  
182 (Table 3). Individuals who had families of 5-8 members were 1.7 times more likely to enrol  
183 in a health insurance scheme compared to those who had families of 1-4 members (OR =  
184 1.67, 95% CI: 1.03 – 2.7, p = 0.038) while those that had families of > 8 members were 2.3  
185 times likely to enrol in a health insurance scheme compared to those who had families of 1-4  
186 members (OR = 2.28, 95% CI: 1.28 – 4.08, p = 0.005). Individuals who depended on salaried  
187 employment were 2.4 times more likely to enrol in a health insurance scheme compared to  
188 those who depended on farming (OR = 2.43, 95% CI: 1.31 – 4.52, p = 0.005).

189 The participants whose income was between 100,000 and 500,000 shillings per month were  
190 1.6 times more likely to enrol in a health insurance scheme compared to those who earned  
191 less than 100,000 shillings per month (OR = 1.59, 95% CI: 1.0 – 2.53, p = 0.049) while those  
192 who earned an income between 500,000 and 1,000, 000 shillings per month were 3.4 times



193 more likely to enrol in a health insurance scheme compared to who earned less than 100,000  
194 shillings per month (OR = 3.4, 95% CI: 1.43 – 8.09,  $p = 0.006$ ). Participants who had not  
195 been members of a microfinance scheme were 78% less likely to enrol in a health insurance  
196 scheme (OR = 0.32, 95% CI: 0.14 – 0.75,  $p = 0.011$ ).

197 Participants who had been diagnosed with diabetes/hypertension 5 – 9 years ago were 2.9  
198 times more likely to enrol in a health insurance scheme (OR = 2.87, 95% CI: 1.69 – 4.9,  $p <$   
199  $0.001$ ) than those who had been diagnosed with the chronic condition 0 – 4 years ago while  
200 those that had been diagnosed with diabetes/hypertension 10 – 41 years ago were 3.2 times  
201 more likely to enrol in a health insurance scheme (OR = 3.15, 95% CI: 1.85 – 5.36,  $p <$   
202  $0.001$ ) compared to those who had been diagnosed with the chronic condition 0 – 4 years ago.  
203 Lastly, the bivariate analysis revealed that patients who were not aware of the existing  
204 schemes were 99% less likely to take up health insurance (OR = 0.01, 95% C I: 0.0 – 0.07,  $p$   
205  $< 0.001$ ) compared to those who knew about existing insurance schemes.

206 At a multivariable level, all factors which had  $p$ -values below the threshold of 0.05 at the  
207 bivariate level were included in the multivariate model (Table 3). The multivariable analysis  
208 showed that participants who had not been members of a microfinance scheme were 76% less  
209 likely to enrol in a health insurance scheme (OR = 0.34, 95% CI: 0.15 – 0.78,  $p = 0.011$ ).  
210 Participants who had been diagnosed with diabetes/hypertension between 5 – 9 years ago  
211 were almost three times more likely to enrol in a health insurance scheme (OR = 2.99, 95%  
212 CI: 1.14 – 7.87,  $p = 0.026$ ) than those who had been diagnosed with the chronic condition 0 –  
213 4 years ago. The multivariable analysis also showed that patients who were not aware of the  
214 existing schemes were 99% less likely to take up health insurance (OR = 0.01, 95% CI: 0.0 –  
215 0.02,  $p < 0.001$ ) compared to those who knew about health insurance schemes operating in  
216 the district.

## 217 **Willingness to enrol in the proposed NHIS**

218 When asked if they had heard about the proposed NHIS, the majority (80.9%) said that they  
219 had not heard about it (Table 3). And when asked whether NHIS would be good for Uganda,  
220 the majority (97.5%) answered “yes”. A large fraction (i.e. 42.9% of the respondents) said  
221 that the main reason why they considered NHIS to be a good idea is that the scheme will help  
222 people to save money incurred on paying for treatment which is often expensive. Only three  
223 people had reservations about the scheme and cited high premiums, corruption and the  
224 absence of need to join another insurance scheme as the main reasons for this view (Table 4).

225 The respondents who said they would like to join the proposed scheme were the majority at  
226 97.8%, and went ahead to propose that premiums should be made every month and that each  
227 person should, on average, contribute 8,200 shillings per month. Regarding those who will  
228 not be able to join because they are indigent, the respondents suggested that these should be  
229 exempt from payment and that their contributions should be paid by government or donors.  
230 They also suggested that if not exempt, indigent persons should pay subsidized premiums and  
231 be encouraged to join savings and credit schemes so as to be able to afford subsidized  
232 premiums. They further indicated that improvement of services at government facilities  
233 would cater for concerns about indigent persons as this would ensure quality care for all.

234 At a bivariate level, logistic regression showed that willingness to enrol in the proposed  
235 NHIS was significantly associated with income source and the income earned per month  
236 (Table 5). Individuals who depended on salaried employment were 85% less likely to be  
237 willing to enrol in the proposed NHIS compared to those who depended on farming (OR =  
238 0.15, 95% CI: 0.02 – 0.93,  $p = 0.042$ ). The participants who earned more than 500,000  
239 shillings (about USD 142.9) per month were 94% less likely to be willing to enrol in the  
240 proposed NHIS as compared to those whose income was less than 100,000 shillings (about

241 USD 28.6) per month (OR = 0.09, 95% CI: 0.01 – 0.97, p = 0.047). However none of these  
242 two variables remained statistically significant when a multivariable analysis was performed.

## 243 **Discussion**

### 244 **Socio-economic factors**

245 This study found that utilization of health insurance by patients with diabetes or hypertension  
246 was low, standing at only 40.8%. The utilization was associated with participants’  
247 membership of a microfinance scheme and years since the first time when they were first  
248 diagnosed with diabetes/hypertension. Patients who had not been members of a microfinance  
249 scheme were less likely to enrol in a health insurance scheme. A potential explanation for this  
250 finding may be the potential role played by microfinance schemes in improving social  
251 solidarity and supporting their members to get used to making regular small contributions.  
252 Microfinance schemes may thus be used for priming participants to the behaviour of regular  
253 payments when designing and implementing the forthcoming NHIS.

254 The study also found that patients who had been diagnosed with diabetes/hypertension 5 – 9  
255 years ago were three-fold more likely to enrol in a health insurance scheme compared to  
256 those who had been diagnosed with the chronic condition 0 – 4 years ago. This indicates a  
257 positive relationship between length of time since being diagnosed with  
258 diabetes/hypertension and acquisition of health insurance. One possible explanation of this  
259 finding is that patients with more years since diagnosis may have encountered difficulties  
260 paying for health care out of pocket and consequently sought insurance cover. Patients  
261 attending the Mbarara Regional Referral Hospital hypertension clinic spend as high as  
262 500,000 shillings per month on medication (Okello *et al.*, 2016). In the US, the total  
263 estimated cost of diagnosed diabetes in 2012 was estimated at \$245 billion, including \$176  
264 billion in direct medical costs and \$69 billion in reduced productivity (American Diabetes  
265 Association, 2013). The substantial burden that diabetes/hypertension imposes on patients

266 may thus explain the increased willingness to seek to join insurance schemes as the length of  
267 time since diagnosis increases. Similar studies in future should test for this directly by  
268 including both the length of time since patients were diagnosed with diabetes/hypertension  
269 and the cost of medication as key independent variables.

270 Other demographic and socio-economic factors including age, gender, marital status, level of  
271 education, household size, main source of income, income per month and perception about  
272 diabetes/hypertension were not statistically significant.

### 273 **Awareness of scheme existence**

274 In this study, utilization of health insurance was found to be significantly associated with  
275 awareness about the existence of health insurance schemes. If all factors are held constant,  
276 patients who were not aware of the existing schemes were 99% less likely to take up health  
277 insurance compared to those who knew about health insurance schemes operating in the  
278 study area. This mirrors the findings of studies conducted in Tanzania, Ethiopia and Ghana  
279 which reported that awareness of scheme existence was a significant determinant of scheme  
280 utilization (Asia *et al.*, 2005; Obse *et al.*, 2015; Owusu-Sekyere & Chiaraah, 2014). It is thus  
281 crucial that clear messages on health insurance be delivered to patients with diabetes or  
282 hypertension possibly through home visits, mass media and awareness campaigns by scheme  
283 staff, scheme members and trusted community leaders. In all these awareness-raising  
284 initiatives, the focus should not only be on the amount of premium that potential enrolees are  
285 expected to pay but should also focus on explaining concepts such as solidarity, optimism,  
286 trust and social protection.

### 287 **The proposed national health insurance scheme**

288 The vast majority of respondents were supportive of the idea of starting the NHIS in Uganda  
289 although concerns were raised about high premiums and poor handling of finances which

290 might ruin trust and hinder individuals from joining the scheme. The challenge of low  
291 enrolment due to premiums that are not affordable has previously been reported (e.g. Basaza  
292 *et al.*, 2008; Molyneux *et al.*, 2007). In Kenya and Tanzania, previous studies reported that  
293 households were not interested in enrolling for health insurance due to corruption (Molyneux  
294 *et al.*, 2007; Mulupi *et al.*, 2013). In Uganda, Orem and Zikusooka (2010) argued that key  
295 systems relating to governance and accountability need to be in place if the NHIS scheme is  
296 to be successfully implemented.

297 The majority of respondents proposed that premiums should be made every month and that  
298 each person should, on average, contribute Ug shillings 8,200 (USD 2.3) per month. This  
299 amount, however, is considerably high and may be unaffordable for many especially those  
300 who have no jobs and those in the informal sector. The amount is even higher than the Ksh  
301 160 (USD 2.0) paid per month in Kenya and the Tsh 5,000 - 15,000 (USD 2.0 – 6.0) paid per  
302 household per annum in Tanzania (Mtei *et al.*, 2007; Mulupi *et al.*, 2013). One possible  
303 reason why respondents proposed such a high amount to be contributed each month could be  
304 that patients with diabetes or hypertension are currently facing a significant burden in paying  
305 for medical care so much so that paying about 8,000 shillings per month would represent  
306 significant relief. Future studies could investigate this further.

### 307 **Study limitations**

308 The major limitations of this study are three-fold. First, the sample of respondents was drawn  
309 from a large referral hospital and a private not-for-profit hospital in Mbarara town and may  
310 thus be viewed as less suitable to represent the average rural patients in the region. However,  
311 these hospitals are referral sites which provide care for many patients with diabetes or  
312 hypertension living in other districts in rural southwest Uganda. Second, the predominance of  
313 females (n = 235 vs 135 males) might also be seen as a limitation. It might, however, be an  
314 indication of gender differences in healthcare-seeking behaviour since men tend to seek care

315 from private for-profit clinics while women more often use government and private not-for-  
316 profit health facilities where payment is relatively low (Hjelm & Atwine, 2011). Third, this  
317 was a cross-sectional study and as such it was not possible to examine causality and effects of  
318 the investigated factors. A longitudinal study could have provided more insight into  
319 associations between utilization of health insurance and the demographic and socio-economic  
320 factors and awareness of scheme existence.

321 Despite these limitations, this study, to our knowledge, is the first to demonstrate a  
322 relationship between utilization of health insurance and belonging to a microfinance scheme.  
323 Our study has important implications for the design of health insurance schemes. First, when  
324 designing the forthcoming NHIS the government may use microfinance schemes for priming  
325 participants to the behaviour of regular payments. Second, our finding that utilization of  
326 health insurance is associated with awareness of scheme existence calls for the government,  
327 scheme staff and other stakeholders to design and deliver health insurance messages to the  
328 community using various communication channels which may include radio talk shows,  
329 home visits and community meetings. Third, it is important that policy makers and health  
330 service managers take into consideration the expectations and concerns of people with  
331 diabetes and hypertension by ensuring that they get cheaper medical treatment and access  
332 quality care.

### 333 **Future research**

334 Future studies should seek to gain more in-depth knowledge about microfinance schemes and  
335 their potential role as an entry point for health insurance programs for patients in this and  
336 other study areas. Another issue for research is whether the cost of accessing medical services  
337 influences the willingness of people with chronic diseases to pay relatively high health  
338 insurance contributions.

## 339 **Conclusions**

340 The findings of this study indicate that utilization of health insurance by patients with  
341 diabetes or hypertension is significantly associated with socio-economic factors and  
342 awareness about the existence of health insurance schemes. In addition, we found that most  
343 of the patients with diabetes or hypertension are willing to enrol in the proposed national  
344 health insurance scheme.

## 345 **Abbreviations**

346 SDGs: Sustainable Development Goals; WHO: World Health Organization; UHC: Universal  
347 Health Coverage; OOP: Out-Of-pocket Payments; NHIS: National Health Insurance Scheme;  
348 CBHI: Community Based Health Insurance; GoU: Government of Uganda; MoH: Ministry of  
349 Health

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355 interviews and shared their unique insights.

## 356 **Authors' contributions**

357 PK conceived and designed the study, collected data and undertook data analysis and the  
358 interpretation of data, synthesis of findings and drafting of the manuscript while LWB and  
359 GA supervised the study. RB and FB participated in the interpretation of data, synthesis of  
360 findings and drafting of the manuscript. All authors read and approved the final manuscript.

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## 364 **Competing interests**

365 The authors have no competing interests to declare.

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452 Table 1: Demographic and socio-economic characteristics of study participants

Variable	Category	n (%)
Gender	Male	135 (36.5%)
	Female	235 (63.5%)
Age (years)	Mean; median; range	57.3; 58; 18–89
Marital status	Married	297 (80.3%)
	Widow	48 (13.0%)
	Divorced	12 (3.2%)
	Single	13 (3.5%)
Household size	Mean; median; range	6.3; 5; 1–30
Level of education	None	92 (24.9%)
	Primary	154 (41.6%)
	Secondary	67 (18.1%)
	Tertiary	57 (15.4%)
Main source of income	Farming	232 (64.8)
	Business enterprises	72 (20.1)
	Salaried employment	54 (15.1)
Income per month	Below Ug Shillings 100,000	207 (57.0%)
	Ug Shillings 100,000 – 500,000	120 (33.1%)
	Ug Shillings 500,000 – 1,000, 000	26 (7.2%)
	Above Ug Shillings 1,000,000	10 (2.8%)
Member of a microfinance scheme	Yes	148 (41.3%)
	No	210 (58.7%)
Years since respondents were first diagnosed with diabetes/hypertension	Mean; median; range	6.6; 4; 0–41
Perception about diabetes/hypertension	Extremely dangerous	334 (90.3%)
	Somewhat dangerous	17 (4.6%)
	Not at all dangerous	15 (4.1%)
	I don't know	4 (1.1%)
Able to keep paying OOP	Yes	209 (62.8%)
	No	124 (37.2%)

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457 Table 2: Descriptive statistics of the participants' awareness of health insurance schemes

<b>Variable</b>	<b>Category</b>	<b>n (%)</b>
Heard about health insurance schemes	Yes	178 (49.4%)
	No	182 (50.6%)
Had ever been enrolled in a health insurance scheme	Yes	155 (42.0%)
	No	214 (58.0%)
Currently enrolled in any health insurance scheme	Yes	149 (40.8%)
	No	216 (59.2%)
Frequency of paying premiums	Annually (every 12 months)	146 (96.7%)
	Quarterly (every 3 months)	2 (1.3%)
	Monthly (every month)	3 (2.0%)
Main reason for choosing a particular scheme	Reduced cost of drugs	134 (88.2%)
	Regular access to medicines	4 (2.6%)
	To avoid having to pay each time they visit	1 (0.7%)
	Helps in times of emergency	1 (0.7%)
	Has aspect of education for children	1 (0.7%)
	Choice made by others	11 (7.2%)
Persons covered by insurance	Insured person alone	130 (92.9%)
	Insured person and spouse	4 (2.9%)
	Insured person, spouse and up to four children	6 (4.3%)
	Insured person, spouse and all dependants	0 (0%)
Main reason for non-enrolment	Lack of information on health insurance	53 (64.6%)
	High insurance premiums	22 (26.8%)
	Mistrust of health insurance agents	2 (2.4%)
	No need for health insurance	5 (6.1%)
Coping strategies	Salary from last month	8 (3.7%)
	Savings	48 (22.4%)
	Help from family and friends	97 (45.3%)
	Loans	1 (0.5%)
	Reduction in daily living cost	60 (28.0%)

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466 Table 3: Logistic regression of factors associated with utilization of health insurance (n =  
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Independent variable	Bivariate analysis		Multivariable analysis	
	OR (95% CI)	P-value	OR (95% CI)	P-value
Age (years)				
18 – 44	1			
45 – 54	0.73 (0.37 – 1.42)	0.350		
55 – 64	1.11 (0.56 – 2.17)	0.771		
65 – 89	0.75 (0.40 – 1.43)	0.381		
Gender				
Male	1			
Female	0.76 (0.49 – 1.17)	0.207		
Marital status				
Married	1			
Single/Divorced/Widowed	0.75 (0.43 – 1.28)	0.285		
Household size				
1 – 4 members	1		1	
5 – 8 members	1.67 (1.03 – 2.7)	<b>0.038</b>	1.87 (0.76 – 4.57)	0.172
> 8 members	2.28 (1.28 – 4.08)	<b>0.005</b>	1.64 (0.60 – 4.50)	0.340
Level of education				
None	1			
Primary	0.67 (0.39 – 1.14)	0.137		
Secondary	1.42 (0.75 – 2.68)	0.284		
Tertiary	1.11 (0.57 – 2.18)	0.759		
Main source of income				
Farming	1		1	
Business enterprises	1.42 (0.82 – 2.46)	0.211	0.97 (0.32 – 2.91)	0.955
Salaried employment	2.43 (1.31 – 4.52)	<b>0.005</b>	1.61 (0.48 – 5.36)	0.440
Income per month				
Below Shillings 100,000	1		1	
100,000 – 500,000	1.59 (1.0 – 2.53)	<b>0.049</b>	0.69 (0.26 – 1.80)	0.450
500,000 – 1,000,000	3.4 (1.43 – 8.09)	<b>0.006</b>	0.42 (0.09 – 1.95)	0.270
Above 1,000,000	1.91 (0.54 – 6.84)	0.317	0.21 (0.03 – 1.68)	0.140
Member of a microfinance scheme				
Yes	1		1	
No	0.34 (0.22 – 0.53)	<b>&lt; 0.001</b>	0.34 (0.15 – 0.78)	<b>0.011</b>
Years since first diagnosis				
0 – 4	1		1	

5 – 9	2.87 (1.69 – 4.9)	< <b>0.001</b>	2.99 (1.14 – 7.87)	<b>0.026</b>
10 – 41	3.15 (1.85 – 5.36)	< <b>0.001</b>	2.21 (0.86 – 5.69)	0.102
Perception about diabetes/hypertension				
Extremely dangerous	1			
Somewhat dangerous	0.98 (0.36 – 2.64)	0.970		
Not at all dangerous	0.51 (0.16 – 1.63)	0.257		
I don't know	0.47 (0.05 – 4.54)	0.512		
Able to keep paying OOP				
Yes	1			
No	0.7 (0.44 – 1.11)	0.131		
Aware of existing health insurance schemes				
Yes	1		1	
No	0.01 (0.0 – 0.07)	< <b>0.001</b>	0.01 (0.0 – 0.02)	< <b>0.001</b>

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481 Table 4: Descriptive statistics of the participants' willingness to enrol in the proposed NHIS

Variable	Category	n (%)
Had heard about the proposed NHIS	Yes	67 (19.1%)
	No	284 (80.9%)
Is it a good idea to have the NHIS in Uganda?	Yes	345 (97.5%)
	No	9 (2.5%)
Why it is good or not good to have NHIS in Uganda	Will help people to save money incurred on paying for treatment which is often expensive	158 (42.9%)
	Will ease access to quality health care	87 (23.6%)
	Will lead to improved health seeking behaviour as a result of early screening	52 (14.1%)
	Will bring about equity because it will act as a risk-pooling mechanism	68 (18.5%)
	NHIS will have high premiums	1 (0.3%)
	Funds remitted to government will not be used properly due to corruption	1 (0.3%)
	No need to join another insurance scheme	1 (0.3%)
Willing to join the proposed NHIS	Yes	316 (97.8%)
	No	7 (2.2%)
Proposed contribution per month (in shillings)	Mean; median; range	8,200; 5,000; 500–100,000
Frequency of making contributions	Annually (every 12 months)	133 (36.7%)
	Semi-annually (every 6 months)	9 (2.5%)
	Quarterly (every 3 months)	21 (5.8%)
	Monthly (every month)	190 (52.5%)
	Weekly (every week)	9 (2.5%)
Suggestions for those who will not be able to join because they are unable to pay (poorest members)	They should be exempt from payment	259 (76.2%)
	Their contributions should be paid by government or donors	37 (10.9%)
	Services at government facilities should be improved to ensure quality care for all	28 (8.2%)
	They should pay subsidized premiums	6 (1.8%)
	They should be encouraged to join savings and credit schemes to afford subsidized premiums	3 (0.9%)
	I don't know	7 (2.1%)

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484 Table 5: Logistic regression of factors associated with the willingness of participants to enrol  
 485 in the proposed national health insurance scheme

Independent variable	Bivariate analysis		Multivariable analysis	
	OR (95% CI)	P-value	OR (95% CI)	P-value
Age (years)				
18 – 44	1			
45 – 54	0.95 (0.08 – 10.72)	0.965		
55 – 64	1.57 (0.10 – 25.78)	0.750		
65 – 89	0.75 (0.08 – 7.42)	0.807		
Gender				
Male	1			
Female	2.21 (0.49 – 10.03)	0.305		
Marital status				
Married	1			
Single/Divorced/Widowed	0.55 (0.10 – 2.91)	0.482		
Household size				
1 – 4 members	1			
5 – 8 members	1.72 (0.28 – 10.47)	0.556		
> 8 members	0.85 (0.14 – 5.24)	0.864		
Level of education				
None	1			
Primary	0.85 (0.08 – 9.50)	0.894		
Post-primary	0.33 (0.04 – 2.97)	0.320		
Main source of income				
Farming	1			
Business enterprises	0.25 (0.03 – 1.83)	0.172	0.43 (0.05 – 3.54)	0.433
Salaried employment	0.15 (0.02 – 0.93)	<b>0.042</b>	0.37 (0.05 – 2.84)	0.336
Income per month				
Below Shillings 100,000	1			
100,000 – 500,000	0.14 (0.01 – 1.23)	0.076	0.22 (0.02 – 2.48)	0.222
Above 500,000	0.09 (0.01 – 0.97)	<b>0.047</b>	0.17 (0.01 – 2.58)	0.200
Member of a microfinance scheme				
Yes	1			
No	3.82 (0.73 – 20.02)	0.112		
Years since first diagnosis				
0 – 4	1			
5 – 9	1.16 (0.12 – 11.3)	0.901		
10 – 41	0.41 (0.08 – 2.07)	0.279		

Perception about chronic diseases

Extremely dangerous	1	
Somewhat or not dangerous	0.70 (0.08 – 5.99)	0.744

Able to keep paying OOP

Yes	1	
No	1.35 (0.26 – 7.06)	0.726

Aware of the existing health insurance schemes

Yes	1	
No	2.31 (0.42 – 12.77)	0.339

Aware of the proposed NHIS

Yes	1	
No	1.89 (0.36 – 10.03)	0.452

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