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Voluntary Enrolment Decisions in the Ethiopian Community-Based Health Insurance Scheme by Rural Households with a Disabled Member

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Abstract

This paper examines the consequence of the prevalence of disability on eligible rural households' voluntary enrolment decisions in Ethiopia's community-based health insurance scheme in Ethiopia. It uses data from the Ethiopian Socio-Economic Survey and estimates the multivariate probit model. The results show that disability of any severity in any of the six functional domains affects the decision to join a community-based health insurance scheme. Relatively, households with severe disability are more likely to join the voluntary community-based health insurance scheme. The result confirms the existence of adverse selection in Ethiopia's community-based health insurance scheme. Adverse selection in the community-based health insurance scheme may threaten its sustainability in the long term. The presence of disability-induced adverse selection in the community-based health insurance scheme may reinforce the revisit of the scheme's design. For the sustainability of community-based health insurance schemes in Ethiopia's health system, the solution may include making enrolment mandatory for all households, setting the ability to pay based premiums, broadening the risk pooling, and integrating with potential legislated social health insurance scheme.

Keywords: Disability, Adverse selection, Community-based health Insurance, Ethiopian households

Introduction

Developing countries in general, Ethiopia in particular, face a significant challenge in achieving national and international policy commitments such as universal health coverage (UHC) mainly due to problems associated with their health system financing [1–3]. UHC is linked to health financing systems that need to be designed to provide all people with access to needed health services (such as promotive, preventive, curative, rehabilitative and palliative health services) of sufficient quality without exposing the user to financial hardship to be effective [4,5]. An effort to secure national and global health objectives requires sustainable sources of funding. Any country's health system could be financed through combinations of the following methods: taxation, social health insurance, community health insurance, private risk-based health insurance, medical savings accounts, out-of-pocket payment, informal fees, donor funding, and non-governmental and foundation funding [6–8]. The performance of these alternative health financing mechanisms can be evaluated based on health policy goals, such as equity, efficiency, financial sustainability and cost-containment, and acceptability and satisfaction [6,8]. The UHC concept embodies three objectives: improving equity in the use of needed health services utilization, improving service quality, and improving financial protection. No country fully achieves UHC; some make progress while others lag far behind [9,10].

In Ethiopia, the resources allocated to the health sector are far below what is estimated for low-income countries for basic health services. While the estimated per capita health expenditure required for essential health services in low-income countries is US $86, it is US $36.4 in Ethiopia in 2019/2020 [11]. Ethiopian health expenditure is financed from five sources: government; household out-of-pocket; Community-Based Health Insurance (CBHI) prepayments; donors; private employers and others. These sources financed 32.2%, 30.5%, 33.9%, 0.9%, and 2.5% respectively of total

health expenditure in 2019/2020 [11]. These figures show that the health financing system in Ethiopia is characterized by a high dependence on external assistance and high out-of-pocket payments. Dependence on out-of-pocket expenditure can expose households to financial risks and eventually impoverishment. The share of out-of-pocket expenditure in total health expenditure in Ethiopia is much higher than the globally recommended level. Keeping out-of-pocket spending to no more than 15% to 20% of total national health expenditure and not less than 5% to 6% of government health spending as a proportion of gross domestic product can reduce the risk of financial catastrophe due to health care costs [12] while Sirag & Mohamed Nor [13] show that out-of-pocket spending exceeding 29% of national health expenditure is associated with an increased risk of poverty.

Formal health insurance coverage in Ethiopia is quite low. Before 2011, health insurance in Ethiopia was provided by some employers for their employees. More recently, coverage has improved as a pilot CBHI program was introduced in 2011 to reduce financial barriers to health care for rural and urban residents in the informal sector. The program started as a pilot in 13 Woredas (districts) of four regions in 2011, and it was expanded to other Woredas in 2014. By 2020, it covered about 75% of the 1100 estimated Weredas in the country. About 37% of households in the informal sector were enrolled in the CBHI in 2020 (Ethiopia Health Insurance Agency [14]. CBHI is a publicly subsidized scheme, and participation in the program by households is voluntary. Member households pay a premium that varies from region to region to get inpatient and outpatient healthcare services at local health centres and referral hospitals. Average household monthly premium contributions are about 2–3% of household monthly income, and the central government subsidizes a quarter of the premium while regional and district governments contribute to cover the costs of insuring 10% of the poorest populations become members of the scheme with no premium payment [14,15].

Covering the fee waived for the growing poor without premium contribution, low premium payment compared to schemes in other African countries, and less than full enrollment in the program are challenges threatening the scheme's financial sustainability [16–18]. The financial sustainability of the CBHI scheme also hinges on the quality or health state of households who have joined the program [19,20]. While the inclusion of families with disabilities in the CBHI scheme is good news in terms of access to healthcare services for the vulnerable, it has negative implications for the financial sustainability of the scheme unless the scheme is backed by targeted subsidies for high-risk groups, the pool from membership of those families who have low health-risk profiles and/or the premium payment by members takes into account the health risk profile of members [18,20]. This paper aims to examine the consequence of having disabled members in a household on the choice of the CBHI scheme. The research will be beneficial for health policymakers in redesigning and restructuring the scheme sustainably.

The rest of this paper is organized as follows. Section 2 discusses the literature related to the topic. Data and methodology are discussed in Section 3. Section 4 presents the results. The limitation of the study is given in Section 5. The chapter is concluded in Section 6.

Literature Review

Conceptualizing disability

Disability is a complex concept to define and measure [21–26]. There are two popular models for conceptualizing disability- the medical model and the social model. The medical model conceptualizes disability as a physical, mental, or psychological condition that limits a person's activities [27,28]. In the recent literature, the more comprehensive and widely accepted social model replaces the medical model. The social model defines disability as the outcome of the interaction of one's functional status with the physical, cultural, and policy environments [28–30].

Drawing upon the social model, the International Classification of Functioning, Disability, and Health (ICF) of the WHO conceptualize disability as an outcome of activity limitations and restrictions placed upon participation that originates from the interaction between body structure, functional limitations, and an unaccommodating environment [30–32]. The Washington Group on Disability Statistics of the United Nations Statistical Commission uses an operational proxy to practically implement the conceptualization of disability outlined by the ICF. The Group recommends activity limitations to the presence of difficulties in a core set of basic activities [28,30,33]. The six core sets of basic activities included in the measure of disability are seeing, hearing, mobility, cognition, self-care, and communication. In this sense, disability is defined as activity limitation in basic actions due to functional limitations associated with an individual's physical, mental or sensory impairment, and the non-enabling physical, cultural, and policy environments.

The disability measure used in this study comes from surveys that employ the Washington Group Short Set of six questions on functioning. Mengistie [34] comments on the shortcomings of the disability statistics measured based on the Washington Group Short Set on functioning.

Adverse selection in community-based health insurance

Community-based health insurance is widely practised in low and middle-income countries to improve health service

utilization and reduce out-of-pocket expenditures for groups that earn predominantly low income in the informal sector, as well as for socially excluded groups with no advantage from government and market-based health financing arrangements [3,35–37]. However, the CBHI is threatened by asymmetric information between the insured and the insurer, generating what is known as adverse selection [18,38,39]. In presence of adverse selection, the enrollees would be mostly high health-risk people; hence the health insurance provider who sets a premium based on the average health risk in the population will make a loss [18,40]. In addition, given the availability of different insurance plans by the insurer and conditional on having health insurance, the high-risk enrollees sort themselves into more generous offers compared to the less risky enrollees [41–43]. Setting insurance premiums based on the average risk of the general population without accounting for adverse selection makes the CBHI program financially unsustainable [17,43,44]. Taking into account the disability status, functional health status, perceived health status and chronic medical condition of the enrollees in setting the premium is therefore important to reduce selection problems [43,45]. The problem of adverse selection in community-based health insurance may be addressed by group coverage, waiting periods, replacing community rating premiums with experience rating, namely different premiums based on different risk groups in the population, and making the health insurance scheme compulsory for all so that both low-risk and high-risk people participate in the scheme [40,46].

However, implementing the experience rating is difficult to administer as the cost of assessing the risk status of potential insurance applicants may be high [47,48]. The objective assessment of the risk status of people may be particularly challenging and costly in a setting where the target population is engaged in informal sectors in the urban areas and agriculture in the rural areas [49]. In addition, experience rating may be inequitable from the perspective of achieving equity as health policy [50–52]. Even if it is possible to assess potential applicants' risk status and set the experience rating, this means charging a high premium for high-risk applicants who are most likely to be poor and vulnerable [50–52].

Mitra & Yap [26] show that households with disabilities are multidimensionally poor compared to households with no disability. Similarly, Takele *et al.* [53] show that functional disability is positively associated with the old age group (80 years old and above), low-income status, low level of physical activity, multimorbidity and depression. The premium needs to be adjusted for income to reduce inequality in enrolment and access to health services without exempting the poor and subsidizing them [54,55]. The experience rating may drive households with disability out of the scheme and endanger the equity goal of health systems and progress towards UHC. After all, at least during the initial phase of the UHC initiative, most established schemes exclusively targeted the poor by fully subsidizing health coverage [49,56].

The second solution to adverse selection is the better option as it serves two purposes. First, a compulsory health insurance scheme helps achieve the UHC objective as both low-risk and high-risk people are forced to join the scheme, which, in turn, improves the responsiveness of the health delivery system and the use of health care services [16,57]. A large health insurance pool is important to spread risks across a large membership base, lower administrative costs and lower tariffs from health providers [57–61]. Second, the cost of administering compulsory health insurance based on the community rating system is lower than that of administering health insurance based on the experience rating system [47,62].

Empirical findings from contributions testing the theory of adverse selection are mixed in the context of CBHI in developing countries [39,63–71]. In Ethiopia, studies examining the willingness to pay for CBHI and the factors determining enrollment to the CBHI include Abebe & Belayneh [72], Bayked *et al.* [16], Begna *et al.* [73], Fenny *et al.* [17], Hussien [74], Kado *et al.* [75], Mebratie *et al.* [15], Mussa *et al.* [76] and Sendekie *et al.* [77]. Abebe & Belayneh [72] use rural district-level data in southern Ethiopia and show that households' willingness to pay for a CBHI is influenced by household wealth status, household head education, household size, participation in indigenous community insurance, and chronic illness in the household. Bayked *et al.* [16] report a positive impact of CBHI on health service issues by reducing catastrophic costs, but a low record on the achievement of UHC due to limited membership compared to the target population. Using data from Nekemte City in Ethiopia, Begna *et al.* [73] report that enrollment in the CBHI is positively associated with being a merchant, awareness about the scheme, being wealthy, borrowing history for medical care and chronic illness in the household. Fenny *et al.* [17] conclude that a low coverage of the target population and less effective income cross-subsidization due to the highly fragmented risk pool and voluntary membership could make the CBHI scheme unsustainable in the long term. Hussien [74] finds that people place greater value on the CBHI scheme when they are from a higher socio-economic group, and they think that the CBHI benefits its members, the health care service is quality and ambulatory services are available under the CBHI entitlement. Kado *et al.* [75] use data from a rural district in Eastern Ethiopia and find that the willingness to pay for CBHI is associated with education, merchant, housewife, wealth status, illness, and distance from the health facility. They suggest that the premium for membership should be customized by individual socioeconomic factors. Unlike recent studies such as Abdilwohab *et al.* [78], Anbesu *et al.* [79] and Moyehodie *et al.* [62], Mebratie *et al.* [15] uncover no evidence that illness, chronic disease, and self-stated health status influence enrollment into the community-based health

insurance scheme. Mussa *et al.* [76] report that CBHI increases outpatient service utilisation but does not affect maternal and child healthcare services utilisation in the Amhara region of Ethiopia. Sendekie *et al.* [77] document the dissatisfaction of CBHI members around the Gondar district in Ethiopia with the overall quality of health services and/or the availability of medications and laboratory tests.

To the best of the researcher's knowledge, no study in Ethiopia examines whether households' decision to join the CBHI is driven by their disability status. The focus of studies so far was to assess the willingness to pay and factors determining enrollment into the CBHI without accounting for the state of disability of households. Hence, this study, for the first time, examines whether disability-induced adverse selection characterizes the CBHI in rural Ethiopia or not.

Data and Methodology

Data

The data is drawn from the fourth round of the European Social Survey (ESS4), collected as part of a joint project between the Ethiopian Central Statistical Agency (CSAE) and the World Bank's Living Standards Measurement Study-Integrated Surveys on Agriculture (LSMS-ISA). ESS4 is not a follow-up on previous surveys. It is a new independent baseline survey for the waves to follow. The ESS4 is representative of the country, region, urban, and rural levels. The ESS4 contains information on 6770 households. This study is based on only 3,115 rural households. The CBHI scheme in Ethiopia targets rural households and individuals in the informal sectors in urban areas. However, the informal sector employees in urban households are not traced in the survey.

The ESS collects detailed individual, household, and community-level information on various topics. Of special interest to this study is that the survey records individual difficulties in performing activities along with the six functional domains (seeing, hearing, mobility, cognition, self-care, and communication) and other characteristics of households and household heads. ESS4 also includes information on whether households are members of CBHI, private health insurance, or employer-provided health insurance. **Table 1** contains the description of the variables.

Table 1. Description of variables.

Variables	**Description**
CBHI	Dummy of 1 if any member of the HH is a member of community-based health insurance
PHI	Dummy of 1 if any member of the HH is a member of private health insurance
EHI	Dummy of 1 if any member of the HH is a member of employer health insurance
Seeing	Dummy of 1 if any HH member above the age of 5 years experiences the seeing difficulty
Hearing	Dummy of 1 if any HH member above the age of 5 years experiences hearing difficulty
Mobility	Dummy of 1 if any HH member above the age of 5 years experiences mobility (walking/climbing) difficulty
Remembering	Dummy of 1 if any HH member above the age of 5 years experiences remembering/concentrating difficulty
Self-care	Dummy of 1 if any HH member above the age of 5 years experiences self-care difficulty
Communicating	Dummy of 1 if any HH member above the age of 5 years experiences communicating difficulty
Disability	Dummy of 1 if any HH member above the age of 5 years experiences difficulty in any of the six functional domains
Disability1	Dummy of 1 if any HH member above the age of 5 years experiences some difficulty in any of the six functional domains
Disability2	Dummy of 1 if any HH member above the age of 5 years experiences severe difficulty in any of the six functional domains (a lot of difficulties and/or cannot perform any activity in any of the six functional domains)
Poor_dev	Dummy of 1 if the household is under the societal poverty line
HHsize	Household size
Fem_head	Dummy of 1 if the household head is female
Age_head	Age of household head
Educ_head	Years of education for the household head
Married	Dummy of 1 if the head of the household is married
Dependencyratio	The ratio of dependents in the household
Maleratio	The ratio of males in the household
Urban	Dummy of 1 if the household lives in small, medium or large cities

February	Dummy of 1 if the household is interviewed in February
Left_married	Dummy of 1 if at least one member leaves the household for marriage
Left_follow	Dummy of 1 if at least one member leaves the household following relatives
Left_work	Dummy of 1 if at least one member leaves the household for work
Left_school	Dummy of 1 if at least one member leaves the household for study purpose
Left_other	Dummy of 1 if at least one member leaves the household for other reasons

Methodology

This paper employs the multivariate probit model to analyze whether households with a disability of at least one member self-select into the CBHI scheme. Households may enrol in three types of insurance schemes in Ethiopia. These are the voluntary CBHI scheme, insurance benefits provided by employers Employer-Provided Health Insurance (EHI), and private health insurance (PHI) schemes. The voluntary CBHI targets households in rural areas and individuals who work in the informal sector in urban areas. However, the survey offers incomplete information about the sector of employment in urban areas. As a result, households with at least one member in the informal sector in the urban areas are excluded, and the analysis exclusively focuses on rural households that are eligible for CBHI as a whole.

In principle, households' decision to enrol in the voluntary CBHI may not be independent of enrollment in the PHI and EHI. The decision to join the CBHI is made at a household level as a unit, and this decision could be influenced by the availability of other insurance schemes to any member of the household. On the one hand, if some members of the household are covered by PHI or EHI schemes, the household as a unit may still decide to join the CBHI for the rest of the members. The availability of the CBHI as a health insurance alternative may also influence the decision to enrol in the PHI and the choice of some household members to find employment that provides EHI. Hence, the choices over the three insurance schemes may be interdependent. Estimating separate univariate probit models for interdependent choices produces biased and inefficient results [80–82]. To counter this problem, the multivariate probit model that takes into account interdependence is employed. The multivariate model considers the endogeneity coming from the correlation of error terms. Similar identification strategies are employed by previous related but not identical studies (For example Aryal *et al.* [83], Filipski *et al.* [84], Quan & Doluschitz [85]; Wang *et al.* [86], Young *et al.* [87]).

A multivariate probit model specified as a latent variable model (Y*) is written as I (i=1, 2, 3) equations model as follows:

$$Y_i^* = \alpha_i + \theta_i' disability_i + \boldsymbol{\beta_i' X_i} + \delta_{ir} + \lambda_{iv} + \varepsilon_i \quad (1)$$

$$Y_i^* = \alpha_i + \theta_{1i}' disability1_i + \theta_{2i}' disability2_i + \boldsymbol{\beta_i' X_i} + \delta_{ir} + \lambda_{iv} + \varepsilon_i \quad (2)$$

$Y_i = 1$ for $Y^* > 0$, and $Y_i = 0$ otherwise for i=1, 2, 3.

where,

- i refers to the choice among the three insurance schemes i.e., i=1 for CBHI, i=2 for PHI, and i=3 for EHI.
- 'disability' in equation 1 is a binary dummy capturing disability of any degree for at least one member of the household. θ_i is the related coefficient.
- 'disability1' and 'disability2' in equation 2 refer to the three-level category of disability dummies, and θ_{1i} and θ_{2i} are coefficients respectively. The second level (disability1) is assigned to households where at least one member of the household suffers from some difficulties in any of the six domains. The third level (disability2) applies where at least one member of the household faces a lot of difficulties in any of the six functional domains and/or cannot perform the related activities at all.
- X is a vector of household and household head level covariates, and β_i is a vector of coefficients for these covariates.
- δ_{ir} and λ_{iv} are coefficients for regional and community-level dummies respectively. These are region and community-level factors that might affect a household's decision to enrol in the insurance scheme.
- α_i is a constant term.
- ε_i denotes a vector of error terms. The error terms are assumed to be multivariate normal with mean zero and unit variance. In the multivariate probit model, the error terms are allowed to be correlated across the three insurance choices.

Estimation of multivariate probit models (models with dimensions of order 3 and above) requires simulation-based methods to evaluate cumulative normal distribution functions of higher order. Specifically, the simulated maximum likelihood estimation is used following Roodman 2011 [88]. For simulation purposes, the smooth recursive conditioning simulator called the Geweke-Hajivassiliou- Keane (GHK) is employed using Stata version 14.2 and 1000 draws of the Halton sequence. Different draws are used to check whether

the results are stable and the results are stable for different draws. Standard errors are clustered at the community level to control for the potential challenge of heteroscedasticity.

Presentation of Results

Descriptive statistics of insurance schemes and disability

Out of all surveyed eligible rural households for the CBHI scheme (3115 households), about 57.9% report at least one member enrolled in at least one of the three insurance schemes (**Table 2**). About 49.1% of rural households have at least one member enrolled only on CBHI. Of the total surveyed rural households, 2.3% report enrolment of at least one member in PHI. Similarly, about 2.2% have at least one member enrolled only in EHI. In some households, members are enrolled in more than one insurance scheme. About 2% of households have at least one member enrolled in both CBHI and PHI. Similarly, 2.3% of households have at least one member enrolled in both CBHI and EHI.

The questionnaire of the survey this study is based on includes questions about whether any member of the household aged five years old and above has difficulty in seeing, hearing, walking or climbing steps (mobility), remembering or concentrating, self-care and communicating functional domains (Ethiopian Statistical Agency Wave Four Socioeconomic Survey, 2018/2019 [89]). In addition, the questionnaire includes a follow-up question of whether the difficulty faced by the household member is categorized under some difficulty, a lot of difficulty, and not performing activity at all in terms of severity. To understand which functional domain of rural households is affected, the household-level prevalence rate of disability is calculated for difficulties in each of the six functional domains at different threshold levels. **Table 3** shows that the rural household disability prevalence rate is highest for seeing functional domain across all difficulties. It is the second highest for the mobility functional domain. For at least some difficulty, hearing, remembering, self-care, and communicating functional domain disabilities take the next highest prevalence rates, respectively.

The variables of interest in this study are the two-category dummy (disability) and the three-category dummies (disability1 and disability2). As shown in **Table 3**, the two-category dummy (disability) indicates that 32.1% of surveyed

Table 2. Enrolment in three insurance schemes in the eligible rural households.

Type of Insurance	The number and percentage of HHs enrolled
Only community-based health insurance	1,530.170 (.491)
Only private health insurance	70.168 (.023)
Only employer health insurance	69.751 (.022)
Community-based and private health insurance only	61.177 (.020)
Community-based and employer health insurance only	72.167 (.023)
Private and employer health insurance only	.268 (.0001)
At least one insurance scheme	1,803.701 (.579)

Note: Numbers in the bracket are percentages compared to the total eligible rural households. The number and percentage of households enrolled are weighted.

Table 3. Rural household disability prevalence rates by functional domain and degree of difficulty.

		At least some	At least a lot	Can not perform at all
By functional domain	Seeing	.155	.041	.019
	Hearing	.101	.031	.013
	Mobility	.136	.039	.016
	Remembering	.096	.036	.014
	Self-care	.076	.030	.015
	Communicating	.068	.036	.016
Two-category dummy	Disability	.321		
Three-category dummy	Disability1	.210		
	Disability2	.076		

Note: The prevalence rates are weighted.

rural households have at least one member with at least some difficulties in any of the six functional domains. This figure is higher than the one reported by Mengistie 2024 [34] for earlier surveys. The second level of the three-category disability dummy (disability1) indicates that 21% of surveyed households have at least one member with some difficulties in at least one functional domain. The third level of the three-category disability dummy (disability2) tells us that 7.6% of rural households have at least one member who has a lot of difficulties and/or is unable to perform any activity in at least one of the six functional domains.

The multivariate analysis

To test whether adverse selection exists in the voluntary CBHI scheme, the multivariate probit model of equations 1 and 2 are separately estimated using simulated maximum likelihood and the results are reported in (**Table 4**). If the effect of disability on the choice of CBHI is not positively significant, then the theory of adverse selection is rejected, and conversely.

Table 4 shows that disability of any difficulty, disability from some difficulty, and disability of severe difficulty in at least one of the six functional domains significantly affect households' decision to enrol on the CBHI. The probability of joining the CBHI scheme increases by about 10.5, 7.9, and 11.4 percentage points respectively for disability of any difficulty, some difficulty, and severe difficulty in at least one functional domain. This means that there is adverse selection as households experiencing disability of any level of difficulty in any of the six functional domains are more likely to enrol in the CBHI scheme compared with those households with no disability experience. The likelihood to join CBHI is higher for a disability of severe difficulty compared to a disability of some difficulty in at least one of the six functional domains. **Table 4** also shows that disability (of any difficulty, some difficulty, and severe difficulty) has no statistically significant effect on enrolling in the PHI, while disability of severe difficulty has a negative significant effect on the likelihood of enrollment in EHI schemes.

The existence of disability-induced adverse selection in the CBHI scheme has a clear negative implication on the financial sustainability of the scheme. Theoretically, it is possible to reduce the problem of adverse selection by designing the premium payment based on the disability status of households i.e., using experience rating [40,90,91]. However, Ethiopian households with disabilities may find it difficult to pay premiums rated based on the disability status. Persons with disabilities and their households are, in fact, more likely to be poorer than persons without disabilities and their households [26,53,92–94]. Rather than applying the experience rating, the government may opt for exempting or subsidizing those households with a disability to improve equity in the health system and to progress towards UHC. Exemptions and subsidies for households with disabilities may increase their probability of enrolment into the CBHI scheme compared with households with no disabled members[1]. Households with disability experience may be forced to live in destitute conditions unless the government grants them an adequate subsidy or exemption to be a member of the CBHI and get access to health care services. The higher likelihood that disability-affected households enrol on the CBHI may be due to the government's subsidy program for the poor. Hence, both the voluntary nature of the CBHI scheme and/or the government's subsidy for the poor to join the scheme may contribute to the presence of adverse selection.

The finding of this paper confirms the research results from Abebe & Belayneh [72], Begna *et al.* [73] and Kado *et al.* [75] that use district-level data from different parts of Ethiopia. However, this research challenges the finding by Mebratie *et al.* [15] that documents the absence of adverse selection in the CBHI. Unlike the present paper, all the studies mentioned above do not directly examine the effect of disability on enrollment into CBHI nor consider disability-induced adverse selection in CBHI. Rather, they discuss the impact of self-assessed health status, chronic diseases, and the incidence of illness on enrollment into the CBHI scheme as a test of the adverse selection hypothesis. Disability, self-assessed health

[1] Regional and district-level governments subsidize indigenous populations to be members of the CBHI and get access to health care for free. These people (the poorest 10% in the district) are identified in each district, where the community-based health insurance is pooled and gets free access. But, households with severely disabled members may not be lucky enough to be part of the subsidy program.

Table 4. Average marginal effects of disability on the decision to join CBHI.

Disability type	Three insurance schemes			No. of Obs.	No. of draws	Wald chi2	Prob > chi2
	CBHI	PHI	EHI				
Disability	.100***(.030)	.008(.009)	-.010(.011)	3115	1000	328.86	0.000
Disability1	.076**(.032)	.018(.011)	-.007(.013)	3,115	1000	334.80	0.000
Disability2	.108**(.049)	-.025(.018)	-.049**(.022)				

Note: Numbers in the parenthesis are standard errors. *** Significant at 1% level, ** significant at 5% level, *significant at 10% level.

status, chronic diseases, and illnesses are distinct health problems. Chronic diseases, poor self-assessed health, and illnesses might antecede and lead to disability or vice versa [95–98].

If Ethiopia is committed to working towards UHC inclusive of the poor and households with disability by extending subsidies, how is it possible to sustain the scheme financially? There are options at the discretion of health policymakers to enhance the long-term sustainability of the scheme. First, Making the CBHI scheme mandatory by law for the target population may consolidate the financial resources. This enables better income cross-subsidization [17]. Second, setting the premium for membership based on the ability to pay would equitably raise the funds. Rwanda's practice of a sliding scale, i.e., setting the premium based on household asset ownership, could be a learning experience [17]. Third, widening the geographic coverage of the risk-pooling area may give leverage to better pool the risks compared to risk-pooling at a narrow geographic location [18]. Fourth, integrating with the legislated social health insurance may help to mobilize financial resources and better pool risks nationwide in the long term. Some experiences show the integration of fragmented health insurance systems into a unified national health system [56,99,100].

Limitations

The results of this study could be plagued by the following limitations, and interpreting the results needs to take into account these limitations. First, the study is based on cross-sectional data and focuses on rural households, while the target population of Ethiopia's CBHI includes urban households engaged in informal sectors. Second, the results of this study may be biased because the true prevalence of disability may be underestimated in the survey as disability is defined to include only persons aged five years old and above with difficulties in any of the six functional domains, and due to measurement issues inherent in the conceptualization of disability. Third, alternative causal analysis methods such as instrumental variable and panel data identification strategies could not be employed due to a shortage of information on possible instrumental variables and the non-availability of panel data. For this reason, this study relies on the analysis from the multivariate probit model.

Conclusion

This paper examines the fourth round of the Ethiopian Socioeconomic Survey data for the prevalence of disability and its effect on enrolment into the community-based health insurance scheme. To reduce out-of-pocket expenditure and increase access to health care services, the government of Ethiopia is scaling up the voluntary community-based health insurance scheme which was started in 2011 in a few districts as a pilot. One challenge to the voluntary nature of this type of scheme is adverse selection. This paper tests the possibility of adverse selection in the presence of a high prevalence of disability in Ethiopia by estimating the multivariate probit model.

The result shows that disability-induced adverse selection characterizes the community-based health insurance scheme for the target rural households. In fact, selection into the scheme by disability-affected households may be enhanced by the government's subsidy program for poor households. Households with disability experience are more likely to be poor and eligible for the government's subsidy (in the form of paying premiums to the indigent). Indeed, the government's subsidy program may be enough only for households affected by a disability of severe degree of difficulty. However, adverse selection is observed for households experiencing disability of some degree of difficulty as well. The presence of adverse selection poses a threat to the financial sustainability of the community-based health insurance scheme in meeting the healthcare demands of its members with sufficient quality and improving the progress towards UHC.

Addressing the problem of adverse selection in community-based health insurance is required for its financial sustainability. Health Policymakers may consider one or combinations of the following options: making the scheme mandatory for all targeted households; changing the flat premium to the one based on households' ability to pay; broadening the pooling area of the scheme beyond the current community-level district; and integrating with the potential social health insurance targeting people in the formal sector. Future research can explore the relationship between disability status with and without insurance and healthcare utilization. In addition, studying the health outcomes among households with and without disabilities of community-based health insurance enrollees could be another line of future research.

Compliance with Ethical Standards

I, the author of this manuscript confirm that there is no conflict of interest to declare. The surveyed data used in this manuscript is not collected by the author of this manuscript. For this reason, informed consent and/or a statement on the welfare of animals is not required from my side.

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