Assessing Regional Heterogeneities in the Uptake of a Pilot Community-based Health Insurance Scheme in Ethiopia

Getnet Alemu Zewdu[1] and Anagaw Derseh Mebratie[2]

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Abstract

In 2011, Ethiopia launched a pilot Community-Based Health Insurance (CBHI) scheme to expand healthcare access for underserved populations and diversify healthcare financing. Initially introduced across four major regions - Tigray, Amhara, Oromia, and the Southern Nations, Nationalities, and Peoples' Region (SNNP) - the program's design and implementation varied significantly in terms of contribution levels, renewal periods, and service delivery. Recognizing these disparities and the limited literature on sub-national performance, this study investigates the determinants of enrolment and membership renewal across these four regions. By taking into account inherent regional heterogeneities, the study seeks to generate empirical evidence to inform the ongoing national rollout of the CBHI scheme. The study utilizes a longitudinal household survey spanning five years (2011–2015). The baseline survey in 2011 sampled 102 households from each of the 16 pilot districts, totaling 1,632 households (9,455 individuals). Follow-up surveys were conducted in 2012, 2013, and 2015, maintaining a high retention rate with only 4.1% attrition over the study period. Logit models were employed to estimate marginal coefficients and identify regional drivers of scheme performance. Results reveal stark regional disparities: Amhara emerged as the highest-performing region, recording a 69% coverage rate and a low dropout rate of 10% by 2015. In contrast, Tigray exhibited the lowest performance, with a 49% uptake rate and a 32% dropout rate. Multivariate analysis indicates that the poor are disproportionately excluded from the scheme in Amhara and Oromia, while membership renewal patterns show a "pro-rich" bias in Oromia and SNNP.

[1] Corresponding author, School of Development, College of Social Sciences, Arts and Humanities, Addis Ababa University, email: galemu2001@gmail.com
[2] School of Public Health, Addis Ababa University, email: anagawd@yahoo.com
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Adverse selection was identified as a notable concern uniquely in Amhara, likely linked to a 2014 policy shift that made contribution rates for households of up to five members the same, which was not the case before (it was based on household size). Demographic drivers also varied: female and elderly populations were positively correlated with insurance uptake in Tigray, whereas male adulthood was the primary predictor in SNNP. On the supply side, the availability of blood-testing equipment significantly enhanced enrolment in Tigray and Oromia. To improve scheme retention and coverage, interventions must target region-specific bottlenecks, such as enhancing the quality of care in SNNP and reducing clinical consultation waiting times in Tigray and Amhara. Ultimately, the evidence underscores that 'one-size-fits-all' strategies are insufficient; expanding CBHI coverage must be tailored to address local socioeconomic and supply-side heterogeneities.

Keywords: health insurance, regional heterogeneities, uptake

JEL Classification: I130

1. Introduction

According to Ethiopia's Federal Ministry of Health (FMoH, 2011), there has been an 18-fold increase in the number of health posts from 833 in 2000 to 15,095 in 2011 and a 7-fold increase (356 to 2,660) in the number of health centres over the same period. Despite this significant progress in expanding healthcare infrastructure and services, utilization rates remain low. For example, according to the Ethiopian Demographic and Health Surveys, outpatient health care utilization per capita per year has increased only marginally from 0.27 visits in 2000 to 0.3 visits in 2011. The low utilization rates are accompanied by a high reliance on out-of-pocket (OOP) spending to finance health care. According to the Federal Ministry of Health (FMoH, 2010), Ethiopia's healthcare financing relies on three primary sources: international and local donors (40%), out-of-pocket (OOP) household expenditures (37%), and central and local government allocations (21%)[3]. These figures underscore a precarious financing landscape characterized by narrow fiscal space, excessive reliance on household spending, and heavy dependence on external donor assistance—a source that is increasingly volatile, unpredictable, and in decline.

[3] The remainder 2% is covered by employer and other private insurance schemes.

Cognizant of this problem, the Ethiopian government designed the CBHI scheme. The main objective of the CBHI program is to provide financial risk protection and reduce out-of-pocket expenditure, increase access to care, mobilize resources, and improve the quality of care for rural communities and those engaged in the informal sector in urban areas.[4]

The program was introduced as a pilot project in 2011 across 13 districts in the four main regional states of Amhara, Oromia, SNNP, and Tigray. After valuable lessons were learned from the pilot and necessary adjustments were made to the scheme's design, the program was expanded, first within the four initial regions and later to others. It has now been scaled up to almost all regions of the country, including urban areas. As of June 2023, CBHI services were available in 1,011 out of 1,052 districts nationwide. Over the same period, household enrolment surged from 125,000 to 12.1 million, and premium collections grew from 14.6 million to 12 billion Birr (see EHIS, 2024/25 performance report). This success is attributable to the federal government's political commitment, the robust leadership of local administrations, and the extensive engagement of various stakeholders (Lavers, 2019; Mebratie et al., 2019; Mulat et al., 2022)

Since the scheme is managed at the district level under the guidance of regional states, there are significant differences in its implementation across districts. These variations include membership contribution levels, renewal periods, waiting times for services, reimbursement claim procedures, referral processes, and access to higher-level treatment at public hospitals. For instance, the contribution level in the Tigray region is fixed at 220 ETB. In contrast, the contribution in the SNNP region depends on the location and ranges from 220 to 500 ETB. Another key difference is in hospital access. In the Oromia region, members can receive higher-level treatment from any public hospital within the region and in Addis Ababa. However, in the SNNP region, members can access such treatment only at a single contracted public hospital.

[4] The Government of Ethiopia launched its first health care financing reform strategy in 1998, establishing the foundation for a modernized health financing system. This strategy introduced pivotal reforms, including facility-level resource mobilization, decentralized service management, and granting health facilities the autonomy to retain and reinvest their generated revenue. These developments paved the way for the 2008 health insurance strategy, which subsequently informed the 2010 health insurance proclamation. Building on this legislative framework, CBHI scheme was officially piloted in 2011.

Despite substantial heterogeneity in the design and implementation of the CBHI scheme across Ethiopia's pilot regions, most existing empirical studies have examined its effectiveness at the national level. These studies typically focus on metrics such as membership coverage, dropout rates, care utilization, out-of-pocket health spending, and household welfare, without accounting for regional differences (see Mebratie et al 2013, Tesfaye 2014, Yilma et al 2015). To date, no studies have investigated the heterogeneous effects of the scheme across different locations within Ethiopia.

Research from other countries suggests that the factors driving CBHI uptake are sensitive to local contexts. For example, a study by Panda et al. (2013) on the determinants of demand for a CBHI scheme in three rural locations in India (Pratapgarh, Kanpur Dehat, and Vaishali) found significant local variations. The study revealed that caste and socioeconomic status influenced the decision to purchase insurance only in Pratapgarh, while utilization of inpatient care affected demand for insurance in Kanpur Dehat. Furthermore, the age profile of household members was significant in Pratapgarh and Vaishali, but not in Kanpur Dehat.

Other studies in Asia and Africa have also stressed that the success of CBHI is highly dependent on the regional context. For instance, Parmar, D. et al. (2014) found that regional differences in socioeconomic conditions are critical for the uptake of CBHI in Burkina Faso. Others, such as Dror, D. M., et al. (2016), found that the success of micro-insurance was significantly higher in regions with high social capital (strong community or self-help groups) than in regions with fragmented social structures. All agree that understanding regional heterogeneity is critical for the success and sustainability of CBHI.

Therefore, this study aims to contribute to the limited literature on this subject by generating empirical evidence to inform policy discussions on regional heterogeneity in CBHI performance. Specifically, this study investigates the determinants of enrolment and renewal decisions in the pilot CBHI scheme across Ethiopia's four main regions: Tigray, Amhara, Oromia, and SNNP.

2. Method and Data

2.1. Source of the data

Prior to the launch of the CBHI scheme in July 2011, a baseline household survey was conducted in March 2011, and follow-up surveys were conducted in 2012,

2013, and 2015 in the same season. The household surveys cover 12 of the 13 CBHI pilot districts and 4 non-intervention districts across four regions (Tigray, Amhara, Oromiya, and SNNP), which together represent approximately 86% of the country's population. From each of the 16 sampled districts, 6 villages (*Kebeles*) were randomly selected, and within each village, 17 households were randomly selected, yielding a total of 1,632 households.

Table 1: Sample size per survey year and sample attrition

Region	Survey year				Sample attrition between 2011 & 2015 (%)
	2011	2012	2013	2015	
Tigray	408	399	389	380	6.9
Amhara	408	399	397	393	3.7
Oromiya	408	404	401	399	2.2
SNNP	408	397	396	393	3.7
Total	1632	1599	1583	1565	4.1

Source: Own compilation from our survey data.
Note: Only households included in the baseline survey were re-surveyed in the follow-up surveys.

As indicated above, and unlike many studies in the field, this research uses four rounds of panel household data collected from both treatment and control districts, before and after the introduction of the CBHI scheme. This robust design allows for a rigorous examination of dynamic changes in CBHI uptake over time.

To supplement the household data, this study utilizes a 2011 pre-implementation survey of 48 randomly selected health centres (three per district). This facility-level data—which provides metrics on healthcare access and quality of care—was merged with the household surveys by mapping the centres to sampled communities based on geographical proximity.

Furthermore, to supplement the quantitative findings and capture household perceptions, the study incorporates qualitative data from focus group discussions (FGDs) and key informant interviews (KIIs) conducted in 2019 across the four pilot regions. In each region, four distinct FGDs were organized based on program participation: 1) CBHI members only, 2) PSNP beneficiaries only, 3) participants in both programs, and 4) participants in neither. Additionally, three KIIs were

conducted per region with officials from the Regional Health Bureau, the Regional Social Health Insurance Agency, and the respective district CBHI offices.

The study participants provided their consent to participate after being informed of the purpose of the research and their right to choose whether to participate. Furthermore, the study had obtained ethical approval from the Ethics Review Board of the International Institute of Social Studies, Erasmus University Rotterdam.

2.2. Method of data analysis

In this study, data management and analysis were conducted using STATA version 16. To examine factors affecting scheme uptake, we estimated marginal effects from a logit model. We choose this model because the dependent variable is binary. The analysis begins by presenting trends in CBHI enrolment and re-enrolment across the pilot regions from 2012 to 2015. Subsequently, the paper employs econometric models to examine the factors influencing scheme uptake and renewal in each region. To account for potential bi-directional relationships between explanatory variables and the outcomes of interest, the model specifies CBHI uptake in *period t* as a function of individual and household characteristics from preceding periods (t-2 or t-4), as shown below:[5]

$$P(CBHI_{hrt} = 1) = \beta_0 + \beta_1 SES_{hr(t-2)} + \beta_2 DF_{hr(t-2)} + \beta_3 HS_{hr(t-2)} + \beta_4 ACSN_{hr(t-2)} + \beta_5 AQHC_{hr(t-4)} + \varepsilon_{hr(t-2)} \quad \textbf{(1)}$$

Where $CBHI_{hrt}$ represents the outcome variable that is CBHI initial enrolment and re-enrolment status of the household *h* at region *r* in time period *t*. Controlled factors include a set of explanatory variables related to Socioeconomic Status (*SES*), demographic factors (*DF*), health status of household members (*HS*), access to cash and social networks (ACSN), and access to and quality of health care (AQHC) at their lagged values. We included these covariates based on the context of the study areas and referring to related studies. β_i's are coefficients to be estimated and ε is error term not explained in the model.

To assess the validity of the regional logistic regression models, several post-estimation

[5] Lagged 2 is for those variables obtained from household survey. Lagged 4 is for those variables obtained health facility survey conducted during the base line The first round of HH survey among the four surveys.)

diagnostic tests were conducted. Model specification was examined using the link test, which helps identify potential specification errors in the logit model. The Hosmer–Lemeshow goodness-of-fit test was used to evaluate how well the predicted probabilities matched the observed outcomes. In addition, we assessed the possibility of multicollinearity among the explanatory variables by calculating variance inflation factors (VIFs) for the variables included in the model.

3. Results and Discussion

3.1. Characteristics of sample households

Table 2 reports the characteristics of sample households per pilot region from the 2013 survey. Socioeconomic status is measured by consumption quintiles, the educational status of the household head, and participation in the Productive Safety Net Program (PSNP), which targets food-insecure households. In terms of consumption, households in the Oromiya and Amhara regions appear to be better off than those in Tigray and SNNP. Furthermore, educational attainment varies, with 54% of household heads educated in the Amhara and SNNP regions, compared with 44% in the Oromiya region.

While demographic characteristics are broadly similar across the pilot regions, with average household sizes ranging from 5.5 in Tigray to 6.4 in SNNP, there are considerable differences in health status. The Amhara region reports the lowest health status; for instance, only 62% of respondents rated their household's health as high, compared to 87% in Oromiya. Similarly, illness is more frequent in Amhara, where 10% of households reported having a member who was ill in the last two months, compared with 4.1% in Oromiya.

Due to the higher incidence of illness in the Amhara region, health care utilization is also highest there. For instance, outpatient care use in the two months preceding the survey was 48% in Amhara, compared to 37% in SNNP, 32% in Tigray, and 18% in Oromiya. Similarly, average healthcare spending was highest in Amhara (57.4 ETB) and lowest in Tigray (23.3 ETB).

When asked about their sources of information for the CBHI scheme, households across all sample regions identified CBHI officials as the primary source. For example, 72% of respondents in Amhara and 82% in SNNP first heard about the scheme from official sources during CBHI-related meetings. In contrast, social networks emerged as the second most important source of information in the Tigray and Oromiya regions. Notably, in Tigray, 40% of respondents learned about the scheme from their friends.

Table 2: Characteristics of CBHI target households, 2013

	Tigray		Amhara		Oromiya		SNNP	
	mean	**sd**	**mean**	**sd**	**mean**	**sd**	**mean**	**sd**
Poorest consumption quintile	0.22	0.42	0.11	0.31	0.05	0.23	0.45	0.50
2nd consumption quintile	0.23	0.42	0.22	0.41	0.11	0.31	0.21	0.40
3rd consumption quintile	0.22	0.42	0.22	0.41	0.21	0.41	0.16	0.37
4th consumption quintile	0.19	0.39	0.22	0.42	0.30	0.46	0.13	0.33
Richest consumption quintile	0.14	0.34	0.23	0.42	0.33	0.47	0.06	0.24
HH head education- educated	0.51	0.50	0.54	0.50	0.44	0.50	0.54	0.50
Participates in PSNP	0.49	0.50	0.07	0.26	0.08	0.27	0.17	0.38
Male-headed HH	0.78	0.41	0.92	0.27	0.90	0.30	0.87	0.33
Age of HH head	49.95	14.44	48.95	13.46	47.47	13.39	49.20	13.99
Household size	5.50	2.44	5.63	1.97	5.73	2.00	6.38	2.20
Proportion of children aged under 6	0.10	0.13	0.10	0.12	0.09	0.13	0.08	0.12
Proportion of males aged 6 to 15	0.14	0.16	0.15	0.13	0.18	0.15	0.15	0.15
Prop. of females aged 6 to 15	0.15	0.14	0.14	0.14	0.15	0.15	0.15	0.14
Prop. of males aged 16 to 64	0.23	0.19	0.27	0.15	0.26	0.15	0.27	0.15
Prop. of females aged 16 to 64	0.27	0.18	0.26	0.14	0.24	0.14	0.28	0.15
Prop. of elderly aged above 64	0.11	0.19	0.09	0.17	0.07	0.16	0.07	0.14
Proportion of household members with good SAH	0.82	0.31	0.62	0.40	0.87	0.26	0.81	0.32
Proportion of household members with fair SAH	0.11	0.23	0.25	0.35	0.08	0.21	0.16	0.31
Proportion of household members with low SAH	0.06	0.17	0.12	0.23	0.03	0.12	0.03	0.08
Past illness event	4.46	10.15	10.01	16.15	4.06	13.54	5.42	11.80

	Tigray		Amhara		Oromiya		SNNP	
	mean	**sd**	**mean**	**sd**	**mean**	**sd**	**mean**	**sd**
Chronic illness	0.25	0.66	0.34	0.98	0.09	0.39	0.10	0.37
Outpatient care use	0.32	0.47	0.48	0.50	0.18	0.39	0.37	0.48
Inpatient care use	0.05	0.22	0.03	0.18	0.02	0.15	0.03	0.18
Duration of hospitalization	0.47	2.46	0.17	1.17	0.61	8.73	0.46	5.52
Outpatient healthcare expenditure	24.26	87.43	57.38	170.69	35.43	190.49	41.56	117.07
Inpatient healthcare expenditure	50.78	292.73	31.48	354.35	81.75	796.73	38.86	308.57
Trust in modern care – Disagree	0.02	0.14	0.03	0.17	0.02	0.14	0.05	0.22
Trust in modern care - Neither agree nor disagree	0.01	0.12	0.03	0.17	0.02	0.14	0.06	0.24
Trust in modern care – Agree	0.97	0.18	0.94	0.24	0.96	0.20	0.89	0.31
Member of *Iqqub*	0.05	0.21	0.04	0.20	0.08	0.27	0.07	0.25
Member of a credit & saving association	0.06	0.24	0.21	0.41	0.05	0.21	0.13	0.33
Member of a religious group	0.60	0.49	0.71	0.45	0.38	0.49	0.36	0.48
Participating in *Wonfel* or *Debo*	0.26	0.44	0.47	0.50	0.51	0.50	0.09	0.29
Savings in a bank account	0.10	0.30	0.22	0.41	0.16	0.36	0.06	0.24
Outstanding loan	0.39	0.49	0.29	0.45	0.13	0.34	0.30	0.46
Official position held	0.11	0.32	0.27	0.44	0.20	0.40	0.18	0.38
CBHI info. source – Neighbours/friends	0.40	0.49	0.15	0.36	0.34	0.47	0.07	0.26
CBHI info. source – CBHI officials	0.53	0.50	0.72	0.45	0.48	0.50	0.82	0.38
CBHI info. source – Health professionals	0.02	0.13	0.07	0.25	0.12	0.33	0.08	0.27
CBHI info. source – Others	0.05	0.21	0.07	0.25	0.06	0.24	0.03	0.16
Only sick people buy CBHI – Incorrect answer	0.13	0.34	0.06	0.23	0.09	0.29	0.17	0.38
Only sick people buy CBHI – Correct answer	0.70	0.46	0.91	0.29	0.73	0.44	0.74	0.44

	Tigray		Amhara		Oromiya		SNNP	
	mean	sd	mean	sd	mean	sd	mean	sd
Only sick people buy CBHI – Do not know	0.17	0.37	0.03	0.18	0.18	0.38	0.09	0.29
CBHI is the same as a savings scheme - Incorrect answer	0.08	0.27	0.02	0.15	0.06	0.24	0.03	0.16
CBHI is the same as a savings scheme – Correct answer	0.66	0.47	0.82	0.38	0.78	0.42	0.72	0.45
CBHI is the same as a savings scheme – I do not know	0.26	0.44	0.16	0.36	0.16	0.37	0.25	0.44
CBHI finances health care - Correct answer	0.81	0.39	0.81	0.39	0.74	0.44	0.42	0.50
CBHI finances health care – Incorrect answer	0.04	0.20	0.13	0.33	0.12	0.33	0.32	0.47
CBHI finances health care – Do not know	0.15	0.36	0.06	0.24	0.14	0.35	0.26	0.44
CBHI premium can be returned - Incorrect answer	0.02	0.16	0.09	0.29	0.06	0.24	0.03	0.18
CBHI premium can be returned – Correct answer	0.63	0.48	0.79	0.41	0.72	0.45	0.63	0.48
CBHI premium can be returned – Do not know	0.34	0.47	0.12	0.32	0.22	0.42	0.34	0.47
No of CBHI meetings attended after implementation	0.76	1.50	1.49	2.26	1.87	2.59	0.78	2.33
Involved in CBHI management	0.10	0.29	0.02	0.15	0.11	0.31	0.17	0.38
CBHI agents solve problems – Disagree	0.07	0.25	0.26	0.44	0.24	0.43	0.13	0.34
CBHI agents solve problems – Neither agree nor disagree	0.12	0.32	0.16	0.37	0.21	0.41	0.00	0.00
CBHI agents solve problems – Agree	0.82	0.39	0.58	0.50	0.56	0.50	0.87	0.34
Community guides CBHI administration – Disagree	0.05	0.21	0.35	0.48	0.29	0.45	0.14	0.35
Community guides CBHI administration – Neither agree nor disagre	0.16	0.37	0.19	0.39	0.23	0.42	0.08	0.27
Community guides CBHI administration – Agree	0.79	0.41	0.47	0.50	0.48	0.50	0.78	0.41
Health workers favor insured patients – Disagree	0.27	0.44	0.55	0.50	0.21	0.41	0.38	0.49
Health workers favor insured patients – Neither agree nor disagree	0.16	0.36	0.15	0.36	0.35	0.48	0.13	0.34
Health workers favour insured patients – Agree	0.58	0.50	0.30	0.46	0.44	0.50	0.49	0.50
CBHI management is trustworthy – Disagree	0.06	0.23	0.38	0.49	0.15	0.36	0.14	0.35

	Tigray		Amhara		Oromiya		SNNP	
	mean	**sd**	**mean**	**sd**	**mean**	**sd**	**mean**	**sd**
CBHI management is trustworthy – Neither agree nor disagree	0.19	0.40	0.22	0.42	0.23	0.42	0.18	0.39
CBHI management is trustworthy – Agree	0.75	0.43	0.40	0.49	0.62	0.49	0.68	0.47
Quality of care linked to CBHI- Good	0.59	0.49	0.52	0.50	0.41	0.49	0.75	0.43
Quality of care linked to CBHI- Fair	0.17	0.38	0.14	0.35	0.15	0.36	0.12	0.33
Quality of care linked to CBHI- Poor	0.16	0.37	0.23	0.42	0.13	0.34	0.07	0.25
Quality of care linked to CBHI- I do not know	0.08	0.26	0.10	0.30	0.31	0.46	0.06	0.23
CBHI card used	0.61	0.49	0.74	0.44	0.63	0.48	0.76	0.43
Travel time to the health centre	62.86	42.90	70.33	44.70	68.47	37.65	36.76	23.45
Travel time to the public hospital	110.81	67.92	116.64	59.80	92.10	49.09	79.81	41.14
Completed first degree (12+3)	0.72	0.45	0.39	0.49	0.55	0.50	0.16	0.37
Received on-the-job training	0.55	0.50	0.72	0.45	1.00	0.00	1.00	0.00
Availability of blood testing equipment	0.78	0.41	1.00	0.00	0.67	0.47	0.89	0.31
Availability of urine testing equipment	0.78	0.41	0.83	0.37	1.00	0.00	1.00	0.00
Waiting time to see a medical professional (in minutes)	57.84	35.51	40.36	22.75	15.46	8.61	25.75	11.56
N	292		300		299		302	

Households in the Amhara and Oromiya regions report higher levels of social capital engagement. Participation in collective work, such as Debo and Wonfel[1] is more common in these regions than in SNNP. Similarly, households in the earlier regions are better off in terms of bank savings. Furthermore, involvement in local administrative processes is greater in Amhara and Oromiya. For example, 27% of households in the Amhara region have at least one member who has held an official position, compared with only 11% of households in Tigray.

There are also significant variations across the pilot regions regarding perceptions and experiences with the CBHI scheme. For instance, perceptions of management responsiveness differ starkly: 87% of insured respondents in the SNNP region reported that scheme management actively addressed member problems and complaints, whereas only 56% of respondents in Oromiya shared this view. Furthermore, members reported contrasting experiences with healthcare providers. While 58% of insured people in Tigray believed health professionals treated them better than uninsured patients, about 55% of respondents in Amhara reported that insurance members faced discrimination during service provision.

In terms of health infrastructure, the SNNP region appears to have a better supply of healthcare services. For example, travel times to the nearest health center and public hospital are shortest in this region, at 36.8 and 79.8 minutes, respectively. In contrast, travel time to a health centre ranges from 38 (Oromiya) to 70 (Amhara) minutes., while reaching the nearest public hospital takes between 92 and 116.6 minutes in these regions. SNNP also performs better in terms of the availability of trained health workers, consultation waiting times, and the availability of medical equipment. For instance, all health workers in the sample health facilities in SNNP received on-the-job training (21%), compared with 55% in Tigray and 72% in Amhara. Consequently, these infrastructure advantages are reflected in patient perceptions: 75% of respondents in SNNP report having access to quality healthcare at CBHI-contracted facilities, compared with only 41% in Oromiya.

[1] Debo and Wonfel the two most common collective activities which are practiced in rural Ethiopia where farmers help each other during crop production and harvest periods.

3.2. CBHI uptake across the pilot regions

This section describes performance trends in the scheme's initial enrolment and membership renewal. Overall enrolment among sample households in the balanced panel grew steadily, starting at 41% one year after the intervention in 2012, increasing to 48% in 2013, and reaching 58% by 2016 (Table 3). Regional performance varied significantly. The Amhara region demonstrated the strongest and most consistent progress, with enrolment beginning at 49% in 2012 and rising to 62% in 2013 and 69% in 2016. The SNNP region also showed substantial growth, with coverage increasing from 36% to 59% between 2012 and 2016. In contrast, the Tigray and Oromiya regions experienced fluctuations in their coverage rates. The most recent data from 2016 shows that Tigray was the lowest-performing region with a 49% coverage rate.

Table 3: CBHI uptake across the pilot regions in the balanced panel

Region	2012		2013		2015	
	%	N	%	N	%	N
Tigray	34.9	97	51.3	142	48.9	136
Amhara	49.1	142	61.9	179	68.5	198
Oromiya	45.2	131	44.5	130	55.5	161
SNNP	35.7	106	35.7	106	58.9	116
Total	41.3	476	48.2	557	58.0	611

Note: Only households in the balanced panel data surveyed four times in 2011, 2012, 2013, and 2015 were used to produce the result. The results do not include households from control districts where CBHI was not introduced.

The sustainability of an insurance scheme depends not only on initial enrolment but also on members' commitment to renew their contracts. As shown in Table 4, member retention at the national level was high. Among those enrolled in 2012, 82% renewed their subscription in 2013, and similarly, 81% of 2013 members remained in the scheme in 2015. Regional analysis reveals that Amhara leads in member retention, consistent with its high enrolment rates, achieving renewal rates of 93% in 2013 and 91% in 2015. In contrast, the dropout rate was highest in the Tigray region, where 32% of members did not renew their policy in 2015[2].

[2] It is also found that the share of households who plan to renew their CBHI membership was high and ranges from 89% in Oromiya to 95% in Amhara (Table 6). As reported in Table 7, the share of uninsured households who plan to join the scheme is lowest in SNNP (32% of sample households) and highest in Oromiya (71%).

Table 4: Probability of CBHI enrolment in 2015 (Logit regression marginal effect estimates)

Variables	Tigray	Amhara	Oromiya	SNNP
Socioeconomic status				
2nd consumption quintile (ref: poorest consumption quintile)	-0.0937	0.142	0.290**	0.115
	(0.126)	(0.0952)	(0.120)	(0.0956)
3rd consumption quintile	-0.0298	0.227***	0.297**	-0.114
	(0.140)	(0.0722)	(0.128)	(0.0953)
4th consumption quintile	-0.0811	0.249***	0.334***	-0.104
	(0.104)	(0.0610)	(0.118)	(0.107)
Richest consumption quintile	-0.0897	0.265***	0.318**	-0.0485
	(0.142)	(0.0580)	(0.130)	(0.151)
HH head education- educated (ref: no education at all)	0.0552	-0.139***	0.0461	-0.0330
	(0.0680)	(0.0490)	(0.0934)	(0.0689)
Participated in PSNP	-0.000959	0.101	0.112	0.304***
	(0.0657)	(0.163)	(0.202)	(0.101)
Demographic traits				
Male-headed HH	0.0467	-0.0606	-0.234**	0.000145
	(0.0745)	(0.118)	(0.115)	(0.141)
Age of HH head	-0.00255	-0.00244	0.00419	-0.0107***
	(0.00397)	(0.00354)	(0.00454)	(0.00269)
Household size	0.0483**	0.0448**	0.0623**	0.0317
	(0.0201)	(0.0186)	(0.0285)	(0.0256)
Prop. of children aged under 6 (ref: Prop. of males aged 16 to 64)	0.187	-0.249	-0.589*	0.119
	(0.359)	(0.430)	(0.316)	(0.274)

Variables	Tigray	Amhara	Oromiya	SNNP
Prop. of males aged 6 to 15	0.593*	0.145	0.0169	-0.618**
	(0.321)	(0.205)	(0.304)	(0.308)
Prop. of females aged 6 to 15	0.591*	-0.255	-0.105	-0.648***
	(0.324)	(0.285)	(0.402)	(0.241)
Prop. of females aged 16 to 64	0.938**	0.120	-0.429	-0.291
	(0.389)	(0.349)	(0.261)	(0.302)
Prop. of elderly aged above 64	0.232	-0.130	-0.475	-0.352**
	(0.375)	(0.247)	(0.411)	(0.152)
Health status and health care use				
Prop. of household members with poor SAH (ref: Prop. of household members with good SAH)	0.269	-0.136*	-0.0517	-0.00844
	(0.185)	(0.0737)	(0.0856)	(0.127)
Past illness event	-0.00722**	0.00400**	0.00452	-0.000121
	(0.00347)	(0.00157)	(0.00502)	(0.00374)
Trust in modern care – Agree (ref: Not agree)	0.0640	0.260**	0.0689	0.104
	(0.209)	(0.105)	(0.152)	(0.0663)
Formal and informal access to credit and social networks				
Member of *Iqqub*	0.220*	-0.00128	-0.216	-0.130*
	(0.132)	(0.0987)	(0.181)	(0.0774)
Participating in *Wonfel* or *Debo*	0.0543	-0.00901	0.0536	0.306*
	(0.0745)	(0.0853)	(0.0652)	(0.185)
Savings in a bank account	0.340***	0.0223	0.201	0.335
	(0.108)	(0.0682)	(0.142)	(0.214)

Variables	Tigray	Amhara	Oromiya	SNNP
Official position held	0.0582	0.119*	0.0587	0.0947
	(0.180)	(0.0723)	(0.0942)	(0.107)
Supply-side characteristics				
Travel time to health centre	-0.000162	0.000148	0.00176**	0.00249
	(0.00117)	(0.000753)	(0.000779)	(0.00292)
Availability of blood testing equipment	0.254***	--	0.724***	--
	(0.0940)		(0.111)	
Waiting time to see a medical professional	-0.00596***	-0.00267	-0.0514***	-0.0348***
	(0.00191)	(0.00192)	(0.0122)	(0.0105)
Perceived quality of care-good (ref: not good)	-0.205	0.378***	-0.217	-0.0580
	(0.125)	(0.0899)	(0.143)	(0.172)
Observations	289	300	292	267

Notes: Outcome variable is CBHI enrolment status in 2015 and explanatory variables are at their 2013 values; In the estimates of Amhara and SNNP regions, the variable 'availability of blood testing facility' drop of the scheme because it predicts success perfectly, clustered standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Analysis of membership dynamics reveals that a significant portion of lapsed members eventually return to the scheme. Among households that did not renew their membership in 2013, approximately 53% had re-enrolled by 2015 (Table 4). This re-enrolment rate ranged from 48% in SNNP to 56% in the Tigray region. The high rate of re-enrolment in Tigray is particularly noteworthy given its higher dropout rate, suggesting successful efforts to bring former members back into the program.

Qualitative data identifies several reasons for this success in Tigray. First, there has been an increasing effort by village administrative bodies to mobilize the community and enhance CBHI coverage. Second, transferring the CBHI structure from the District Administration Office to the District Health Office has made health workers more accountable for the scheme's success. Third, health extension workers are now fully engaged in providing information, raising awareness, and facilitating the enrolment and renewal process for the community. According to a health extension worker in the Ahferom district:

> *"Community-level organizations like the Health Development Army (HDA) have become integral to supporting CBHI membership retention. These groups regularly discuss the scheme's status and employ a key strategy of targeted follow-up. HDA members receive lists of households that have not renewed their membership on time, and designated women investigate the reasons for non-renewal. When financial hardship is identified as the primary barrier, the HDA network mobilizes support, offering solutions that range from small loans to direct financial aid for the poorest households. (KII 2; March, 2019).*

Some districts in the SNNP region also offer exemplary models for supporting CBHI membership. According to a regional-level informant, members of the HDA undergo a quarterly evaluation of their implementation of health extension packages. A key informant from the Damot Weyde district explained this process further:

> *"When members of the HDA evaluate each other's performance on the implementation of health extension packages, being a member of CBHI contributes 5% to their score. This creates positive competition among the women to join the CBHI scheme, gain recognition, and help their development group succeed. However, this guideline is not implemented in many districts, and we need to expand this successful experience to all districts in the region." (KII 8, May 2019).*

3.3. Factors influencing enrolment in the scheme

We have assessed the adequacy of the logit models used to evaluate factors driving enrolment in the CBHI scheme using various model diagnostic tests. The link test did not indicate any specification problems, as the squared predicted term (_hatsq) was not statistically significant in any of the regional models. The Hosmer–Lemeshow goodness-of-fit test also suggested that the models fit the data reasonably well, with non-significant p-values across regions (ranging from 0.15 in Amhara to 0.90 in Oromia). Finally, the variance inflation factor (VIF) results showed no evidence of serious multicollinearity among the explanatory variables, with mean VIF values ranging between 1.5 and 3.2. These results suggest that the models used in the study provide an adequate fit to the data.

The marginal effects from the logit models showing the factors associated with enrolment in the CBHI scheme are presented in Table 5. To identify important factors driving scheme uptake, we controlled for a range of variables in the empirical analysis, including socioeconomic status, demographic characteristics, household health status, access to cash from formal and informal sources, and the accessibility and quality of health care services.

Regarding socioeconomic status (SES), the results indicate that the richest households in the Amhara and Oromiya regions are more likely to join the pilot scheme than poorer households. For instance, in Amhara, households in the highest consumption quintile (fifth) are 26.5 percentage points more likely to enroll than those in the lowest quintile. Similarly, the richest households in Oromiya are 32 to 33 percentage points more likely to enroll than the poorest. This finding aligns with numerous studies that provide empirical evidence of the poor being socially excluded from voluntary health insurance programs (e.g., Aggarwal, 2010; Chen & Yan, 2012; Gnawali et al., 2009).

Table 5: Single most important reason for enrolling and future plan to renew in 2015, %

Insured households	Tigray (N= 135)	Amhara (N= 177)	Oromiya (N=156)	SNNPR (N=90)	Total (N=558)
Reasons for enrolment (percent of insured households)					
Illness and/or injury occurs frequently in the household	3.0	20.9	10.9	22.2	14.0
Pregnant women in the household need health care services	0.0	11.9	14.7	13.3	10.0
Mother (mothers) in the hhs need health care services	5.2	3.4	19.2	4.4	8.4
Child/children in the households need health care services	4.4	6.2	23.7	4.4	10.4
Old hh members need health care services	4.4	7.9	5.1	2.2	5.4
To finance health care expenses	74.1	38.4	16.7	50.0	42.8
The household is exempt from registration fee and premium	2.2	0.6	2.6	0.0	1.4
Premium is low compared to user fee	5.2	7.9	2.6	2.2	4.8
Pressure from CBHI/village officials/other members	1.5	2.9	3.8	0	2.3
Other reasons	0.0	0.0	0.6	1.1	0.4
Insured households who plan to renew their CBHI membership	94.0	94.5	89.0	93.0	92.7

Note: The result is for the balance panel.

Contrary to expectations, the results show that in the Amhara region, households with literate heads are approximately 14 percentage points less likely to enroll. Consistent with previous studies (e.g., Shigute et al., 2017; Mebratie et al., 2015), participation in the Productive Safety Net Program (PSNP), which targets the poorest households, is positively associated with joining the CBHI scheme. However, this effect was observed only in the SNNP region, where PSNP members are up to 30 percentage points more likely to enroll compared to non-members.

Qualitative information from the SNNP region indicates that PSNP members receive regular information about the health insurance scheme, which encourages them to join. Additionally, focus group discussion (FGD) participants reported a degree of social pressure to enroll PSNP members in the CBHI scheme. For instance, one FGD participant in the SNNP region stated:

> *"I have a neighbour who depends on PSNP benefits for survival. Last year, village officials reduced his monthly benefit to pay for his CBHI contribution without his consent. As a result, he faced financial constraints and struggled to feed his family during the month his PSNP payment was deducted" (FGD4, May 2019).*

Key informants in this region confirmed that several Kebeles previously collected CBHI contributions during the transfer of PSNP benefits. They noted, however, that this practice was discontinued following complaints from PSNP members. Beneficiaries who participated in FGDs also reported that the pressure to enforce CBHI membership has recently diminished. A new challenge has emerged, however: beneficiaries are no longer receiving fee waivers to join the scheme. As one PSNP member explained:

> *"The village and district governments still believe that we can contribute from our PSNP benefits, so they prioritize giving fee waivers to those who are not PSNP members. However, we do not have enough income to pay for health insurance, since the PSNP benefit is not even sufficient to cover our basic consumption expenses" (FGD3, May 2019)*

Household composition by age and gender affects scheme enrolment differently across the regions. An increase in household size by one member is associated with a 5- to 6-percentage-point increase in demand for health insurance in the

Household composition by age and gender affects scheme enrolment differently across the regions. An increase in household size by one member is associated with a 5- to 6-percentage-point increase in demand for health insurance in the Tigray, Amhara, and SNNP regions. This is likely because the Ethiopian CBHI scheme has a flat premium per core household member, regardless of family size[1], making it particularly attractive to larger households. Furthermore, in the SNNP region, the presence of male household members aged 16 to 64 increases the probability of enrolment. This may be attributed to an income effect, as adult males are often the primary breadwinners who generate the income needed to purchase the insurance policy.

While numerous studies (e.g., Chen and Yan, 2012 in China; Diop et al., 2006 in Mali; and Parmar et al., 2012 in Burkina Faso) show that adverse selection is a serious challenge for health insurance schemes, this study finds no strong evidence of it in the Ethiopian context. Although there is a positive relationship between the incidence of illness and demand for insurance in Amhara, the effect size is very small at only 0.4 percentage points. In the other regions, the relationship between health status and enrolment is not statistically significant. This conclusion is further supported by the 2015 household survey (Table 6), which revealed that far more households joined the scheme to finance unexpected health expenditures (from 17% to 74% of respondents) than due to the frequent occurrence of illness (3% to 22%) (Table 6).

Among households that were not enrolled, the main reason given for not joining was the cost of registration and premiums (35.1%), followed by lack of awareness about the scheme (23.9%). The importance of these reasons differed across regions, with affordability being particularly common in Amhara and Oromiya. At the same time, more than half of the uninsured households (56.8%) said they planned to enrol in the future, although this varied considerably across regions, from 31.7% in SNNPR to 71.3% in Oromiya (Table 7).

[1] This is not the case anymore.

Table 6: Single most important reason for not enrolling and future plan to enrol in 2015, %

Uninsured households	Tigray (N= 145)	Amhara (N= 86)	Oromiya (N=121)	SNNPR (N=58)	Total (N=410)
Reasons for not enrolling in CBHI (percent of non- insured households)					
Illness and injury does not occur frequently in the household	9.0	11.6	2.5	15.5	8.5
The registration fee and premiums are not affordable	31.7	39.5	38.8	29.3	35.1
Want to wait in order to confirm the benefit	2.1	18.6	9.9	8.6	8.8
Lack of detail awareness about the scheme	29.7	17.4	24.0	19.0	23.9
Limited availability of health services	6.2	1.2	6.6	5.2	5.1
Quality of health care services is low	7.6	4.7	3.3	8.6	5.9
The benefit package does not meet our needs	4.1	1.2	1.7	5.2	2.9
CBHI management is not trustworthy	3.5	0.0	9.1	8.6	5.1
Other reasons	6.2	5.9	4.2	0.0	4.6
Uninsured households who plan to enrol in the future	63.0	48.9	71.3	31.7	56.8

Note: The result is for the balance panel.

Table 7: CBHI renewal and re-enrolment in the balanced panel

Region	Renewal in 2013[a]		Renewal in 2015[b]		Re-enrol in 2015[c]	
	%	N	%	N	%	N
Tigray	75.0	72	68.3	97	56.0	14
Amhara	93.0	132	90.1	163	50.0	5
Oromiya	79.4	104	81.3	104	55.6	15
SNNPR	78.3	83	81.4	83	47.8	11
Total	82.3	391	81.1	447	53.0	45

***Note*: [a]** is CBHI drop out status in 2013 as a function of CBHI membership in 2012; **[b]** is CBHI drop out status in 2015 as a function of CBHI membership in 2013; **[c]** refers to HHs who enrolled in the scheme in 2012 and dropped out in 2013 but re-enrolled in 2015. Re-enrolment is equal to one if the household was CBHI member in 2012 and 2015 but not in 2013 and equal to zero if the household was CBHI member in 2012 but not in 2013 and 2015.

The Ethiopian CBHI scheme has several design features intended to mitigate adverse selection. A key strength is that the unit of enrolment is the household rather than the individual, which discourages purchasing decisions based on a single person's pre-existing medical condition. Moreover, new members must observe a waiting period of at least one month before they can use their membership to access health care services. Beyond these structural safeguards, factors like trust in the healthcare system also play a crucial role. For instance, in the Amhara region, trust in modern care was found to increase the probability of insurance purchase by 26 percentage points (Table 5)

Access to finance from formal and informal sources also affects enrolment, with notable variations across regions. In the Tigray region, membership in an *Iqub* (a traditional savings group) or having a bank account increases scheme uptake by 34 percentage points. In contrast, in the SNNP region, participation in an *Iqub* is associated with a 13-percentage-point reduction in enrolment. However, other forms of social capital in SNNP, such as participation in collective work like *Debo* and *Wonfel*, are positively linked to joining the scheme, increasing the probability of joining by about 30 percentage points. Furthermore, civic leadership plays a significant role in the Amhara region, where holding an official position increases the probability of enrolment by 11 percentage points. This is likely because government officials and community leaders received detailed training on the CBHI scheme, participated in awareness campaigns, and pledged to serve as role models by joining it.

Factors related to the healthcare supply significantly explain the likelihood of enrolment in the scheme. Access to quality care is a powerful driver of scheme uptake. For instance, the availability of blood test equipment at the nearest facility increases the probability of enrolment by 25.4 percentage points in Amhara and a striking 72.4 percentage points in Oromiya. Similarly, a 10-minute reduction in waiting time increases the probability of enrolment by 51.4 percentage points in Oromiya and by 34.8 percentage points in SNNP. The availability of quality health services overall helps expand the CBHI scheme's coverage by 37.8 percentage points in Amhara.

Despite the clear importance of quality care in attracting new members, the 2015 household survey reveals widespread dissatisfaction among those already insured. About 58% of insured respondents in Amhara and 59% in Oromiya did not believe the quality of care at contracted facilities was good (Table 2). This sentiment was echoed by FGD participants, who complained about drug shortages and being required to make extra payments. For instance, an insured participant in the SNNP region indicated that,

> *"We feel forced to pay for healthcare twice: first for our CBHI membership, and then again to purchase drugs from private dealers. Unless the problem of drug shortages at the contracted health centres is solved, I do not believe the health insurance scheme is relevant to our community." (FGD1, May 2019).*

In the SNNP region, the financial burden on households is exacerbated by the lack of a reimbursement mechanism for drugs purchased from non-contracted providers. Consequently, insured households must incur out-of-pocket expenses whenever contracted facilities do not have the required drugs in stock. Those too poor to pay for these external purchases are often forced to forgo treatment. Furthermore, dissatisfaction extends beyond logistical issues to the service provided by health workers. A focus group discussion participant in the Tigray region described their experience:

> *"Health workers reportedly perceived patients with CBHI membership cards in two negative ways. First, they were often viewed as poor individuals receiving government-subsidized care, rather than as legitimate clients. Second, there was a corresponding belief that insured patients would over-utilize services, visiting facilities for minor checkups simply because they did not have to pay a user fee for consultation" (FGD1, May 2019).*

3.4. Factors influencing contract renewal decisions

Table 8 reveals that socioeconomic status is a key determinant of CBHI renewal decisions, particularly in the Oromiya and SNNP regions. For instance, in SNNP, households in the second consumption quintile are 13.4 percentage points more likely to remain in the scheme compared to those in the poorest quintile. Similarly, in Oromiya, households in the poorest quintile are significantly more likely to drop out than their richest counterparts. This evidence strongly suggests that without a subsidy arrangement, the scheme risks excluding the poorest households, who may be unable to sustain their membership even after successfully enrolling.

Table 8: Probability of membership renewal in 2015 (Logit regression marginal effect estimates)

Variables	Tigray	Amhara	Oromiya	SNNP
Socio-economic status				
2nd consumption quintile (ref: poorest consumption quintile)	0.0625	-0.111	0.0708*	0.134**
	(0.154)	(0.157)	(0.0386)	(0.0523)
3rd consumption quintile	0.0900	-0.0126	0.115**	-0.141
	(0.143)	(0.0550)	(0.0541)	(0.0859)
4th consumption quintile	-0.140	0.0125	0.228**	0.0271
	(0.179)	(0.0501)	(0.110)	(0.112)
Richest consumption quintile	0.114	0.0322	0.175**	0.0311
	(0.156)	(0.0351)	(0.0802)	(0.143)
HH head education- educated (ref: no education at all)	0.162	-0.0288	0.0385	0.0303
	(0.123)	(0.0279)	(0.0323)	(0.0432)
Participated in PSNP	-0.176***	_	-0.765***	-0.0450
	(0.0629)		(0.191)	(0.0733)
Demographic traits				
Age of HH head	-0.00437	-0.00333**	0.00368*	-0.0044**
	(0.00376)	(0.00162)	(0.00205)	(0.00210)
Household size	0.0281	0.0285**	0.0230	-0.0149
	(0.0344)	(0.0127)	(0.0141)	(0.0127)
Prop. of children aged under 6 (ref: Prop. of male aged 16 to 64)	0.731	-0.191	-0.126	0.364
	(0.577)	(0.148)	(0.232)	(0.292)
Prop. of male aged 6 to 15	0.894***	-0.0341	0.165	-0.352*
	(0.272)	(0.0805)	(0.107)	(0.198)
Prop. of female aged 6 to 15	0.753***	-0.0874	0.0465	-0.0686
	(0.283)	(0.112)	(0.147)	(0.289)

Variables	Tigray	Amhara	Oromiya	SNNP
Prop. of female aged 16 to 64	1.610***	0.303*	-0.277	-0.363
	(0.481)	(0.169)	(0.247)	(0.252)
Prop. of elderly aged above 64	0.0844	-0.0291	-0.199	-0.357
	(0.413)	(0.108)	(0.175)	(0.557)
Health status and health care use				
Prop. of household members with good SAH (ref: Prop. of household members with poor SAH)	-0.364	0.0488	-0.0333	-0.00681
	(0.227)	(0.0325)	(0.0803)	(0.188)
Past illness event	-0.00610	0.000764	-0.000248	-0.00175
	(0.00428)	(0.00117)	(0.00189)	(0.00224)
CBHI card used	0.307**	0.0229	0.0668**	0.0679
	(0.124)	(0.0514)	(0.0330)	(0.112)
CBHI experience and design features				
Overall satisfaction with the scheme—high (ref: low)	-0.140	0.0119	0.0319	0.00525
	(0.103)	(0.0196)	(0.0404)	(0.0904)
Supply side characteristics				
Travel time to health center (in minutes)	3.65e-05	9.89e-05	0.000330	0.000159
	(0.00130)	(0.000304)	(0.000631)	(0.00197)
Quality of care linked to CBHI—Good (ref: not good)	0.0193	0.00686	0.0657	0.164**
	(0.0861)	(0.0370)	(0.0515)	(0.0721)
Waiting time to see a medical professional (in minutes)	-0.0059***	-0.00172**	0.00292	0.00525
	(0.00137)	(0.000828)	(0.00360)	(0.0103)
Observations	141	164	127	102

Notes: Outcome variable is CBHI membership renewal status in 2015. In the estimate of Amhara region, the variable 'PSNP_ever_enrol' drop of the scheme because it predicts success perfectly, Explanatory variables are at their 2013 values; standard errors in parentheses are clustered at the village level. ***P<0.01, **P<0.05, *P<0.1

The analysis reveals that PSNP members in the Tigray and Oromiya regions are now less likely to renew their membership status. This finding directly contradicts earlier research by Mebratie et al. (2015), which found that PSNP participation enhanced scheme retention. This divergence may be explained by both the different study periods and, more significantly, recent shifts in implementation policy. Qualitative data from key informants in Tigray and SNNP indicate that a previous policy of coercing PSNP beneficiaries into contributing to the CBHI scheme has been discontinued due to complaints. Furthermore, in regions such as SNNP, PSNP beneficiaries have recently been excluded from fee-waiver benefits to prioritize households with no income at all. These shifts -from coercion to voluntarism and changes in subsidy eligibility - could systematically reduce membership renewal among poor households. This perspective was clearly articulated by an uninsured focus group participant who is also a PSNP beneficiary in the Tigray region:

> *"I understand the importance of health insurance for our community. However, I am not a member of CBHI because I have other, more immediate priorities, including purchasing food. I simply do not have the financial capacity to afford the contribution" (FGD4, May 2019).*

The age of the household head is a significant factor in membership retention, though its effect varies by region. In the Amhara and SNNP regions, an increase in the head's age is associated with a reduction in membership renewal, although the magnitude of this effect is very small (less than 0.5 percentage points). This negative relationship may be due to a diminished capacity among older heads to generate the resources needed to afford the health insurance contribution. In direct contrast, in the Oromiya region, age is a positive and significant predictor of scheme retention.

In all the pilot regions, there is no evidence of adverse selection behavior in renewal decisions. In the Tigray and Oromiya regions, using a CBHI membership card to access care increases the probability of membership renewal by 31 and 6.7 percentage points, respectively. This implies that receiving benefits from the scheme increases interest in continuing as a member.

Perceptions of quality also play a crucial, albeit regionally varied, role. While general attitudes did not systematically predict renewal, a specific positive view on the quality of care in the SNNP region increased the likelihood of renewal by 16.4 percentage points. This is particularly salient given that FGD participants in

SNNP frequently complained about drug shortages at contracted facilities, which forced them to incur out-of-pocket costs. Furthermore, in Tigray and Amhara, longer waiting times for consultations were associated with lower renewal rates.

The clear policy implication of these findings is that improving the quality of care—specifically by ensuring drug availability and providing timely services—is essential to encouraging insured households to retain their membership.

5. Conclusion and Recommendations

In 2011, as part of its effort to achieve universal health coverage, the Ethiopian government introduced a CBHI scheme in 13 districts across four regions. The program has since undergone a major scale-up, covering 350 districts by June 2016, with a national goal of reaching 80% of target households by 2020. This success is attributable to the federal government's political commitment, the robust leadership of local administrations, and the extensive engagement of various stakeholders in Ethiopia. For the same argument, please see Lavers, 2019; Mebratie et al., 2019; Mulat et al., 2022. However, the scheme's design features—such as contribution levels, premium collection periods, and reimbursement policies—vary significantly across these regions. Despite these heterogeneities, existing studies have not examined their impact on the scheme's effectiveness. This study, therefore, aims to fill this knowledge gap by investigating regional differences in scheme coverage. To do so, it relies on four rounds of a balanced panel dataset collected between 2011 and 2015, supplemented by qualitative data from focus group discussions and key informant interviews.

Results from the balanced panel data show significant regional disparities in the uptake of the CBHI scheme. Enrolment is highest in the Amhara region and lowest in Tigray. For instance, in 2015, uptake rates ranged from 68.5% in Amhara to just 49% in Tigray. Similarly, contract renewal rates were highest in Amhara (90%) and lowest in Tigray (68%). Qualitative data suggest that these variations are driven by differences in implementation practices, including the level of commitment from local government officials and the extent to which the scheme's benefits align with community needs.

Regression analysis further reveals that the factors driving enrolment also differ by region. In Amhara and Oromiya, for example, the richest households are significantly more likely to enroll, with the richest quintile 23 to 33 percentage points more likely than the poorest. This suggests a higher risk of excluding the

poor in these regions. Furthermore, socioeconomic status is a major predictor of renewal in Oromiya and SNNP, where poorer households are less likely to continue their membership. In SNNP, however, participation in the PSNP program was found to increase initial enrolment by 30.4 percentage points, a finding that qualitative data suggest was historically linked to coercive contribution practices that have since been discontinued.

Household demographics significantly influence enrolment, often in ways that reflect the scheme's design. In the Amhara, Tigray, and Oromiya regions, larger households are more likely to enroll, as the flat-rate premium makes the scheme particularly cost-effective for them. In contrast, in the SNNP region, the presence of adult males is a stronger predictor of enrolment, likely due to an income effect, as they serve as primary breadwinners who can afford the contribution.

Furthermore, the study finds little evidence of adverse selection in Tigray, Oromiya, and SNNP, largely because the policy of mandatory household-level enrolment discourages individuals from joining on the basis of pre-existing conditions. The Amhara region, however, presents a key exception. A small but significant adverse selection effect was observed there, which qualitative data suggests was a direct consequence of its initial design. Originally, Amhara's premium was calculated per person, which incentivized some households to register only their sick members to reduce costs. Recognizing this flaw, the region has since adopted the flat-rate household premium model used elsewhere, effectively closing this loophole.

Healthcare supply-side factors are significant drivers of demand for the insurance scheme. Shorter waiting times and the availability of medical equipment are positively associated with enrolment in Tigray, Oromiya, and SNNP, while perceived quality of care is a key driver in Amhara. This link between quality and retention is particularly evident in SNNP, where members who rate the service as good are 16.4 percentage points more likely to renew their membership. Furthermore, a positive user experience is critical; using the CBHI card to access care increases the likelihood of renewal by 30.7 percentage points in Tigray and 6.7 percentage points in Oromiya, demonstrating that realizing the scheme's benefits is key to retention. The overall evidence from this study, therefore, underscores the importance of local innovation and community participation in the design and implementation of micro health insurance. To ensure success, it is crucial to involve the community in decisions regarding the benefit package, referral procedures, premium levels, and claim settlements.

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Appendix Table 1: Description of the abbreviated variables listed in the Appendix Tables

Variable	Description
per_cons_quint1	Belonging to a household from the poorest consumption quintile
per_cons_quint2	Belonging to a household from the 2nd consumption quintile
per_cons_quint3	Belonging to a household from the 3rd consumption quintile,
per_cons_quint4	Belonging to a household from the 4th consumption quintile,
per_cons_quint5	Belonging to a household from the richest consumption quintile
head_literacy	can head of the household read and write in any language? (1=yes)
PSNP_ever_enroll	has this household ever been participating in the productive safety net programme? (1=yes)
sex_new	Sex of the household head =1 if male and 0 otherwise
age_new	Age of the household head (in completed years)
HH_size	household size
under6_share	share of male members of below 6 years old
male6_15_share	share of male members of >=6 but <=15 years old
female6_15_ share	share of female members of >=6 but <=15 years old
male16_64_share	share of male members >=16 but <= 64 years old
female16_64_ share	share of female members >=16 but <= 64 years old
above64_share	share of household members above 64 years old
HH_SAH_high_share	Share of households members who have good or excellent self assessed health status
HH_SAH_fair_ share	Share of households members who have fair self assessed health status
HH_SAH_low_ share	Share of households members who have low self assessed health status
hh_illness_2months	Incidence of illness in the household within two months recall period (1=yes)
hh_chronic_il~s	number of household members(aged 6 & above) who suffered from chronic illness which stayed above 30 days
OPC_use_dummy	did at least one hh member use outpatient care in the last 2months? (1=yes)
IPC_use_dummy	did at least one hh member use inpatient care in the last 12 months? (1=yes)
hh_hosp_days	total number of days spent in modern health facility last 12 months
hh_OPC_cost_2months	household's outpatient spending in Birr last two months

Variable	Description
hh_IPC_cost_12months	household's inpatient spending in Birr last 12 months
modern_trust1	modern_trust==disagree
modern_trust2	modern_trust==neither/nor
modern_trust3	modern_trust==agree
CBHI_info_friends	CBHI info source==neighbours/friends
CBHI_info_officials	CBHI info source ==CBHI officials
CBHI_info_worker	CBHI info source ==health professionals
CBHI_inf_other	CBHI info source == other sources like media, campaign...
CBHI_buy_sick_yes	Only sick people should join CBHI = correct
CBHI_buy_sic_no	Only sick people should join CBHI = not correct
CBHI_buy_sic_donot	Only sick people should join CBHI = do not know
CBHI_like_sav_yes	CBHI is similar to saving institutions = correct
CBHI_like_sav_no	CBHI is similar to saving institutions = not correct
CBHI_like_sav_donot	CBHI is similar to saving institutions = do not know
CBHI_finace_yes	CBHI finances health care = correct
CBHI_finace_no	CBHI finances health care = not correct
CBHI_finace_donot	CBHI finances health care = do not know
CBHI_premium_yes	CBHI premium can be returned = correct
CBHI_premium_no	CBHI premium can be returned = not correct
CBHI_premium_donot	CBHI premium can be returned = do not know
CBHI_implem_met_no	after implementation of the CBHI, how many times have participated in CBHI related meetings? you or any of your hh
CBHI_involved_mgt	are you or any one of your hh members involved in the administration of CBHI?
official_position_held	have you ever held official, kebele, or traditional position?
CBHI_agent_disagree	CBHI agents solve problems ==disagree
CBHI_agent_nor	CBHI agents solve problems ==neither agree nor disagree
CBHI_agent_agree	CBHI agents solve problems ==agree
CBHI_community_disagree	Community guides CBHI administration ==disagree
CBHI_community_nor	Community guides CBHI administration ==neither agree nor disagree
CBHI_ community_agree	Community guides CBHI administration ==agree
HF_favour_disagree	Health workers favour insured patients ==disagree
HF_favour_nor	Health workers favour insured patients ==neither agree nor disagree
HF_favour_agree	Health workers favour insured patients ==agree

Variable	Description
CBHI_mgt_ disagree	CBHI management is trustworthy ==disagree
CBHI_mgt_nor	CBHI management is trustworthy ==neither agree nor disagree
CBHI_mgt_agree	CBHI management is trustworthy ==agree
CBHI_qualitycare_good	Quality of care linked to CBHI ==good
CBHI_ qualitycare_fair	Quality of care linked to CBHI ==fair
CBHI_ qualitycare_poor	Quality of care linked to CBHI ==poor
CBHI_ qualitycare_do not know	Quality of care linked to CBHI ==i don't know
CBHI_card_used	have you made use of your cbhi membership to cover health costs? (1=yes)
health_center_time	How many minutes will it take you to go to the nearest health center using the usual mean of transportation?
hospital_pub_time	How many minutes will it take you to go to the nearest public hospital using the usual mean of transportation?
head_HF_degree	Head of HF school level==degree (12+3)
head_training	have you received any kind of training in health? (1= yes)
blood_test_facility	do you have blood test facility/service? (1= yes)
urine_test_ facility	do you have urine test facility/service? (1= yes)
average_wait_doctor	average waiting time for 5 patients to see medical (in minutes)
hc_quality_overall_good	In general, do you think that this health facility is providing the expected/standard? (1=yes)

Appendix Table 2: Sensitivity Analysis - Probability of CBHI enrolment in 2015 as a function of (socioeconomic) covariate in 2011 (baseline value) (Logit regression marginal effect estimates)

Variables	Tigray	Amhara	Oromiya	SNNP
per_cons_quint2	0.138	-0.0573	0.170	-0.126
(ref: per_cons_quint1)				
	(0.0838)	(0.0668)	(0.186)	(0.106)
per_cons_quint3	0.0552	0.0532	0.0571	-0.0105
	(0.110)	(0.0822)	(0.191)	(0.137)
per_cons_quint4	0.246**	0.106	0.160	-0.0177
	(0.122)	(0.107)	(0.190)	(0.137)
per_cons_quint5	0.0540	0.207***	0.219	0.0588
	(0.154)	(0.0593)	(0.207)	(0.195)
head_literacy	-0.0619	-0.0218	0.0614	0.0469
	(0.0787)	(0.0615)	(0.0785)	(0.0683)
PSNP_ever_enroll	0.0970	0.110	0.0922	0.355**
	(0.0592)	(0.0831)	(0.303)	(0.148)
sex_new	0.0727	-0.0216	-0.154	0.0366
	(0.0962)	(0.155)	(0.139)	(0.146)
age_new	-0.00312	-0.000851	0.00776	-0.0128***
	(0.00384)	(0.00407)	(0.00493)	(0.00458)
HH_size	0.0339	0.0546***	0.0539**	0.0354*
	(0.0257)	(0.0212)	(0.0256)	(0.0202)
under6_share	0.367	-0.367	0.000313	-0.249
(ref: male16_64_share)				
	(0.315)	(0.333)	(0.311)	(0.342)
male6_15_share	0.711***	0.0822	0.153	-0.695*
	(0.231)	(0.347)	(0.310)	(0.366)
female6_15_share	0.790**	-0.129	0.0206	-0.159
	(0.321)	(0.300)	(0.308)	(0.297)
female16_64_share	0.794***	0.239	-0.323	-0.0594
	(0.284)	(0.357)	(0.310)	(0.335)
above64_share	0.270	-0.587**	-0.812**	-0.227
	(0.247)	(0.297)	(0.404)	(0.463)
HH_SAH_not_high (ref: high)	0.148*	-0.0357	0.0153	-0.176
	(0.0830)	(0.0833)	(0.291)	(0.167)
hh_illness_2months	0.000469	-0.00170	0.00245	0.000501
	(0.00258)	(0.00233)	(0.00324)	(0.00158)
modern_trust3_agree	-0.0430	0.119	0.0775	0.0745
(ref: not agree)				

Variables	Tigray	Amhara	Oromiya	SNNP
	(0.0995)	(0.133)	(0.202)	(0.122)
iqqub_participate	0.126	-0.0610	-0.0363	-0.0720
	(0.168)	(0.0960)	(0.0829)	(0.0995)
wonfel_debo_parti	-0.154*	-0.156*	-0.0609	0.228
	(0.0864)	(0.0915)	(0.0738)	(0.203)
bank_account	0.230***	0.0254	0.261**	0.0424
	(0.0779)	(0.0578)	(0.113)	(0.219)
official_position_held	0.275***	-0.0111	0.131*	-0.0293
	(0.102)	(0.0393)	(0.0735)	(0.147)
health_center_time	9.77e-05	-0.000138	0.00168*	-0.00239
	(0.000656)	(0.000722)	(0.000951)	(0.00164)
blood_test_facility	0.227***		0.700***	
	(0.0758)		(0.148)	
average_wait_doctor	-0.00667***	-0.00201	-0.0483***	-0.0376***
	(0.00158)	(0.00169)	(0.0125)	(0.0110)
hc_quality_overall_good	-0.205*	0.444***	-0.237	-0.0308
	(0.111)	(0.0701)	(0.202)	(0.151)
Observations	300	305	303	267

Notes: Outcome variable is CBHI enrolment status in 2015 and explanatory variables are at their baseline (2011) values; In the estimates of Amhara and SNNP regions, the variable 'blood_test_facility' drop of the scheme because it predicts success perfectly, clustered standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Appendix Table 3: Sensitivity Analysis - Probability of membership renewal in 2015 as a function of (socioeconomic) covariate in 2011 (baseline value) (Logit regression marginal effect estimates)

Variables	Tigray	Amhara	Oromiya	SNNP
per_cons_quint2(ref: per_cons_quint1)	0.122	0.00142	0.381***	0.0808
	(0.139)	(0.0242)	(0.102)	(0.0794)
per_cons_quint3	-0.0420	0.0193	0.591***	-0.148
	(0.145)	(0.0244)	(0.110)	(0.174)
per_cons_quint4	0.207*	-0.0212	0.755***	-0.0587
	(0.118)	(0.0519)	(0.0854)	(0.117)
per_cons_quint5	0.0921	-0.0675	0.997***	0.112
	(0.212)	(0.0895)	(0.00171)	(0.0723)
head_literacy	0.0407	-0.0201	-0.0924	0.102*
	(0.0837)	(0.0228)	(0.0729)	(0.0582)
PSNP_ever_enroll	-0.0144		-0.0868	0.0205
	(0.108)		(0.120)	(0.0802)
age_new	-0.00629	-0.00271*	-0.00312	-0.00104
	(0.00443)	(0.00162)	(0.00359)	(0.00354)
HH_size	0.0362	0.0183*	0.0412**	-0.000644
	(0.0314)	(0.00984)	(0.0188)	(0.00915)
under6_share (ref: male16_64_share)	0.583	-0.299*	-0.213	-0.276
	(0.529)	(0.164)	(0.236)	(0.562)
male6_15_share	0.656*	-0.0207	0.0930	-0.548
	(0.392)	(0.108)	(0.241)	(0.389)
female6_15_share	0.841*	-0.0379	-0.224	-0.0922
	(0.468)	(0.131)	(0.189)	(0.498)
female16_64_share	1.317***	0.223	-0.414**	-0.416
	(0.458)	(0.172)	(0.174)	(0.460)
above64_share	0.547**	-0.125	0.196	0.178
	(0.269)	(0.116)	(0.339)	(0.613)
HH_SAH_high_share (ref: low)	-0.0845	0.0116	-0.0286	0.233
	(0.0854)	(0.0253)	(0.161)	(0.255)
hh_illness_2months	0.0101***	-0.00124**	0.00297	0.000471
	(0.00361)	(0.000627)	(0.00208)	(0.00167)
health_center_time	0.000520	8.04e-05	-0.000681	-0.00133

Variables	Tigray	Amhara	Oromiya	SNNP
	(0.00109)	(0.000201)	(0.000498)	(0.000884)
hc_quality_overall_good (ref: not good)	-0.123	0.0689	0.266**	-0.0260
	(0.110)	(0.0569)	(0.136)	(0.0847)
average_wait_doctor	-0.00690***	-0.00196**	-0.000680	-0.0173
	(0.00127)	(0.000837)	(0.00380)	(0.0137)
Observations	143	167	127	101

Notes: Outcome variable is CBHI membership renewal status in 2015 while explanatory variables are their baseline (2011) values. In the estimate of Amhara region, the variable 'PSNP_ever_enroll' drop of the scheme because it predicts success perfectly, Explanatory variables are at their 2013 values; standard errors in parentheses are clustered at the village level.[1] ***P<0.01, **P<0.05, *P<0.1

Appendix Table 4: Sensitivity Analysis - Probability of CBHI enrolment in 2015 as a function of covariates in their 2013 values and after controlling for regional dummies (Logit regression marginal effect estimates)

Variables	Mfx (se)
per_cons_quint2 (ref: per_cons_quint1)	0.0630
	(0.0598)
per_cons_quint3	0.127*
	(0.0662)
per_cons_quint4	0.148**
	(0.0585)
per_cons_quint5	0.159**
	(0.0691)
head_literacy	-0.00556
	(0.0361)
PSNP_ever_enroll	0.123**
	(0.0584)
sex_new	-0.0576
	(0.0512)
age_new	-0.00120
	(0.00183)
HH_size	0.0408***
	(0.0107)
under6_share (ref: male16_64_share)	-0.104
	(0.186)

Variables	Mfx (se)
male6_15_share	0.233*
	(0.126)
female6_15_share	0.0127
	(0.148)
female16_64_share	0.255
	(0.169)
above64_share	-0.154
	(0.152)
HH_SAH_not_high (ref: high)	-0.112*
	(0.0587)
hh_illness_2months	0.00143
	(0.00156)
modern_trust3	0.159**
	(0.0650)
iqqub_participate	-0.0851
	(0.0855)
wonfel_debo_parti	0.0884*
	(0.0474)
bank_account	0.162***
	(0.0606)
official_position_held	0.138***
	(0.0474)
health_center_time	0.00116**
	(0.000583)
blood_test_facility	0.0519
	(0.0972)
average_wait_doctor	-0.00565***
	(0.00153)
hc_quality_overall	0.151**
	(0.0732)
region_tigray (ref: region_snnp)	0.199*
	(0.106)
region_amhara	0.296***
	(0.0901)
region_oromiya	0.00550
	(0.104)
Observations	1,181

Notes: Outcome variable is CBHI enrolment status in 2015 and explanatory variables are at their 2013 values, clustered standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Appendix Table 5: Sensitivity Analysis - Probability of membership renewal in 2015 as a function of covariates in their 2013 values and after controlling for regional dummies (Logit regression marginal effect estimates)

Variables	Mfx (se)
per_cons_quint2	0.0272
	(0.0536)
per_cons_quint3	0.0310
	(0.0520)
per_cons_quint4	0.0278
	(0.0523)
per_cons_quint5	0.0604
	(0.0516)
head_literacy	0.00911
	(0.0311)
PSNP_ever_enroll	-0.0727*
	(0.0411)
age_new	-0.000959
	(0.00138)
HH_size	0.0130
	(0.0110)
under6_share	0.0263
	(0.188)
male6_15_share	0.271**
	(0.111)
female6_15_share	0.102
	(0.119)
female16_64_share	0.167
	(0.153)
above64_share	-0.102
	(0.137)
HH_SAH_high_share	0.00355
	(0.0537)
hh_illness_2months	-5.37e-05
	(0.00128)
CBHI_card_used	0.135***
	(0.0493)
CBHI_expr_rank_high	-0.0355
	(0.0358)
health_center_time	0.000388

Variables	Mfx (se)
	(0.000458)
CBHI_qualitycare_nice	0.0201
	(0.0354)
average_wait_doctor	-
	0.00358***
	(0.000705)
region_tigray (ref: region_snnp)	0.0833
	(0.0554)
region_amhara	0.141**
	(0.0638)
region_oromiya	-0.0396
	(0.0913)
Observations	550

Notes: Outcome variable is CBHI membership renewal status in 2015, Explanatory variables are at their 2013 values; standard errors in parentheses are clustered at the village level.␣***P<0.01, **P<0.05, *P<0.1