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Effect of financial health risk protection education on health insurance knowledge and enrollment willingness among rural households in Tanzania: a cluster randomized controlled trial

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Abstract

Background Many countries have introduced health insurance schemes to accelerate progress toward Universal Health Coverage (UHC) and improve access to healthcare. However, limited awareness of catastrophic health expenditures and the risk of impoverishment from healthcare costs may hinder enrollment. In Tanzania, these gaps underscore the importance of financial health risk protection education as a strategy to enhance insurance knowledge and enrollment willingness, especially among rural households.

Objective To measure the effect of financial health risk protection education on knowledge and willingness to enroll in health insurance among rural households in Tanzania.

Methods The study was a cluster-randomized controlled trial. Total of 560 household heads were assigned randomly to a control or intervention group (280 in each group). A questionnaire was used to collect data. Intervention group received education for 1 month then was followed for 2 months. Outcomes measured were change in knowledge on financial health risk protection, health insurance for all and willingness to enroll. Logistic regression was conducted to establish a relationship between knowledge and willingness to enroll.

Results The odds of knowledge about financial health risk protection and health insurance for all increased substantially in the intervention households at endline compared to baseline. Participants in the intervention group were two times more likely to have adequate knowledge about financial health risk protection at the endline compared to the baseline study [(OR = 0.478, $p = 0.005$) baseline to (OR = 2.3, $p < 0.0001$) endline]. Similarly, participants in the intervention group were more likely to have adequate knowledge about health insurance at the endline compared to the baseline study [(OR = 0.20, $p = 0.29$) baseline to (OR = 1.4, $p < 0.0001$) endline]. The odds of willingness

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to enroll in health insurance increased two times more in the intervention households at the endline compared to the baseline study [(OR=-0.28, $p=0.18$) baseline to (AOR = 2.2, $p<0.0001$) endline].

Conclusion Financial health risk protection education significantly improved knowledge and willingness to enroll in health insurance among rural households, demonstrating its potential to promote insurance uptake. Scaling up such educational interventions in rural Tanzania is recommended to address knowledge gaps, enhance enrollment, and advance progress toward Universal Health Coverage.

Trial registration The trial was registered on 11th April 2023, with registry number PACTR202304503715724, Clinical trial number not applicable.

Keywords Catastrophic health spending, Health insurance for all, Out of pocket payments and financial health risk protection

Introduction

Worldwide, it has been estimated that majority of the population especially in middle- and low-income countries become financially impoverished due to health care spending [1]. Financial impoverishment is caused by an increase in out of pocket payments (OOP) which is the direct cost incurred by a household member when using health services [1]. In 2010, the WHO reported that around 150 million individuals in the World underwent financial crises upon use of health services, where 5% became extremely poor in some countries [2]. Trends of increasing out of pocket payments, catastrophic health spending and poverty due to health expenditures have increased and in 2017 it was estimated that half of the world's population lacked access to essential health services whereas 100 million fell into poverty due to out of pocket expenses [3].

The World Health Organization (WHO) assembly in 2015 called for universal health coverage (UHC) as a means to prevent health financial catastrophes, the universal health coverage theme was adopted in sustainable development goal (SDG) number 3, target 3.8 of the United Nations to achieve the universal health coverage by the year 2030 [3]. Lack of financial protection in health, increases the out of pocket payments and impoverishes the economy which leads to unaffordability of health services and then poverty [4]. To combat with increases of out of pocket payments and the catastrophic health spending, the low and middle income countries adopted community based health insurance (CBHI) as a financial pooling strategy to expand health insurance coverage and mitigate the financial impact of health care costs to their citizens [5]. The low literacy in health insurance affects an individual's decision regarding willingness to enroll in a health insurance scheme and this may lead to catastrophic health spending [6, 7] & [8].

Upon acquiring independence in 1961, Tanzania has passed through several waves of financial reforms in health including; introduction of user fees in 1990s, establishment of the community health fund and national health insurance fund (NHIF) in 2001 and upgrade of the community health fund to improved community health fund (iCHF) in 2018. The aim of all these was to expand financial health risk protection service accessibility to the citizens [9]. Despite the efforts, the enrollments in health insurance have remained low. Only 15% of the country's population are covered with health insurance [10, 17]. Meanwhile, the country has committed to achieve universal health coverage by introducing health insurance for all, which will require all citizens to have health insurance. The commitment resulted from the increased out of pocket payments and catastrophic health spending to citizens which threatens the household income, community and nation at large [17]. The strategy of health insurance for all is expected to increase enrollment in health insurance, strengthen leadership in health insurances and service expansion to meet the demand needs, while at the same time increasing pooling and availability of medical products [10].

Literature from Sub-Saharan Africa (SSA) and low- and middle-income countries has shown that low knowledge about health insurance was associated with low enrollments in health insurance (HI) schemes [7 & 8]. Moreover, in Tanzania, scholars have reported that limited knowledge on HI and financial health risk protection (FHRP) are among factors associated with low enrollment in HI. They therefore recommended an educational intervention as an important strategy to increase enrollment in HI and emphasized the need to focus on low-income groups with limited formal education [11, 12] & [13]. Evidence from the literature has shown that providing education on FHRP and HI enhances the decision ability and likelihood of enrolling to HI [14 & 15]. Therefore, to succeed in the mission of UHC in Tanzania, there was a need to educate the community on financial health risk protection and health insurance. Hence, this study aimed at providing education on FHRP and HI based on the assumption that increased knowledge would empower communities to make informed decisions to seek health insurance and result in behavior change (enrollment in the scheme).

The study used the health belief model by Abraham Sheeran 2014 [16], underpinned by its constructs i.e., the perceived susceptibility, severity, benefits & barriers and cues to action/self-efficacy. It was conceptualized that educating the community on FHRP and HI, using the theory would have provided the participants to perceive possibility of economic hardship due to health expenses, estimate the severity of the hardship and its impacts to the household but also perceive the benefits of having health insurance. This in turn could help the participant to make self-behavioral reflection on the need of being financially protected through increasing the willingness to enroll in health insurance. The intervention was expected to demonstrate the high level of FHRP knowledge and increase the willingness to enroll in the coming health insurance for all among the rural households who received FHRP education compared to those who did not receive education. The conceptual framework of the study is attached as supplementary file 6.

Materials and methods

Study area

The study was conducted among rural communities at Misungwi district in Mwanza region, Tanzania. Misungwi is one among seven districts in Mwanza region with 27 wards, 115 villages and 58,601 households. Among these households, only 7687 are enrolled in iCHF (13%) [17]. In 2022, the district had a population of 467,867. These 66,192 were urban residents while 401,675 were rural residents [11]. Most of the human activities in the district are farming, fishing, and small-scale businesses [18]. The district has 2 hospitals, 4 health centers and 44 dispensaries with 497 total health care workers [19]. Reports from the district showed that for the past three years, there has been a decrease in utilization of health services. The number of clients in the outpatient registry at the facilities ranged from 287,067 clients in 2020, 259,472 clients in 2021 and 237,750 clients in 2022. The decrease was associated with an increase in health expenses, unaffordability of health services and low enrollment in health insurance schemes [17].

Study design, population and inclusion criteria

The study was a Cluster randomized controlled design with quantitative approach. The villages were randomized into intervention and control groups. A unit of randomization (cluster) was a village. The study population was rural community members in Misungwi District. The rural population was targeted because according to the ILO report 2020/2021, 89.9% of all Tanzanians are employed in the informal sector and the majority are living in rural areas [20]. The study included household heads, aged from 18 years and above who consented to participate in the study. The study focused on household heads because existing literature shows that household heads are financial decision makers and responsible for covering health services costs when the household member uses health services [21]. The study excluded transients, seriously ill and mentally ill household heads. These conditions cause emotional and physical distress which affects the individual's abilities in learning, comprehension and decision making [22].

Sample size determination

Sample size was determined through a formula by [23].

At power 80% which is stated as

$$N = DE^{*}\left(Z_{1-\alpha/2+}Z_{\beta}\right)^{2}\frac{P_1\left(1-P_1\right)+P_2\left(1-P_2\right)}{\left(P_2-P_1\right)^{2}}$$

Where,

N = total sample size.

Z α = z value at level of significance 95%.

Zβ = z value at power 80%= 0.84.

ρ = Intercluster correlation, the study used 0.01 from literature [24].

DE = Design effect.

$DE = 1 + (20 - 1)\,0.01 = 1.2$

P1 = Proportion of an outcome in control group which was 0.01 from literature [24].

P2 = Proportion of an outcome in an interventional group estimated to be 0.06.

Therefore $N = 1.19\,(1.96 + 084)^{2}\frac{0.01(1-0.01)+0.06(1-0.06)}{(0.06-0.01)^{2}}$

The sample size (N) was = 243. To obtain the sample size for two groups the sample size was doubled to 486. Adding 11% attrition, the total sample size became 540 household heads. To get the number of required clusters K = N/M [24]. K = required number of clusters, N = Total sample size calculated and M = cluster size which was 20 households. Therefore, to obtain the total number of clusters (K) total sample size(N) was divided by the cluster size (M) = 540/20 dividing these clusters to intervention and control gave 13.5, since there is no half village as a cluster it was estimated as 14 clusters per each arm. The required number of household heads from each cluster (village) were 20, From each cluster 20 household heads were included in the study; hence the final total size became 560 household heads.

Participant's recruitment and allocation sequence

The principal investigator generated the allocation. After random selection of geographical zones, in the selected zones, village leaders were consulted and the total number of households in their areas was obtained. The principal investigator systematically allocated the households in both zones which were to be involved in the study.

Systematic sampling technique with the starting point obtained using a table of random numbers was used to select the houses in each village. The sampling interval of two was used to pick the house. The first house to be interviewed was randomly selected by randomly pointing in the random number table with eyes closed so as to obtain the starting number. From the first house, every second house was selected till sample size was obtained. The direction of movement was determined by random selection. The selected households were contacted by phone, households in which the selected head declined to participate or was not reachable were excluded from the study, and the next eligible household on the list ywas contacted. The allocation was done blindly in both zones to control for allocation bias. After the selection the research assistants enrolled the participants. The participants' recruitment process is shown in Fig. 1.

Randomization

The villages were randomized based on economic status and awareness of health insurance to ensure comparability between control and intervention groups. An initial assessment, using a WHO and World bank–adapted tool, was conducted to control for confounding differences in household economic status. Awareness of health insurance for all was assessed to ensure both groups had at least some knowledge of the subject, thereby controlling for factors that could influence the intervention's outcomes. This assessment, conducted using a tool adapted from WHO and World bank Global monitoring report of 2021 [3] served as a reference for randomizing study participants. Findings indicated that participants from the two zones were comparable in the assessed characteristics (Supplementary File 1), allowing for randomization. Simple random sampling was then applied to assign the zones into control and intervention groups. The SPIRIT checklist for the intervention is presented in Table 1.

Data collection tools, method and process

Data was collected in the control and the intervention groups from May to September 2024. A structured questionnaire which was adapted from the Ministry of health Tanzania [10, 25], pre-tested and modified to meet the study objectives. The questionnaire covered the following sections; (1) Socio-demographic information, (2) Knowledge on financial health risk protection, (3) Knowledge on the health insurance for all and (4) Willingness to enroll in health insurance for all. The questionnaire was prepared in English and then translated to Swahili language. To ensure content related validity the questionnaire was back translated to English and again in Swahili by two professional

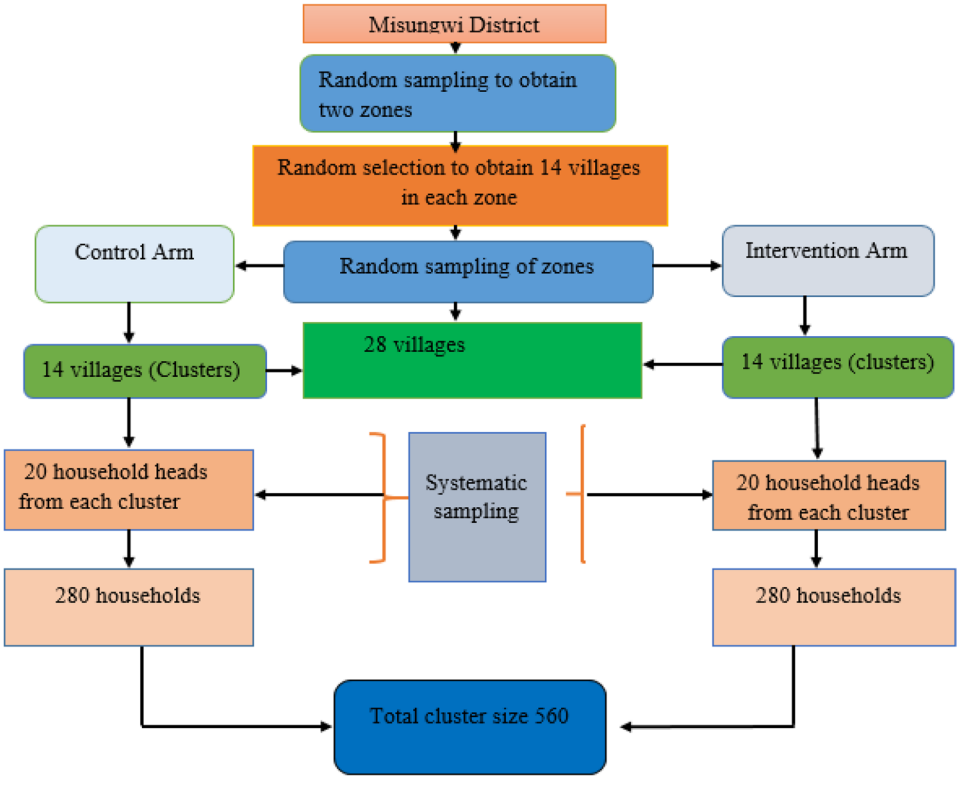

Fig. 1 Participant's recruitment diagram

Table 1 The spirit checklist for the intervention

	STUDY PERIOD							
	Enrolment	**Allocation on**	**Intervention group Sessions (2 sessions weekly)**				**Follow-up**	**Close-out**
TIMEPOINT**	-t1	0	S1	S2	S3	S4		tx
PREPARATION	April 2024							
Modification of teaching tool	v							
Training of research assistants	v							
Pre-baseline household economic assessment	v							
ENROLLMENT								
Eligibility screen	xx	v						
Informed consent	x	v						
Allocation	x	v						
BASELINE DATA COLLECTION	1 st to 15th May 2024							
Financial health risk protection knowledge	x	v						
Health insurance for all knowledge	x	v						
Willingnessto enroll assessment	x	v						
INTERVENTION	20th May – 20th June 2024							
Financial health risk protection education								
Health insurance for all education								
ASSESSMENTS:								
Two months follow up	22nd June – 22nd August 2024							
Financial health risk protection knowledge			v	v	v	v	v	
Health insurance for all knowledge			v	v	v	v	v	
Willingness to enroll in health insurance							v	
Endlinedata collection	23rd August- 10th September 2024							
Financial health risk protection knowledge	x	x	x	x	x	x	x	v
Health insurance for all knowledge	x	x	x	x	x	x	x	v
Willingness to enroll in health insurance	x	x	x	x	x	x	x	v

Key -t1: Time before the intervention (preparation)

-tx: Time after the intervention (endline)

S1, S2, S3, S4: Session numbers

V: Activity performed

X: Activity not performed

:⟷: Activity performance timeline

experts in the field who were fluent in both English and Swahili. In order to establish face validity, the questionnaire was further reviewed and critically assessed by two experts in the field. Data was collected in two phases; baseline and endline.

Baseline and end-line study

A baseline cross-sectional study was conducted in each selected village, where the principal investigator and trained research assistants used questionnaires (Supplementary File 2) to collect socio-demographic data, knowledge about financial health risk protection, awareness of health insurance for all, and willingness to enroll. Two months after the intervention, an end-line survey was carried out in both the intervention and control groups, repeating all baseline measures except demographic data to assess for the effect of the intervention. Data collection was conducted by 12 iCHF registration officers and six community health workers, who were selected based on their strong communication skills. The assistants underwent six days training on using smartphones, study tools, data collection procedures, and the intervention process. They also played a role in the delivery of health education.

The intervention

The intervention had three phases; the intervention, follow-up and the post intervention. The implemented intervention was financial health education on financial health risk protection and health insurance for all. The health education package included two components. The first component was focused on the financial health risk protection package which consisted of (1) knowledge about vulnerability of becoming poor due to health expenses (2) knowledge about poverty severity due to health expenses (3) benefit of having health insurance (4) barriers to enrolment and (5) strategies to have a health insurance. The second component was the health insurance for all package which consisted of (1) aim of health insurance for all, (2) service coverage, (3) benefit packages, (4) payment modalities and (5) beneficiaries' description. The intervention flow is shown in the Fig. 2.

The training material (supplementary file 3) was developed after conducting an intensive literature review from the global monitoring report on financial protection in health [3] and the Ministry of Health Tanzania documents about health insurance [10]. The material was reviewed by experts in the field and was then translated to Swahili language to make them understood well by participants. The financial health risk protection and health insurance for all education was delivered in two phases of the study.

First phase

The first phase was delivered after the baseline data collection. The intervention group was provided with education on financial health risk protection and health insurance for all. Intervention was conducted with a group of 20 participants two times a week in a period of one month in each group to accomplish the eight sessions. Sessions were interactive and lasted for 45–60 min. The research assistants (6 Community Health Workers) delivered educational materials to the participants using a teaching plan (supplementary file 4) prepared by researchers. The whole process of delivering education to participants was supervised by the principal investigator. At the end of the first phase, participants were provided with education material leaflets for self -reading.

Second phase

Participants in the intervention group were followed up in a group of 10 household heads. The follow-up was twice a week for two months after the first phase. This was done by research assistants and principal investigators in the village executive office halls within the

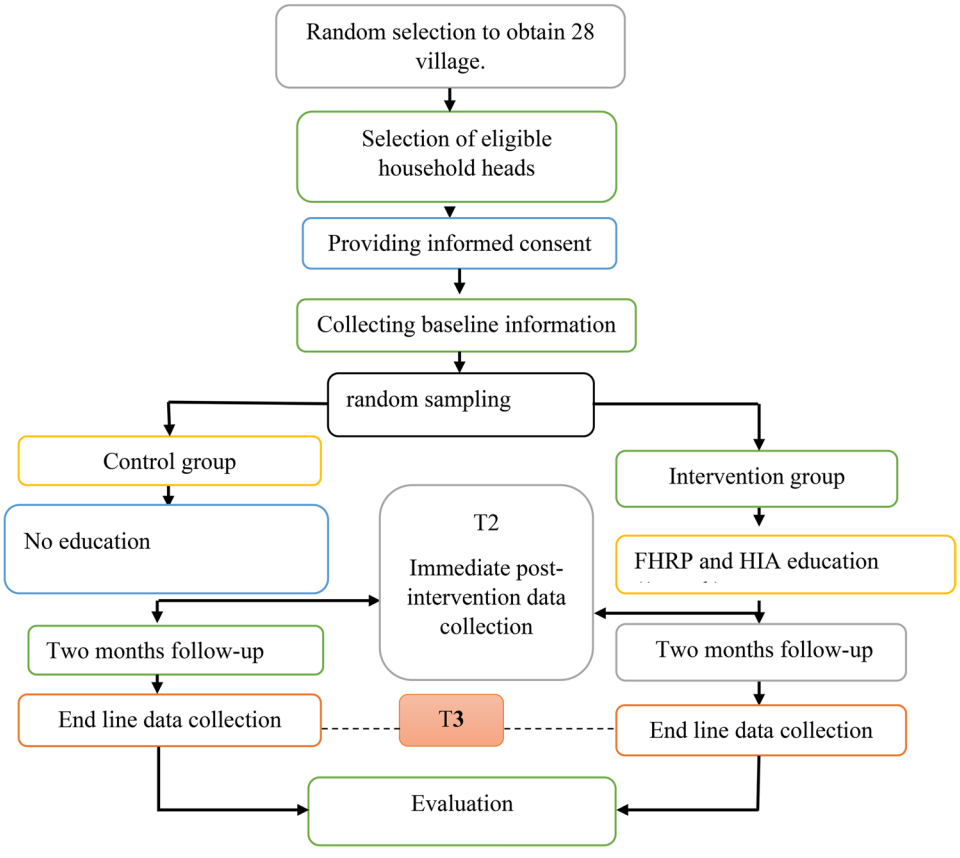

Fig. 2 The intervention flow diagram

villages or other agreed places which were able to contain all the participants. During follow-up, discussion on financial health risk protection and health insurance for all was done using the discussion guide (supplementary file 5) which was prepared by researchers. Also, review of the previous covered content was performed and participants were reminded to review the provided leaflets. Tracing and follow-up of participants in the intervention group was conducted by the principal investigator in collaboration with the research assistants to ensure the adherence to the intervention.

Post intervention phase

The end-line survey was conducted in both groups (intervention and control) two months after the intervention. The information assessed during baseline survey was re-assessed to measure the effectiveness of intervention. Knowledge of health insurance for all and financial health risk protection was measured by using the same questionnaire used during the baseline survey. At the end of the study the control group was provided with education material leaflets for self-reading to acquire knowledge on financial health risk protection and health insurance for all.

Strategies for achieving participation

To ensure adherence, follow-up was conducted over twice a week over a two months period. The principal investigator in collaboration with the research assistants scheduled the communication to remind the participants about the content of the intervention, by explaining the purpose. The participants were also provided with standardized leaflets for self-reading. The principal investigator was responsible to assess, collect and report the adverse events, from data collectors and the participants daily during the trial. However, during the trial no adverse events were noted. To ensure participation, the principal investigator in collaboration with the research assistants developed a good rapport with the local leaders but also adhered to the ethical principles which guided the research. Not only this but also weekly communication with the household heads helped to establish a good rapport and supported their participation.

The study planned for attrition, but all participants completed the study. The principal investigator conducted an audit of the trial progress. The aim of the trial audit was to update the research team with the progress of the research, communicate and solve challenges which might have occurred. The audit was done every two weeks during the study time. As required by research ethics on human participants studies, that they should not incur harm, considering that participants had to travel from their homes to the agreed place, the traveling fees from their homes to the meeting points was compensated effectively.

Control group

The study employed active controls who did not receive the educational intervention during the trial. However, for ethical reasons, the control group was given education on financial health risk protection, health insurance for all, and take-home leaflets after the end of the study.

Bias control

To minimize bias, the study applied several strategies. Performance bias was reduced through triple blinding, where different research assistants collected baseline data, delivered the educational intervention, and collected post-intervention data, with both participants and the data analyst blinded. Selection bias was addressed by randomly selecting rural villages using the lottery method, conducted by the principal investigator. Allocation bias was controlled by randomly assigning two zones through the lottery method and systematically allocating households within each zone. Households were contacted by phone, and if the selected household head was unreachable or declined, the next household was chosen, with allocation conducted blindly to prevent researcher bias.

Study variables measurement

The dependent variable was the willingness to enroll in health insurance for all and the independent variables were; the intervention (knowledge on financial health risk protection and health insurance for all) and the social demographic characteristics of the study participants.

i. Dependent variable
   Willingness to enroll in health insurance for all was measured by using one question with dichotomous responses Yes or No [26] and [27] The 'Yes' responses were considered as willing to enroll and 'No' responses were considered as not willing to enroll.
ii. Independent variable
   a Knowledge about financial health risk protection was assessed by a total of ten questions with binary responses 'yes' and 'no.'1(one) mark was awarded for correct response and 0 (zero) was awarded for incorrect response, and the total score was 10. Knowledge level was measured by calculating a mean score. The scores of five and above signified participant had "adequate knowledge" and below that was considered had "inadequate knowledge" [28]
   b Knowledge about health insurance for all was assessed by a total of five questions with binary

responses. '1(one) mark was awarded for correct response and 0 (zero) was awarded for incorrect response, and the total score was 5 (five). Knowledge level was measured by calculating a mean score. The scores of three and above signified participant had "adequate knowledge" and below that was considered had "inadequate knowledge" [28].

Validity and reliability of the study

Content validity was done to ensure the questionnaire items reflect relevant local knowledge, beliefs and terminologies. Public health specialists, health insurance expertise and community health workers reviewed the content of the questionnaire. The questionnaire was translated in Kiswahili by a bilingual translator familiar with health and insurance terminologies and then a second independent translator back-translated into English to see if it kept the original meaning. Face validation was done by pretesting the questionnaire with a small sample of 70 participants from the rural population who had similar characteristics with the study area but were not included in the actual study. After pretest the unfamiliar terms were replaced with locally used terms to make sure the questions were understandable. Internal consistency for reliability was measured by Cronbach's alpha (> 0.7) which indicated the consistency of the tool.

Data processing and analysis

Data was cleaned, edited and entered for analysis. Data was analyzed by using STATA version 17 statistical software. Descriptive statistics were used to describe participants' characteristics where frequency and percentages of variables were obtained and presented in tables. Bivariate and multivariable logistic regression was done to establish the relationship between independent and outcome variables. Odds ratio and their corresponding 95% confidence intervals and the p-value were reported as measures of association. p-value of < 0.05 on two sided tests were considered statistically significant. Independent t tests were performed to describe the mean difference in knowledge between the intervention and the control group two groups. The effect of the intervention was measured by the generalized estimating equation (GEE) model. This model was preferable because it measures the effect of the intervention across the population rather than cluster-specific effect [29]. The results were presented in tables and figures.

Table 2 Frequency and percentage distribution of social demographic characteristics of household heads (N=560)

Variable	Category	Intervention	Control
		n (%)	n (%)
Gender	Male	167(59.64)	193(68.93)
	Female	113(40.36)	87(31.07)
Household Size	Small	71(25.36)	63(22.50)
	Medium	188(67.14)	177(63.21)
	Large	21(7.50)	40(14.29)
Age category	18–24 yrs.	14(5)	2(0.71)
	25–49 yrs.	141(50.36)	150(53.57)
	50 + yrs.	125(44.64)	128(45.71)
Level of education	Never attended school	48(17.14)	36(12.86)
	Primary education	211(75.36)	228(81.43)
	Secondary education	16(5.71)	14(5.00)
	Certificate/diploma	5(1.79)	2(0.71)
Occupation	Farmer	258(92.14)	270(96.43)
	Non-Farmer	22(7.86)	10(3.57)
Monthly Income	10,000–99,999/=	210(75.00)	266(95.00)
	100,000–499,999/=	59(21.07)	13(4.64)

Results

Social demographic characteristics of the study participants

A total of 560 household heads participated in the study, response rate was 100%. Of all household heads 360 were males. Participants' social demographic characteristics are explained in Table 2.. In the control group, most (68.93%) of household heads were males and more than half (67.14%) were in medium size families. Half (50.36%) of the household heads were between the age of 24–49 years. Three quarters (75.36%) had completed primary education and the majority (92.14%) of them were farmers. Three quarters (75%) of the household heads earned a monthly income between 10,000 and 99,999 Tanzanian shillings. In the intervention group, more than half (59.64%) of participants were male household heads. Majority (63.21%) of households' members were in medium size families. Half (50.36%) of household heads were between the ages of 24–49 years Also, a high proportion (81.43%) of household heads had completed primary education. Most (96.43%) of the household heads were farmers. Majority (95%) of household's monthly income ranges between 10,000 and 99,999 Tanzanian shillings.

Assessment of knowledge on financial health risk protection

Table 3 shows the results of knowledge on financial health risk protection in the control and the intervention group.

Control group

At baseline results showed that half (50.7%) of the respondents knew that financial health risk protection will enable accessibility of health care services at any time, at the endline this proportion increased to 87.5%. More than half of the respondents were aware that financial health risk protection assures the continuum of care in diseases which requires long care processes (51.7%)

Table 3 Participants responses on knowledge of financial health risk protection

	Knowledge scores							
	Baseline				**Endline**			
	Control		Intervention		Control		Intervention	
Item	Yes	No	Yes	No	Yes	No	Yes	No
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Qn 1	142(50.7)	138(49.2)	187(66.7)	93(33.2)	245(87.5)	35(12.5)	274(97.8)	6(2.14)
QN2	145(51.7)	135(48.2)	175(62.5)	105(37.5)	239(85.3)	41(14.6)	268(95.7)	12(4.2)
QN3	145(51.7)	135(48.2)	164(58.5)	116(61.4)	222(97.2)	58(20.7)	266(95)	14(5)
QN 4	143(51.0)	137(48.9)	161(57.5)	119(42.5)	203(72.5)	77(27.5)	260(92.8)	20(7.14)
QN5	142(50.7)	138(49.2)	168(60)	112(40)	204(72.8)	76(27.1)	261(93.2)	19(6.7)
QN6	139(49.6)	141(50.3)	162(57.8)	118(42.1)	207(73.9)	73(26.07)	256(91.4)	24(8.5)
QN7	81(28.9)	199(71.0)	145(51.7)	135(42.8)	163(58.2)	117(41.7)	98(4.7)	182(65)
QN8	73(26.0)	207(73.9)	142(50.7)	138(49.2)	160(57.1)	120(42.8)	89(31.7)	191(68.2)
QN9	134(47.8)	146(52.1)	151(53.9)	129(46.07)	216(77.1)	64(22.8)	259(92.5)	21(7.5)
QN10	133(47.5)	147(82.2)	156(55.7)	124(44.2)	218(77.8)	62(22.1)	261(93.2)	19(6.7)

QN 1. Being financially protected will enable me and my family membersto access health care services any time due to financial protection, QN 2.Being financially protected assures the continuum of care particularly fordiseases which require long care process, QN 3. Being financially protectedwill prevent my family from excessive health spending, QN 4. The family incomewill improve if I became financially protected, QN 5. My family will beprotected from unnecessary payments if I became financially protected, QN 6.Due to disease uncertainties, being financially protected will reduce the riskof severe poverty to my family, QN 7. Only the poor needs to be financiallyprotected, QN 8. Financial health risk protection is for the formal sectoremployees only, QN 9. Financial health risk protection improves pooling of theeconomically well-off population with the economically disadvantagedpopulation, QN 10. Financial risk protection enables sick individuals andnon-sick to contribute for each other.

and that financial health risk protection prevents the family from excessive spending (51.7%). At the endline the proportion of those who were aware that financial health risk protection assures the continuum of care in diseases which requires long care processes increased to 85.3% and those who were aware that financial health risk protection prevents the family from excessive spending increased to 97.2%. The proportional of participants who were knowledgeable that family income will improve with financial health risk protection increases from baseline (51.0%) to endline (72.5%). The proportion of respondents who were aware that financial health risk protection will protect the family from unnecessary payments increases from baseline to endline (50.7% to 72.8%) respectively.

In the baseline, about half (49.6%) of the respondents were aware that financial health risk protection could reduce the risks of severe poverty in the family, the endline proportion increased to 73.9%. During the baseline study, a quarter (25%) of the study participants knew that not only the poor need to be financially protected in health and at the endline nearly half (41.7%) of participants knew that not only the poor need to be financially protected in health. At the baseline more than a quarter (28.6%) of the participants understood that financial health risk protection was not for the formal sector alone, however at the endline this proportion increased to 42.8%. Less than half of the participants knew that financial pooling in health will improve between the economically well-off and the disadvantaged population (47.8%) and the sick and non-sick will contribute to each other (47.5%) with financial health risk protection. At the endline, these proportions increased to 77.1% and 77.8% respectively. The mean knowledge score was 4.5 ± 4.1SD and 6.5 ± 3.4SD at baseline and at the end line respectively. Based on cutoff points used to assess knowledge score, the overall proportion of having adequate knowledge on financial health risk protection in the control group was 48.5% and 81.0% at baseline and endline respectively.

Intervention group

At baseline, results showed that more than half (66.7% and 62.5%) of household heads knew that, being financially protected will enable accessibility of health care services and financial health risk protection assures the continuum of care in diseases which requires long care processes respectively. More than half of the study participants knew that families will be protected from excessive spending (58.5%) and the family income will improve (57.5%) with financial health risk protection. Being financially protected in health was recognized to prevent the family from risks of severe poverty by 60% of the study participants. Less than half (42.8% and 49.2%) of the household heads knew that it was not only the poor and the formal sector who needed financial protection respectively. More than half (53.9% and 55.7%) of the respondents understood that financial health risk protection improves pooling of the economically well-off population with the economically disadvantaged population and financial health risk protection enables the sick and non-sick to contribute to each other respectively.

At the endline, results showed that there was an increase in proportion of participants who were knowledgeable in various aspects of financial health risk protection compared to baseline. Most of the aspects

assessed had the proportion of over 90%, with the exception of two variables namely; "not only the poor need to be financially protected in health" and "financial health risk protection is for the formal sector only" which had a proportion of 65% and 68.2% respectively. The mean knowledge of financial health risk protection at baseline was 5.2 ± 4.04SD and increased to 9.6 ± 1.6SD at the endline. Based on cutoff points used to assess knowledge score, the overall proportion of adequate knowledge on financial health risk protection in the intervention group was 46% at baseline and 98.5% at the endline.

Assessment of knowledge on health insurance for all

Table 4 shows the results of knowledge on health insurance for all in the control and the intervention group. In the control group, results in Table 4 shows that at baseline less than a quarter (20%) of the study participants knew that not only those who fall sick require to have health insurance. This proportion increased at the endline to 52.1%. More than half (52.2%) of the participants were aware that health insurance finances future health care needs, while at the endline this proportion increased to 63.9%. More than a quarter (26.0%) of the participants knew that health insurance is not a saving scheme, at the endline the proportion of awareness among participants increased to 30.7%. A quarter (25.3%) of the respondents understood that beneficiaries' premiums will not be returned back even if no claims were made to health insurance, this proportion increased to 47.1% at endline. Less than a quarter (24.6%) of the participants were knowledgeable that not only those who fall sick need health insurance, at the endline this proportion increased to a quarter (25.5%). The mean knowledge of health insurance for all at baseline was 1.4 ± 1.7SD and increased to 2.2 ± 1.4SD at endline. Based on cutoff points used to asses knowledge score, the overall proportion of adequate knowledge on health insurance for all in the control group was 24.3% and 40% at baseline and endline respectively.

In the Intervention group, results in Table 4 shows that, at baseline, less than a half (40.3%) of the study participants knew that not only those who fall sick require health insurance, during endline, this proportion increased to more than half (67.5%) of the participants. The proportion of household heads who knew that health insurance finances future health care increased from baseline (42.8%) to endline (86%). At baseline about half (46.7%) of the respondents knew that health insurance is not like a savings scheme, this proportion increased to 51.1% at the endline. During baseline 39.2% of the participants knew that beneficiaries' premiums will not be returned back even if no claims were made by health insurance, this proportion increased to about three quarters (71.4%) at the endline. Less than half (43.2%) of the respondents knew that not only those who fall sick need to have health insurance, at the endline this proportion increased to 66%. The mean knowledge of financial health risk protection at baseline was 1.6 ± 1.6SD and increased to 3.5 ± 1.4SD at endline. Based on cutoff points used to assess knowledge score, the overall proportion of adequate knowledge on financial health risk protection in the intervention group was 28.5% and 76% at baseline and endline respectively.

Mean knowledge difference on financial health risk protection between the control and the intervention groups at different study times

Results (Table 5) of the independent t-test showed that at baseline, there was a significant mean difference in knowledge between the control and the intervention ($\Delta M = 1.2$, $t = 3.45$, $p = 0.007$). At the endline the mean difference between the control and intervention group increased to ($\Delta M = 2.47$, $t = 12.71$, $p < 0.000$).

Mean knowledge difference on health insurance for all between the control and the intervention groups at different study times

Table 5 shows the results of an independent t-test. At baseline, there was no significant mean difference in

Table 4 Participants responses about knowledge of health insurance for all

Knowledge scores								
	Baseline				Endline			
Item	Control		Intervention		Control		Intervention	
	Yes	No	Yes	No	Yes	No	Yes	No
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
QN1	224(80)	56(20)	167(59.6)	113(40.3)	134(47.8)	146(52.1)	91(32.5)	189(67.5)
QN2	147(52.5)	133(47.5)	120(42.8)	160(57.1)	179(63.9)	101(36.0)	242(86)	38(13.5)
QN3	207(73.9)	73(26.0)	149(53.2)	131(46.7)	194(69.2)	86(30.7)	137(48.9)	143(51.1)
QN4	209(74.6)	71(25.3)	170(60.7)	110(39.28)	148(52.8)	132(47.1)	80(28.5)	200(71.4)
QN5	211(75.3)	69(24.6)	159(56.7)	121(43.2)	209(74.6)	71(25.5)	95(33.9)	185(66)

QN 1. Only the very poor who cannot afford to pay for healthcare need to join the schemes, QN 2. Under Health insurance for all program, you pay money (premiums) in order for the health insurance to finance your future health care needs, QN 3. Health insurance for all is like savings scheme, you will receive interest and get your money back, QN 4. If you do not make claims through Health insurance, your premium will be returned, QN 5. Only those who fall sick should consider enrolment in Health insurance

Table 5 Mean differences on knowledge of financial health risk protection and health insurance for all between the control and the intervention group at different study times

Baseline				Endline						
				95%CI					95%CI	
	Mean	S. error	S. deviation	Lower	Upper	Mean	S. error	S. deviation	Lower	Upper
Control	4.5	0.24	4.15	4.07	5.04	7.13	0.18	3.03	6.78	7.49
Intervention	5.8	0.24	4.08	5.23	6.23	9.61	0.06	1.16	9.47	9.74
Difference	1.2	0.34		0.50	1.87	2.47	0.19		2.08	2.85
T-value	3.45					12.71				
P-value	0.007					0.0000				
Health Insurance for all										
Baseline						Endline				
Control	1.43	0.10	1.71	1.23	1.63	2.27	0.08	1.49	2.11	2.44
Intervention	1.68	0.97	1.63	1.49	1.88	3.52	0.09	1.48	3.35	3.7
Difference	0.25	0.14		0.23	0.53	1.25	0.07		1.0	1.5
T-value	1.79					10.21				
P-value	0.07					0.0000				

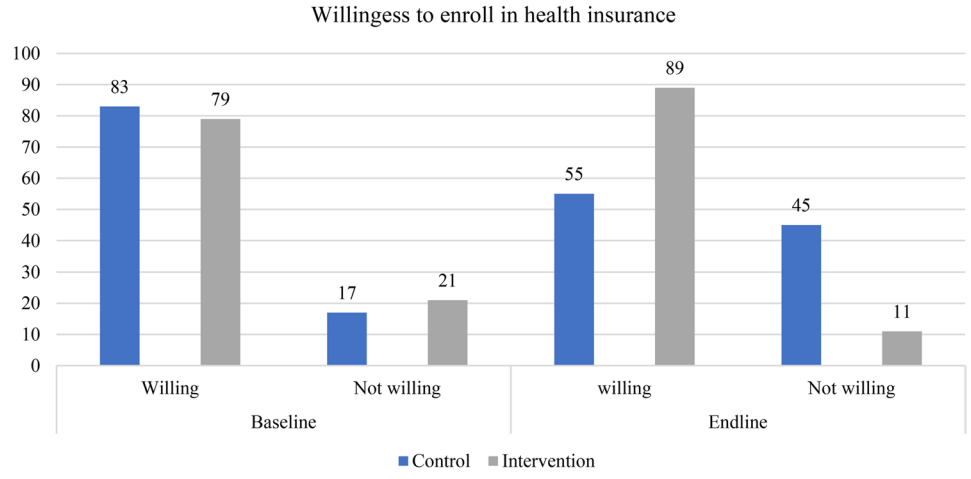

Fig. 3 The Willingness to enroll in health insurance between the control and intervention group at different study times

knowledge between the control and the intervention ($\Delta M = 0.25$, $t = 1.79$, $p = 0.07$). At the endline there was a significant mean difference between the control and intervention group that increased to 1.25 ($\Delta M = 1.25$, $t = 10.21$, $p < 0.0000$).

The willingness to enroll in health insurance at baseline and endline

Results in Fig. 3 shows that in the control group more than three quarter of the study participants (83%) were willing to enroll in health insurance for all at baseline, at endline the proportions decreased to 55%. In the intervention group, the majority (79%) of the study participants were willing to enroll in health insurance for all at baseline, at endline proportion increased to 89%.

The effect of the intervention on knowledge of financial health risk protection

Table 6 shows the results of the fitted GEE for the effect of intervention on chance of having adequate knowledge on financial health risk protection. The results of the model revealed that, at baseline there was no significant difference in knowledge of financial health risk protection between subjects in intervention and the control group ($\beta = 0.478$, 95%CI: 0.143–0.183, $p = 0.052$). At the endline, the magnitude of the D-I-D (β) for the intervention group was 2.2. ($\beta = 2.2$, 95%CI: 1.27–3.33, $p < 0.0001$). Based on these results, it showed that the change in proportion of subjects with adequate knowledge from baseline to endline was significantly higher among subjects in the intervention group as compared to subjects in the control group.

Table 6 Effect of the intervention on financial health risk protection, health insurance for all and the willingness to enroll in health insurance

	Financial health risk protection			Health insurance for all			Willingness to enroll in health insurance		
Effect	**Estimate(95%CI)**	**S. error**	***p*-value**	**Estimate(95%CI)**	**S. error**	***p*-value**	**Estimate(95%CI)**	**S. error**	***p*-value**
Intercept	−0.05(−0.29–0.18)	0.12	0.63	−1.12(−1.39–0.846)	0.14	< 0.0001	1.65(1.33–1.97)	0.16	< 0.0001
Time									
Endline (after 2 months)	1.51(1.19–1.83)	0.16	< 0.001	0.712(0.36–1.07)	0.19	0.002	−1.43(−1.78–1.09)	0.17	< 0.0001
Baseline	ref								
Treatment									
Intervention	0.48(0.14–0.81)	0.17	0.052	0.202(−0.174–0.56)	0.19	0.29	−0.28(−0.72–0.143)	0.22	0.18
Control	ref								
	Difference in difference coefficient								
Time treatment (Effect after 2 months)	2.30(1.27–3.33)	0.53	< 0.0001	1.4(0.84–1.9)	0.27	< 0.0000	2.23(1.70–2.76)	0.27	< 0.0001

The effect of the intervention on knowledge of health insurance for all

Table 6 shows the results of the fitted GEE for the effect of intervention on the chance of having adequate knowledge on health insurance for all. The results of the model revealed that, at baseline, there was no significant difference in knowledge of health insurance for all between subjects in intervention and the control group (β = 0.202, 95%CI: −0.174 to 0.577, $p = 0.2932$). At the endline, the magnitude of the D-I-D (β) for the intervention group was 2.2. (β = 1.400, 95%CI: 0.8426 to 1.958, $p < 0.0001$). Based on these results, it showed that the change in proportion of subjects with adequate knowledge from baseline to endline was significantly higher among subjects in the intervention group as compared to subjects in the control group.

The effect of the intervention on willingness to enroll in health insurance for all

Table 6(additional file 1) shows the results of the fitted GEE for the effect of intervention on willingness to enroll in health insurance for all. At baseline there was no significant difference observed in willingness to enroll in health insurance for all subjects in intervention as compared to those in the control group (β=−0.289, 95%CI: −0.721–0.143, $p = 0.2932$). This means that the two treatment groups were similarly comparable at baseline. At endline, the magnitude of the D-I-D (β) shows a significant higher improvement in proportion of individuals willingness to enroll in health insurance in the intervention group as compared to the control group with (β = 2.2, 95%CI: 1.701–2.763, $p < 0.0001$). positive effect on willingness to enroll in health insurance for all among community members in Misungwi district.

Factors influencing the willingness to enroll in health insurance

Results in Table 7. shows the findings from bivariate and multivariate regression analysis. The factors that were associated with willingness to enroll were; gender, secondary education and financial health risk protection knowledge. After adjusting for the odds, the variables that remained to be significant were; gender and knowledge of financial health risk protection. The finding shows that households headed by male heads were 1.6 times more likely to be willing to enroll in health insurance as compared to female's household heads (AOR = 1.8 95%CI = 1.04–3.17, $p = 0.03$). Results showed that household heads with adequate knowledge on financial health risk protection were 1.5 times more likely to enroll in health insurance compared to those with inadequate knowledge (AOR = 1.5 95%CI = 0.975–3.058, $p = 0.03$). However, the willingness to enroll in health insurance was not influenced by knowledge about health insurance for all.

Discussion

The intervention increased the participants' knowledge about the financial health risk protection and health insurance. As the world is moving towards the universal health coverage, implementation of health interventions on financial health risk protection and health insurance has an important role in fostering knowledge and increasing enrollment in pre-payment schemes which are important in solving the catastrophic health spending. As observed in the results, throughout the study time there was an increase in mean knowledge on financial health risk protection and health insurance for all from baseline to endline in both groups. Despite the increase in knowledge in both groups, the marked increase was more observed in the intervention group. This implies that the intervention had an effect on knowledge of financial health risk protection and health insurance for all, as the difference in difference coefficient showed that the odds of having adequate knowledge on financial health risk protection and health insurance for all increased after the intervention. The effect observed can be influenced by the interactive mode of delivering the education session

Table 7 Factors affecting the willingness to enroll in health insurance

Variable	Category	COR	95%C		P-value	AOR	95%CI		P-value
			Lower	Upper			Lower	Upper	
Gender	Male	1.62	1.04	2.50	0.03	1.8	1.04	3.17	0.03
	Female	Ref							
Marital status	Married living apart	0.44	0.12	1.49	0.18	0.4	0.11	1.45	0.17
	Married living together	0.	0.29	2.13	0.6	0.5	0.19	1.17	0.34
	Separated	0.3	0.11	1.31	0.12	0.3	0.11	1.43	0.15
	Single	0.9	0.28	3.01	0.8	0.9	0.27	3.17	0.91
	Widowed	3.1	0.33	28.7	0.3	3.5	0.37	34.06	0.26
	Divorced	Ref							
Income	10,000–99,999/=monthly	1.6	0.86	3.02	0.48	1.3	0.29	5.77	0.7
	100,000/=–499,999/=	1.07	0.26	4.44	0.9	1.06	0.22	4.95	0.9
	500,000/=and above monthly earning	Ref							
Household size	0–4 members	1.5	0.35	7.26	0.5	1.9	0.38	9.52	0.4
	5–10 members	1.02	0.66	1.58	0.9	1.7	0.66	1.72	0.4
	More than 10 members	Ref							
Occupation	Assured of monthly income	0.6	0.39	11.28	0.6	0.6	0.26	18.29	0.8
	Unemployed	1.5	0.15	14.75	0.71	1. 8	0.10	31.04	0.6
	Retired	Ref							
Education level	Primary education	1.5	0.88	2.67	0.12	1.5	0.87	2.80	0.1
	Secondary education	4.6	1.02	21.27	0.047	4.3	0.91	20.96	0.06
	College	2	0.22	17.58	0.53	2. 1	0.17	28.0	0.5
	Never attended school	Ref							
Knowledge on health insurance for all	Adequate knowledge	1.21	0.85	1.56	0.26	1.2	0.83	1.76	0.32
	Inadequate knowledge	Ref							
Knowledge on financial health risk protection	Adequate knowledge	1.7	1.00	3.12	0.05	1.5	0.98	3.04	0.03
	Inadequate knowledge	Ref							

such as, the use of the trained research assistants, sharing the key take home message in every session and in-class activities.

Similar findings were reported in Ghana and Nigeria by [30 & 31] whereby knowledge about health insurance increased in the intervention group compared to the control group after the education about health insurance. The similarities observed in these studies could be explained in terms of the methods used to deliver the intervention, in which all the studies used interactive learning during the sessions [33]. Therefore, the program for empowering the community on catastrophic health spending will be very important to increase health insurance uptake. Hence, a sustainable program for community empowerment on the benefits of financial health risk protection would benefit this population. Being aware of the benefits of financial health risk protection will increase enrollments in health insurance thus, decrease the catastrophic health spending and resulting poverty among the community members.

In this study, male headed households were more likely to be willing to enroll in health insurance compared to female headed households. This finding suggests a gender disparity in health insurance enrolment, particularly among female headed households. These households may face difficulties such as limited knowledge, mistrust and competing financial priorities. To address these issues, health insurance education campaigns should be gender sensitive and policymakers should consider subsidy models, flexible premium payments or financial empowerment. Furthermore, gender equity goals should be integrated into health insurance schemes to ensure equal benefits for both men and women. The finding of this study concurs with a study conducted in Togo which found that male headed households were more willing to enroll in health insurance as compared to women headed households [32]. The similarity of the results can be explained by the shared culture norms between the two contexts whereby in African culture men are commonly family providers who are responsible for the financial issues in the household and women often have lower incomes and fewer opportunities. The finding in this study contradicts the findings from Ghana where females were more likely to enroll in health insurance as compared to males. The likelihood of female enrollment in Ghana was due to the reason that females were provided

with free health insurance particularly during pregnancy [14].

Having secondary education was associated with willingness to enroll in health insurance. This can be explained with the fact that education could expose individuals to different means of information which can enable them to understand the importance of being insured in health. The finding of this study is in line with other studies conducted in Africa which found that formal education was associated with willingness to enroll in health insurance [33, 34] & [35]. This study recommends program planners and policy makers to design community-based programs for educating the population on the importance of financial health risk protection and having covered with health insurance, this will lead to increased enrollment in health insurance funds. The finding of this study is different from the study in Nigeria which found that education has no influence in willingness to enroll in health insurance [36]. The observed differences in the findings could be due to different study populations and settings whereby, this study involved only household heads in rural areas, while Nigeria's study involved any individual in the community both urban and rural, in which in urban areas there could be more educated individuals than in rural areas.

Having adequate knowledge about financial health risk protection was found to influence willingness to enroll in health insurance for all. This could imply that, uninsured individuals who acquired knowledge about health insurance and financial issues after the education intervention in this study developed interest to enroll in health insurance, as knowledge on financial health risk protection may create awareness on catastrophic vulnerability. The findings of this study is congruent with the study in Myanmar which reported that adequate knowledge on financial health risk protection, increased trust in health insurance as well as the willingness to enroll in the health insurance scheme [6]. The finding of this study differs from that of Ghana which found that, despite the increase in knowledge, there was a significant decline in enrollment in health insurance. The declined enrollment was explained by lack of adequate and sustainable communication programs about the health insurance scheme [30]. Hence, it is important to improve the knowledge level of community members in order to increase enrollment in health insurance for all. Information on health insurance on what is covered, services that are free, services that might cause out of pocket payment, how to access health care under the insurance, and which services are eligible to get reimbursement, are very important knowledge for beneficiaries of health insurance as far as enrollment is concerned.

This study revealed that the intervention had an effect on willingness to enroll in health insurance as it was observed that the odds of willingness to enroll in health insurance were high in the intervention group at the end-line as compared to the control group. The increase in odds of enrollments can be attributed to the education intervention provided. The finding of this study could imply that targeted education interventions can be an effective strategy to increase willingness to enroll in health insurance. Policymakers could consider integration of structured educational programs into national health financing initiatives, particularly in rural communities, to improve understanding of health insurance benefits and enhancement enrollment rates, thereby advancing progress toward universal health coverage. These findings are supported with the studies from Nigeria, Ghana and Bangladesh, where the willingness to enroll in health insurance increased after an education program [31, 37] & [38].

The finding of this study is different from Elizabeth Shultz et al., [30] from Ghana who found that, despite high knowledge of the participants on health insurance, the enrollment declined significantly as a result of unavailability of sustainability of communication of information on health insurance programs to the community. Therefore, program sustainability is of paramount for successful enrollment in health insurance.

Strength and limitations of the study

The study assessed the current issue in the country, by trying to find the means which will help the Tanzania Government to achieve universal health coverage through health intervention. The timing of the intervention before the actual implementation of the health insurance for all in the country has provided an overview of community members knowledge as far as health insurance for all is concerned thus, the study finding can inform the implementation process to a great extent. Due to the presence of the control group and similarities of the groups it could be possible to conclude that, the knowledge change observed was due to the intervention. Knowledge was assessed by using yes and no questions, which is essential when using actual scale to measure knowledge rather than self-reporting. The intervention can serve as a platform to impart knowledge on FHRP and HI in the community, as the study shows that adequate knowledge was associated with increased willingness to enroll in health insurance. Moreover, the intervention activities provided the opportunities for regular gathering and knowledge exchanges between the community members.

Considering the implementation of the intervention was based on targeting household heads, the potential of success in achieving greater knowledge of health insurance and financial health risk protection might be enhanced by organizing similar intervention

through household heads on a wider scale. Despite the strengths, there was a possibility of contamination as results showed that at some points there were significant increases of knowledge in the control group. The increase in the control group could probably be due to a possibility of spillover from the intervention to the control group. However, the researcher attempted to control contamination by randomization of the control and the intervention from different district zones. The variable willingness to enroll (WTE), was measured via a single binary yes/no response which lacks depth of understanding the extent of willingness. The use of Likert scale could provide a more detailed understanding of participants' willingness to enroll in health insurance, capturing degrees of hesitancy or strength of intention.

Conclusion

This study revealed that an educational intervention is effective in changing the community's knowledge about financial health risk protection and health insurance for all to a great extent. The improvement led to an increased willingness to enroll in health insurance. The improvement observed after the intervention reflects the applicability of the mode of delivering the education package. This implies the package can be used in different local settings with greater success. Therefore, to increase enrollment in health insurance, there is a need to provide education on financial health risk protection and health insurance to the community members.

Recommendation

Having been informed by the findings from this study, the study recommends that, before implementing the health insurance for all policy in Tanzania, policy makers should consider that the topic in question is made clear from the grassroots (communities), to ease the implementation process. The study recommends a follow-up qualitative study approach to explore in depth motivations, beliefs, and contextual factors influencing participants' willingness to enroll in health insurance.

Abbreviations

CBHI	Community based health insurance
CHE	Catastrophic health expenses
CHS	Catastrophic health spending
DMO	District medical officer
FHRP	Financial health risk protection
GoT	Government of Tanzania
HBM	Health belief model
HIA	Health insurance for all
HI	Health Insurance
ICHF	Improved community health fund
MOH	Ministry of health
NHIF	National health insurance Fund
NHIS	National health insurance scheme
NGO	Non- governmental organization
OOP	Out of pocket
PHIA	Proposed Health Insurance for all
SA	South Africa
SDG	Sustainable development goal
UHC	Universal health coverage
WHO	The world health organization
WTE	Willingness to enroll

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12889-025-25021-z.

Supplementary Material 1.

Supplementary Material 2.

Supplementary Material 3.

Supplementary Material 4.

Supplementary Material 5.

Supplementary Material 6.

Supplementary Material 7.

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Not applicable.

Potential benefits

Community members benefited directly by understanding the trends of poverty attributed to health expenditures but also acquired knowledge on health insurance, measures of preventing them from catastrophic health expenditures. In addition, the study provided the policy makers with insight on developing strategies of increasing enrollment during when health insurance for all implementation begins.

Potential risks

Participants were informed that there were no risks associated with the study.

Authors' contributions

L.K, supervision, reviewing, coordinating and consultationN.S.G supervision, Methodological techniques, reviewing and consultation J.K Supervising and reviewing the progress.C.S.M Supervising and Coordination.V.O.L Conceptualized, Methodology and wrote the manuscript.

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Data availability

Data in this study will be shared upon request from the corresponding author.

Declarations

Ethics approval and consent to participate

The Vice Chancellor of the University of Dodoma granted the approval for conducting the study through the University of Dodoma Research Review Ethical Committee by a letter with Ref No. MA/84/261/02/'A'/59/401 dated on 9th March 2023.The letter from the University of Dodoma was sent to Mwanza Region Authority, where the permission to conduct the study was given through the regional administrative Secretary (RAS) by a letter with ref. No. DA.137/372/01/which was dated on 16/March 2023. This letter was submitted at Misungwi District Authority where the permit to conduct the study was given through a letter with ref No. AM/M.20/28/VOL.IV/165 dated 10th April 2023. The trial adhered to the ethical principles by the declaration of Helsinki and to the research ethics of the United Republic of Tanzania.
Participants was informed about the research and then written informed consent declarations were sought from the study participants. Also, participants were informed on the voluntary nature of their capacity, and that they were free to continue or withdraw from the study at any time. Participants were assured that their identity in this study was confidential and numbers were used instead of participant names. Data collected was/will be used for the purpose of this study only. Study participants were assured that

there were no risks associated with their participation in this study. Consent was given in written form.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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