Community Based Health Insurance Schemes and Protection of the Rural Poor: Empirical evidence from Tanzania

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Abstract

The objectives of this study are two folds: firstly to explore the magnitude of catastrophic expenditure, and secondly to determine its contributing factor,s including the protective impact of the voluntary community based health insurance schemes in Tanzania. The study covered 274 respondents. Study findings have shown that the estimated poverty line was Tsh.35,064.6 (US$21.25). Of the sampled respondents, 30.3% experienced catastrophic expenditure in the range of 10-20% of their capacity to pay, and 26.6% of the insured respondents experienced catastrophic expenditure. The average catastrophic expenditure for the sample is 26.64%. We used logistic regression to predict the factors influencing catastrophic health expenditure. Our results have shown that households with heads involved in social organisations or networks were more protected against catastrophic health expenditures. On the other hand, households headed by a female and involved in farming, were more likely to experience catastrophic health expenditure. Further, in households whose heads had low levels of education and households having members with recurring or chronic illness were more likely to experience catastrophic health expenditure. While households with insurance cover were more likely to be protected from the risk of catastrophic health expenditure compared with those not covered by insurance schemes, there are no significant differences in terms of lessened catastrophic expenditure that poor participants and non-participants enjoyed from their participation in CHF.

Keywords: catastrophic expenditure, social protection, community based health insurance, community health fund.

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1.0 Introduction

Health shock is among the major factors that contribute to poverty in the developing countries today. The effects of Ill health and poverty have also been observed to complement and reinforcing each other (Wagstaff, 2002). Precisely, while poverty breeds ill-health on the one hand, on the other hand, ill-health results in impoverishment, indebtedness and other allied consequences (World Bank, 2002). The impacts of ill health are severe in developing countries because of financial and other institutional limitations that hinder the provision of affordable and quality health care services by governments and the lack of inclusive and pro-poor financial protection mechanisms.

In the absence of health insurance, people who get sick have to pay for medical services out of their own pockets. However, out-of-pocket payments at the time of services use and financial constraints have often been considered significant barriers to access to health care in many low-income countries. Out-of-pocket payments and financial constraints are also the main factors responsible for driving vulnerable households further into poverty (Xu *et al*, 2003). For example, it is estimated that about 150 million people worldwide suffer the catastrophic effects of high and unpredictable health expenditures each year, and health bills impoverish 100 million people each year (Xu *et al*., 2007). In the developing countries more than 50% households meet their health expenditures from out-of-pocket payments (Meghan, 2010).Estimates show that the share of out-of-pocket expenditures as a percentage of total expenditure on health in India stands at 86% (Selvaraj *et al*., 2012), 45% in Ghana and 11% in South Africa (Meghan, 2010).

The pathways through which a health shock and out of pocket expenditures affect households include increasing health expenditure in the event of illness; and by affecting productivity and income earning capacity of households(Asfaw et al. 2002). The other effects include impaired consumption smoothing and ability to accumulate assets (Gertler & Gruber, 2002; Wagstaff, 2007). In particular, out of pocket expenditures are blamed for forcing households to resort to coping strategies that are harmful to the family welfare, for example, borrowing funds at a high interest rate to meet both medical expenditure and other household consumption needs, selling productive assets or pulling children out of school. Oftentimes household members may also forgo or consume less medical care. However, forfeiting health care consumption in periods of illness or consumption of less health care may have far-reaching effects on household members' health status. This is because the untreated illness can lead to more severe medical conditions, family disruptions and lost productivity. Untreated illness may also lead to long lasting illness, disability or even death (Flores *et al*., 2008).

In recognition of these facts, developing countries have in recent years increased advocacy for the promotion of social protection mechanisms for the poor. Social protection is now considered an important poverty reduction strategy and a tool in the reduction of susceptibility to socioeconomic and other natural shocks, such as the income and pecuniary consequences of illness. Of the social protection mechanisms that have received attention in the past decade include the community based health insurance schemes (CBHIs).Proponents argue that CBHIs they protect the poor from the adverse financial consequences of illness through the reduction of the out-of-pocket expenditure on health care at the time of services use (Msuya *et al.*, 2007; Franco *et al*., 2008;Aggarwal, 2010). Arguably, health insurance by pooling of risks across members who participate in the health insurance lessens the financial burden of members affected by illness, thus making them more financially resilient in the aftermath of a health shock or any adverse event. Precisely, with insurance cover, a

health shock is much less likely to result in a subsequent financial catastrophe, as most costs are borne by the pool. It is also argued that CBHIs approach is more viable, especially among rural communities because CBHIs are community centered. As such, CBHIs are praised for being able to reach low-income people in rural areas and in the informal sector who are otherwise difficult to reach. Similarly, CBHI scan easily exploit social capital stocks available in communities to bring about greater awareness, but also hold possibilities for the correction of adverse selection and moral hazard problems. CBHIs also encourage preventive measures and increased access to health care (Ahuja & Jütting, 2004).

1.1 Overview of the Tanzania's Voluntary Community Based Insurance (CHF)

Community Based Insurance Scheme, also known as Community Health Fund (CHF) was launched in the country in 1996. For the urban informal sector, insurance scheme similar to the CHFs is the TIKAs (Tiba kwa Kadi). The aim of the fund is to ensure universal health coverage and financial protection by all through increasing financial investment in the health sector. The CHF is a pre-payment voluntary membership scheme where members make prescribed payments at regular intervals to lessen the financial risk of larger payments at the time of service use when a household member becomes ill. Membership in the schemes lasts for one a year, but is renewable. The fund covers up to 6 family members. The premiums paid by members are determined by district authorities (local government) depending on the local conditions, and hence the premiums vary by districts. Research has established that in member districts the premiums range from TZS 5,000 to TZS 20,000 per annum. The benefit package includes all services offered by health centres and dispensaries, but excludes hospital care (URT, 2001, 2011). In addition, the benefits are limited to one health centre or dispensary and are not transferable to other health care providers in the district or in other regions. The national target is to reach 75% of the rural population by 2015 (URT, 2010), however, as of 2011, the average enrolment to the CHF stood at 5%, which is far below the target.Moreover, the evidence of the impact of CHF on reducing people's financial barriers remains scanty (Borgh *et al*., 2013).Research also shows that out-of-pocket payments in Tanzania are considerably high compared to other sources of health care financing. For example, in 2006, about 47% of health care financing came from household out-of-pocket-expenditures (Mtei & Borghi, 2007). Further, studies have noted that health care services in the country benefit the rich more than the poor. Estimation shows that the poorest receive less than 20% of the health benefit than they need (Makawia *et al*., 2010).

Generally, however, while development practitioners and organisations have increasingly recognised the role that community based health insurance schemes play in improving access to health care and poverty reduction efforts (ILO, 2006; UNDP, 2007), their impacton protection of their members through the reduction of out-of-pocket payments, and improving access to healthcare services is inconclusive, debatable and scanty (Tabor, 2005; McIntryre *et al*., 2008). The available evidence is also mixed (Michalopoulos *et al*., 2011;Haddad *et al*., 2012; Oxfam, 2013). Precisely, Haddad *et al.* (2012) argue that "while expectations regarding the benefits of community-based insurance remain high, empirical evidences to support its generalization are still relatively limited". They are also of the view that the evidence is inconsistent and the size of the observed effects is at times modest. Similarly, the Geneva dialogue (2013) suggests that "community-based insurance schemes may ultimately neither be the right model for achieving scale in health insurance, nor for reaching the poorest of the poor". Also, research in a number of countries suggests that the enrolment rate in these schemes remains considerably low (World Bank, 2010; Ito & Kono, 2010) which further

raises a questionas to whether CBHIs are a feasible approach to achieving universal coverage and protecting the poor.

In their study that explored the impact of community health insurance schemes on health care provision in Rural Tanzania, Msuya *et al*. (2007) report that the poorest of the poor were unlikely to participate in the schemes. They also found that although member households were more likely to get treatment than non-member households when members fall ill, there were no significant differences between members and non-members in terms of the use of preventive measures and the amount of health expenditure incurred. In addition, while the study also noted that insured households were better sheltered against financial health shocks than uninsured households, could not provide an empirical evidence of the extent and determinants of catastrophic expenditure. Further, in a more recent study that examined the correlates of out-of-pocket and catastrophic health expenditures in Tanzania, Brinda *et al*. (2014)established that large household sizes, households with heads involved in manual labour, households with members having a chronic illness and households that visited traditional healers were significantly associated with higher out of pocket health expenditures and catastrophic expenditure. Nevertheless, the study could not explore the impact of the health insurance on alleviating the catastrophe. Therefore, the objectives of this study is to explore the size of catastrophic expenditure and it's determining factors, including the evidence of the protective impact of the voluntary community based health insurance schemes in Tanzania. This is because; any efforts to achieving universal coverage and protecting the poor through community based health insurance would require a better understanding of not only the magnitude of catastrophic expenditure but also the factors contributing to the catastrophe.

The remainder of this study is organized as follows. While section 2 gives literature reviews, section 3 sketches out methodology, variables under study and model estimation technique. Section 4 estimates, reports and discusses empirical results. Section 5 provides conclusion, recommendations and limitation of the study.

2.0 Literature review

2.1 Protective effects of community based health insurance schemes

As we have already noted, literature provides mixed and overlapping results regarding the protective effects of voluntary community based health insurance schemes. For example, in their study that estimated the impact of a national rural health insurance scheme in China, Wagstaff *et al*. (2007) found that the scheme increased utilization of both inpatient and outpatient care by 20-30%, but the scheme had no impact on the protection and services utilization among the poor. On the other hand, Ekman (2007) in a study that investigated health care utilization and spending in Zambia found that health insurances were not providing financial protection against the risk of catastrophic payments; instead were found to increase the risk.

In a different study, Saksena (2011) reports that although these schemes are able to enhance higher health care utilization and improved financial risk protection for households; their protective effects are somewhat limited. In particular, Saksena found that the schemes had a higher impact on utilization in lower income levels than higher income categories, however, the schemes offered limited protection. The study established that more than 40% of the insured household members were not using health services when falling ill and 20% of the members who required health care faced a financial burden that exceeded 10%.

In examining the impact of micro-insurance in protecting the poor against health risks in Bangladesh, Werner (2009) established that micro-insurance health schemes were able to reduce barriers to health services for the poor but also encouraged them to use professional and preventive healthcare as opposed to traditional healers. On the contrary, Werner discovered that high-cost health care and services not covered by the scheme were still a major impoverishing factor for the poor. In their study that explored equity in community health insurance schemes in Armenia, Polonsky *et al*. (2009) report higher health care utilization rates among insured households. Similar utilization rates were observed among the poorest quintile of the program members. Members were more likely to visit and seek medical care as compared to non-members. They also established that members who were most at risk of facing barriers in accessing health care, such as women, the elderly and the poor benefitted the most from membership in these schemes.

In a different study in China, Babiarz *et al.* (2010) using a difference-in-difference analysis employing multivariate linear regressions, after controlling for clinic and individual attributes as well as village and year effects, their results show that the scheme induced an increase in village clinic use. However, no change in overall medical care use was observed. They also noted a reduction in out of pocket expenditure for medical care and a decline in financial risk. They are however, of the opinion that the scheme could achieve these results after correction for distortions in country's rural health care system.

Haddad *et al.* (2012) also ascertained that programme members enjoyed substantial savings by paying less than non-members. However, they acknowledge that their study could not determine the specific benefits that accrued to the poor. In the search for the effectiveness of a community based health insurance in rural Burkina Faso, Hounton *et al.* (2012) found that in terms of asset ownership, people in the second and third quintiles made greater use of health services whilst for the fourth and fifth (least poor) quintiles the effect was statistically insignificant.

In their evaluation study of health insurance in rural Cambodia, Levine and Polimeni (2014) established that on average insured households experienced significant decreases in out-pocket expenditure for the treatment of serious health shocks and a decrease in the level of indebtedness in the event of an adverse health shock. Also households were less likely to sell their assets to meet health care expenditure following a health shock. In studying the financial protection effect of health insurance schemes in Ghana, Nguyen *et al.* (2011) also report a reduction of out of pocket expenditures and the likelihood of experiencing catastrophic effect among insured households. Similarly, a significant reduction in the out-of-pocket payments for the sampled poorest quintile of insured households was experienced.

Evidence from Kenya shows that on average insured households, in addition to experiencing reductions in total medical expenditure and inpatient costs, enjoy higher levels of consumption, assets and savings than none member households. Member households are also less likely to seek for informal loans to meet contracted health care costs; yet there is no evidence of increased health facility utilization and improvement in the general well-being of the poor (Dercon *et al*., 2012).

The evidence of reduced financial burden has also been reported in Nigeria, where the insurance induced a 40% decrease in health expenditures. It is also reported that over 70% of insured households enjoyed increased access to quality health care and utilization of health (Gustafsson-Wright, 2013). The study also noted that members were more likely to use

modern health care and private health facilities as a result of the programme than non-members. However, the study could not provide the evidence of the protective effect of health insurance on different categories of the poor. Also, Mebratie *et al*. (2013) in their review of literature on community based health insurance schemes that covered 61 articles, noted that 56 percent of such articles established that the schemes were successful at reducing out of pocket health care expenditures and 86 percent of the articles reported a significant reduction in the risk of catastrophic health expenditure. Their review also found that despite the assumed benefits, community based insurance schemes hardly improved access to health services and social inclusion of the ultra-poor. Further, they noted that even if the lowest income groups become members, they were less likely to use health care services due to their inability to afford pre-payments and other costs associated with accessing health care.

2.2 Determinants of catastrophic of health care expenditure

Studies that have explored the determinants of catastrophic expenditure have also produced conflicting results. In their comparative study that examined the impact of social health protection on access to health care, health expenditure and impoverishment of three African countries, Scheil-Adlung *et al*. (2006) found persons with higher income and education to be more protected from catastrophic expenditure. However, the study could not report any significant sex differences in terms of enjoying financial protection from catastrophic expenditure. They also found that households in rural locations had a higher probability of facing catastrophic expenditure. Households that had senior members in need of health services were also more likely to face catastrophic expenditure, but the effect was insignificant. In contrast, households with members under five years of age were more likely to face catastrophic expenditure in Senegal while the opposite result was obtained in Kenya.

In the quest for household catastrophic health expenditure in Georgia, Gotsadze *et al.* (2009) found that households in the richest quintile were less likely to face catastrophic expenditure when compared with the poorest quintile. Moreover, the odds of facing catastrophic expenditure were higher among households having members with chronic illness and those that needed hospitalization. The evidence from Tajikistan shows that catastrophic expenditure is influenced by economic status and chronic illness among household members. Other factors are disability, the number of small children and a short supply of necessary drugs (Habibov, 2009).

In examining catastrophic health expenditures using household consumption expenditure diaries in Nigeria, Onoka *et al*. (2011)found that 22.6% thepoorest and 7.6% of richest households experienced a catastrophe. However, the study could not determine the socioeconomic and demographic factors that contributed to the catastrophe. Using two different measures of catastrophic expenditure, viz., measuring catastrophic expenditure as out-of-pocket health expenditure based on consumption of necessities and two; measuring catastrophic expenditure as out-of-pocket health expenditure that exceeds some fixed proportion of household income or household's capacity to pay, Pal (2012) arrived at conflicting results. In particular, Pal noted that the incidence of catastrophic health expenditure increased with income when using the first measure, whereas catastrophic expenditure was found to decrease as income increased when using the second measure. The expenditure was also influenced by the economic and social status; and education level of the household heads.

In studying the factors affecting catastrophic expenditure in China, Li *et al*. (2012) established that households having the elderly or chronically ill members were more likely to experience catastrophic health expenditure. Rural households or poor regions were

also found to suffer higher rates of catastrophic expenditure. In contrast, insured households and households with urban employees had lower rates of catastrophic health expenditure. Empirical evidence from Turkey also shows that low income households, households with the elderly and disabled persons; and households that had no insurance cover or green card type health insurance were more likely to face catastrophic health care expenditure (Sozmen, 2013).

In a different study, Majid *et al*. (2014) found that catastrophic health expenditure was influenced by household characteristics, such as income, sex, education and employment status of the household head. The proportion of expenditure spent on food and place of residence were also found to influence the magnitude of catastrophic expenditure. Mettle *et al.* (2014), in their study that analysed catastrophic spending on health in statistically under-developed countries, established that household size, ecological zone, age and education level of the household heads were the significant determinants of catastrophic expenditure. Other factors included the social economic group of the household head. A study in Iran that explored the household financial protection against catastrophic health care expenditures, reports that catastrophic health care expenditure was mainly influenced by household size, economic status and health insurance coverage (Moghadam *et al*., 2012). In a different study in Iran, Kavosi*et al*. (2014) found that catastrophic expenditure was determined by household incomes. They also found that households that had person(s) with chronic illness, households that used dental and inpatient services were more likely to face catastrophic expenditure. Further, households that did not have any supplementary health insurance were more likely to face catastrophic expenditure; however, the impact of medical insurance was not significant.

From the literature review, we deduce that while there could be different reasons for the mixed results, these are attributed partly to differences in the structure of the health insurance market and scheme designs. Some scholars are also of the view that differences in impacts are a result of a voluntary nature of the schemes, and therefore there is an ongoing debate as to whether community based health insurance schemes should be involuntary or voluntary. This is because such schemes have low coverage and exclude the poor. In particular, earlier studies have shown that these schemes suffer a selection bias, with the poorest less likely to enrol as compared to the least poor, hence compromising the notion of achieving equity in access and uptake of services, but also protection of the poorest (Jütting, 2004; Oxfarm, 2013). Research also reports that differing findings emanate from differences in measures of catastrophic health expenditure used (Pal, 2012).

3.0 Methodology

The data used in the study were drawn from a survey of 274 household heads in Kilosa district in March 2012. Kilosa was among the districts that were included in the pilot phase for the establishment of the Community Health Fund (CHF) back in 1996. As of 2012, the district had nine divisions and 46 wards. To select our representative sample, we employed both a multistage cluster and systematic sampling techniques. The approach involved a random selection of three wards and two villages from each division. Similarly, representative household heads were randomly selected from each village using systematic sampling from the village lists of a total population of 4062. Using this approach, household heads were selected skipping every 10th household in the village list. We conducted individual interviews for the randomly selected household heads using semi-structured questionnaires. Our target sample was 400 household heads; however, only 68.5% of respondent questionnaires had complete information that could be used for the study.

3.1 Study variables and model estimation

To measure the financial burden (catastrophic expenditure) of health care expenditure relative to the household's capacity to pay, we firstly collected data on household expenditure on direct health care services, such laboratory test, drugs and medicine and other hospital charges. We also collected data on indirect costs, such as transport to a health centre. Likewise, data were collected on other household expenditures, such as rent, food, transport, clothes, water, electricity, etc. The data collected focused on expenditures incurred during the 30 days prior to the interview. This is because households especially in the rural areas hardly keep record of their expenditures and other economic transactions. On the other hand, we collected data on demographic characteristics of household heads and their households including their socioeconomic information. Specifically, data were collected on age, sex, marital status and family size.

Socioeconomic data include occupation or economic activity, average monthly incomes, education level of the household head and participation in social networks and organisation. Literature suggests that these variables they influence not only the participation in health insurance schemes, but they also determine the magnitude of the health care burden experienced by households (Su *et al*., 2006; Xu *et al.,* 2007).Also to better capture the effect of poverty on the possibility of experiencing catastrophic expenditure, we collected data on the status of the household dwellings and the source of energy for cooking purposes.

3.2 Estimation of the ability to pay and catastrophic expenditure

To measure the extent to which out of pocket expenditure amounted to catastrophic health expenditure, we employed the WHO approach (Xu*et al*., 2003). According to this approach a household is considered to experience catastrophic health care expenditure if out of pocket expenditure is large to the extent that the household consumption expenditure is below the poverty line. Catastrophic expenditure is measured by the household's capacity to pay for health care (Xu *et al*., 2003).Household ability to pay for health care is defined as effective income less subsistence expenditure of the household. It is also defined as household's non-subsistence expenditure. Alternatively, for households whose reported food expenditure is less than their subsistence expenditures, their ability to pay is calculated as the effective income less food expenditure. Nevertheless, while the estimations of effective income and subsistence expenditure require data on total income, reported consumption expenditure is preferred to reported incomes. This is because expenditure data from household surveys are more reliable than income data, particularly in developing countries for the fact that data on tax or payroll are not readily available, but respondents are also more likely to conceal their true incomes (Deaton, 1997). In a study of small businesses in Africa, Daniels (2001) also arrived at the same conclusion. Daniels suggests that in the event of poor or lack of record, information must be derived from memory, and the simplest method to gather the needed information is to ask the respondents about business transactions last month.

To arrive at the capacity to pay, firstly, food expenditure share as a percentage of the household food expenditure over its total expenditure was calculated. However, this should be adjusted for household size to account for the extent of household consumption or equivalent household size. This is because while food expenditures increase with the number of household members; this increase is lower than the increase ratio in household size. In this case, the household equivalence scale is used instead of the actual household size. The equivalence household size is given as the actual household size raised to power 0.56 (Xu *et al*. 2003). To get the equivalised food expenditure, food expenditure is divided by the

equivalent household size. Nonetheless, to minimize measurement error, it is recommended that the calculations should be based on the average food expenditure of households whose food expenditure share is in the 45^{th} and 55^{th} percentile range.

Another step involves calculating the poverty line. The poverty line is used to classify respondents as poor or non-poor. This is the weighted average of food expenditure in the 45^{th} to 55^{th} percentile range. This is also referred to as the subsistence expenditure per capita. To arrive at household's subsistence expenditure, the poverty line is multiplied by the equivalent household size of each household. A household is regarded as poor if its household expenditure is smaller than its subsistence expenditure. As we have already noted, the capacity to pay is therefore given as total household expenditure less subsistence expenditure of the household, if subsistence expenditure is less than food expenditure or as total household expenditure less food expenditure if subsistence expenditure is greater than food expenditure.

Lastly, the burden of healthcare payment (catastrophic expenditure) is defined as the out of pocket expenditure as a percentage of household's capacity to pay. It should, however, be noted that there are no precise thresholds for defining health expenditure as catastrophic. In their study, Wagstaff and Lindelow (2008) considered health expenditure to be catastrophic if exceeded 5 percent of average income, and Nguyen *et al*. (2011) used 10 and 20 percent of non-food consumption expenditure as measures of catastrophic expenditure. WHO (2000)on the other hand, considers health care expenditure to be catastrophic if equals to or exceeds 40% of household's capacity to pay or non-subsistence expenditure.

3.3 Multivariate Analysis

For the purpose of this article, we use logistic regression analysis to explore the effect of the Community Health Fund (CHF) and other factors influencing households' exposure to catastrophic health expenditure. This is because our dependent variable is dichotomous.In our study, a household with health expenditures ranging between 10 and 20% of their ability to pay has been categorized as households that experienced catastrophic expenditures. Hence, our dependent variable takes the value of one (1) if a household experienced catastrophic expenditure and zero (0) if not.

We used the STATA statistical package to model the relationship between catastrophic expenditure and its influencing factors. Moreover, to measure the effects of explanatory variables on our dependent variable, we estimated two models: one with the basic variables (without participation in CHF), the second model with the participation in CHF. Study variables are presented in Table 1 and regression analysis results are given in Table 2.

Table 1: Variables Description and Measurement

Variable Description	Variable measurement/Coding
1. Age in years	Transformed into ln
2. Marital status	1= if married or living with a partner, 0= otherwise
3. Education level	1= if the highest level of education completed is secondary, 0= otherwise
4. Sex	1= Male, 0= otherwise
5. Number of members	Number transformed into ln
6. Number of children	Number transformed into ln
7. Economic activity	1= farming, 0= otherwise
Income levels	
8. Income1	1 = Yes, 0 = No
9. Income 2	1 = Yes, 0 = No
10. Income 3	1 = Yes, 0 = No
11. Income 4	1 = Yes, 0 = No
12. Health status of household members	1= fair, 0= poor
13. Participation in social networks	1 = Yes, 0 = No
14. Participation in CHF	1= Yes, 0= No
15. Nature of a dwelling	1= Wood house, 0= otherwise
16. Type of fuel for cooking	1= firewood, 0= otherwise

Table 2: Logistic regression results with catastrophic health care expenditure as a dependent variable

	Model 1 Without Participation in CHF			Model 2 With Participation in CHF			Model 2 Marginal Effects		
Variables	**OR**	**z**	**P>z**	**OR**	**Z**	**P>z**	**dy/dx**	**Z**	**P>z**
Age of household head	0.559	-1.17	0.242	0.610	-0.99	0.323	-0.084	-0.99	0.322
Number of children	0.688	-0.63	0.527	0.704	-0.58	0.562	-0.060	-0.58	0.563
Education	0.180	-2.12	0.034	0.174	-2.13	0.033	-0.197	-3.66	0.000
Number of members	1.070	0.16	0.873	1.008	0.02	0.986	0.001	0.02	0.986
Fuel type	3.171	2.39	0.017	4.300	2.35	0.019	0.194	3.13	0.002
Income 1	3.111	3.41	0.001	2.002	1.85	0.064	0.123	1.80	0.071
Income 2	0.934	-0.19	0.852	0.914	-0.24	0.809	-0.015	-0.24	0.809
Income 3	0.547	-0.95	0.343	0.546	-0.90	0.366	-0.090	-1.07	0.286
Income 4	0.550	-0.88	0.376	0.546	-0.91	0.365	-0.090	-1.06	0.288
Marital status	1.287	0.53	0.598	1.232	0.42	0.671	0.034	0.44	0.657
Sex	0.460	-2.41	0.016	0.432	-2.53	0.012	-0.147	-2.47	0.013
Economic activity	0.243	-3.58	0.000	0.242	-3.46	0.001	-0.284	-3.18	0.001
Participation in networks	0.247	-3.14	0.002	0.253	-3.00	0.003	-0.187	-3.84	0.000
Health status	1.938	2.01	0.045	1.856	1.84	0.065	0.110	1.80	0.072
House status	3.416	3.03	0.002	3.319	2.57	0.010	0.175	3.04	0.002
Participation in CHF				0.897	-0.08	0.935	-0.018	-0.08	0.934
Fuel type x participation in CHF				0.320	-1.07	0.285	-0.158	-1.36	0.174
House status x participation in CHF				1.139	0.12	0.902	0.023	0.12	0.904
Income1 x participation in CHF				7.596	2.38	0.017	0.452	2.39	0.017
	N = 274 LR Chi2(15) = 80.06 Prob > Chi2 = 0.000 Pseudo R2 = 0.2382			N = 274 LR Chi2(18) = 87.42 Prob > Chi2 = 0.000 Pseudo R2 = 0.2601					

4.0 Results and discussion

The objectives of this paper were to examine the magnitude of out of pocket expenditure for health care (catastrophic expenditure) and its determinants; and secondly to provide an empirical evidence of the financial protection impact of the voluntary community based health insurance schemes in Tanzania.

Our study findings have shown that the household's monthly average food expenditure was Tsh.70,129.10 (US$42.5* or US$ 1.42 per day) whereas, monthly average consumption expenditure was Tsh.248,486 (US$150.6). Analysis has also shown that households' share of food expenditure was 28.2% of the total household consumption expenditure. Further analysis has demonstrated that households' monthly average ability to pay for health was estimated at Ths.39,981.0 (US$24.23 or US$0.81 per day). The estimated poverty line was Tsh.35,064.6 (US$21.25). Of the sampled respondents, 30.3% experienced catastrophic expenditure in the range of 10-20% of their capacity to pay, and 26.6% of the insured

respondents experienced catastrophic expenditure. The average catastrophic expenditure for the sample is 26.64%.

Regarding the determinants of catastrophic expenditure, our results (Table 2) show that households headed by males were 0.396 times less likely to experience catastrophic expenditure as compared to female headed households. Females headed households were 2.52 times more likely to face catastrophic expenditure than male headed households. This finding supports the work of Li *et al*. (2014) in China, which also found that females were more likely to experience catastrophic expenditure as compared to male headed households. This could be ascribed to entrenched poverty and gender inequalities, including limited access to economic opportunities that erode the females' ability to provide for both care giving and other competing household expenditures. Research has also established that due to poverty, female headed households are less likely to purchase a health insurance than the male headed households (Ying *et al*., 2007; Kuwawenaruwa *et al*., 2011). However, in their comparative study that involved three countries in Africa, Xu *et al*. (2007) could not find sex to make a difference in terms of the odds of experiencing catastrophic expenditure.

Households whose head was a member of social associations and networks were less likely to experience catastrophic health care expenditures than non-members ($p<0.005$). These were 0.23 less likely to experience catastrophic expenditure. In contrast, households with heads who were not members of any associations and social networks were 4.3 times more likely to experience catastrophic expenditure than those who members. This further suggests that participation of the household head in associations and social networks reduced their probability of experiencing a catastrophic expenditure. Those who were members of social organisations or associations were 1.9 times less likely to experience catastrophic expenditure than those who were not ($p<0.01$). Studies have also established that there is a positive relationship between social capital and willingness to pay for a community based health insurance (Zhang *et al*., 2007; and Donfouet, *et al*., 2011).

It was also expected that households having members with recurring or chronic illness are more likely to experience catastrophic expenditure than otherwise. Usually, recurring or chronic illness among household members is liable to increase both health care needs and out-of-pocket health care expenditures; hence placing an increased burden on households. Our results show that the risk of facing catastrophic expenditure for households having members with recurring or chronic illness is 2.64 times greater than the risk for their counterparts ($p<0.01$). This finding is consistent with previous studies which found that households with members experiencing recurring or long-term illness are more likely to face the risk of catastrophic expenditure (McIntyre *et al*., 2006: Li *et al*., 2012, 2014).

Our results have also shown that the education level of the respondents is a significant predictor of a catastrophic expenditure experience. In households whose head had education levels above secondary were about 0.15 less likely to experience catastrophic expenditure. In other words, household with lower education levels were 6.6 times more likely to experience catastrophic expenditure than their counterparts ($p<0.05$). Similar finding is reported by Li *et al*. (2014) who also found that respondents with higher education levels were less likely to experience catastrophic health care expenditures in China. Prior research alsoreports that educated people are more likely to be employed and therefore have higher and reliable incomes that enable them to meet their health care expenditures with far less difficulty (Dror *et al*., 2007; Bourne and Kerr-Campbell, 2010; Oriakhi and Onemolease, 2012).

4.1 Economic activity

The coefficient for economic activity is significant and negative. This suggests that being employed reduces the odds associated with catastrophic expenditure. In particular, households with employed heads were 27% less likely to experience catastrophic expenditure in comparison to households where heads are involved in our economic activities. In contrast, household heads involved in other activities were 3.7 times more likely to experience catastrophic expenditure than employed household heads ($p<0.01$).Our findings are also consistent with study findings by Li *et al*. (2012, 2014)in China, which arrived at the same conclusions. Previous research has noted that employed people are usually covered by their employer-sponsored insurance programmes and hence reducing their likelihood of experiencing catastrophic expenditure (Bourne and Kerr-Campbell, 2010). On the other hand, the majority of rural dwellers and farmers are more likely to face catastrophic expenditure because of low incomes, but also are less likely to join a health insurance, hence increasing their risk of catastrophic expenditures (Donfouet *et al*., 2011).

Further, contrary to our expectations, the number of dependent children and household members doesn't predict catastrophic expenditure ($p=0.527$ and $p=0.873$ respectively; Model 1). Generally, this contradicts findings from previous research that households that have a large number of dependent children and members are more likely to face catastrophic expenditure (Scheil-Adlung *et al*., 2006; Li *et al*., 2007; Gotsadze *et al*., 2009).In contrast, in their study in China, Li *et al*. (2012)reportthat larger households were more likely to experience lower instances of catastrophic expenditure.

There is a negative relationship between age and catastrophic expenditure. This implies as the household head advances in age, households are less likely to face catastrophic expenditure. However, the age of the household head bears no statistically significant impact on catastrophic expenditure ($p=0.242$, Model 1). This finding contradicts earlier studies, for example, by Xu *et al*., (2006) in Uganda which showed that households with heads or any other members who were advanced in age were more likely to face catastrophic health expenditure than households with no elderly members.

Results have also demonstrated that lower income households were 3.1 times more likely to experience catastrophic expenditure than otherwise ($p<0.01$) (Table 2, model 1). Prior research also reports that households in poorer quintiles are more likely to suffer the consequences of catastrophic health expenditure and impoverishment (Su *et al*., 2006; Adhikari, 2009; Li *et al*., 2012). We also expected that the higher the income the greater the likelihood of being protected from catastrophic expenditure. However, the results show that higher income is not a significant predictor of catastrophic expenditure. In a study that explored the determinants of out of pocket expenditures on prescribed medications in Tajikistan, Habibov (2009) also reports similar findings. In particular the study could not find any significant differences in terms of catastrophic expenditure on different income levels. In contrast, in a different study in Georgia, Gotsadze *et al*. (2009) found that households in the highest income level were more likely to escape catastrophic expenditure when compared with the lowest income levels. Similar findings are reported by Li *et al.* (2014) in China.

Results have also shown that the predicted odds for catastrophic expenditure for households that were categorised as poor in terms of their housing or dwelling status ($p<0.01$) and the type of fuel used in the household for cooking purposes ($p<0.05$) were 3.4 times and 3.17 times the odds for non-poor households respectively (Model 1).

Our study also sought to explore the effect of membership in CHF on catastrophic expenditure. The results show that there is a negative relationship between participation in insurance schemes and catastrophic expenditure. This suggests that respondents who were insured were less likely to experience catastrophic expenditure than uninsured. However, being insured could not produce a significant effect on the possibility of avoiding catastrophic expenditure (p =0.143). Similar finding is reported by Li *et al.* (2012; Nketiah-Amponsah, 2009; Bourne and Kerr-Campbell, 2010. This could be a result of the limited benefit package by the CHF which forces members to meet some of the pharmaceuticals, outpatient and other specialised services out of pocket. Other studies report conflicting results. For example, in their comparative study in Africa, Scheil-Adlung *et al*. (2006) observed that households with insurance cover in Senegal were significantly protected from catastrophic expenditure than the uninsured households, nonetheless; no significant effects were noted in Kenya. In contrast, Habibov (2009)found that households covered by the insurance schemes had similar levels of catastrophic health expenditure as those without health any insurance cover.

To better capture the impact of participation in CHF on protecting poor households from experiencing catastrophic expenditure, we focused on three proxy indicators of poverty: income, housing status and the source of energy for cooking purposes. Results have demonstrated that are significant main effects for the predicted odds for catastrophic expenditure for households that were categorised as poor in terms of their housing or dwelling status ($p<0.01$) and the source of energy used for cooking purposes ($p<0.05$) (Table 2, Model 2).These were 4.30and 3.31times more likely to face catastrophic expenditure than non-poor households respectively. On the other hand, the interaction effects for poor households' participation in CHF are not significant (housing status p=0.902 and source of energy for cooking p=0.285). These imply that there are no significant differences in terms of lessened catastrophic expenditure that poor participants and non-participants enjoyed from their participation in CHF.

For households that were categorised as poor in terms of their income levels (low income households), their interaction effect is significant. This suggests that despite their participation in CHF, low income households were still facing catastrophic expenditure. Marginal effects (Model 2) ($p<0.05$) show that low income households were 0.452 times more likely to face catastrophic expenditure than other household income categories. This represents a decrease of 2.66 points (3.1 Model 1- .452 Model 2).

5.0 Conclusions and recommendations

Our study has demonstrated that the poor are more likely to experience catastrophic expenditure than otherwise. In addition, despite their membership in CHF schemes, these schemes seem to provide only a limited financial protection to people in the rural areas. This suggests that to achieve universal coverage and significantly reduce healthcare catastrophic expenditures and their allied consequences, an all-inclusive, pragmatic and sustainable approach is needed. This could include designing more pro–poor health insurance schemes that address both the socioeconomic characteristics and specific needs of their potential members. There is also a need to increase the benefit package and quality of services with a view to improving the protection of members, but also attracting more members to the schemes. More importantly, there is a need to rally for improved rural incomes. This further suggests that extending the benefit package is vital not only for improving access to

health care, especially among the poor, but also for improving rural productivity, economy and the general welfare of the people.

One of the obvious limitations of our study is the use cross-sectional research design, as a result failing to capture the long term impact of the schemes. Longitudinal or follow up studies are essential in order to assess the life course impacts of a catastrophic health expenditure and the possible impacts of community-based health insurance schemes in alleviating these impacts. The other limitation that faces studies of a similar nature is the use of data collected from the past 30 days during the time of a survey (for example, Swartz, 2009). In that regard, it is evident the computation of household's annual expenditure is somewhat knotty due to seasonal and changing patterns in household's food and non-food expenditures including health care seeking behaviour.

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