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Does community-based health insurance affect lifestyle and timing of treatment seeking behavior? Evidence from Ethiopia

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ABSTRACT

Objectives: This paper aims to investigate the effects of enrollment in the Ethiopian community-based health insurance (CBHI) scheme on household preventive care activities and the timing of treatment-seeking behavior for illness symptoms. There is growing concern about the financial sustainability of CBHI schemes in developing countries. However, few empirical studies have identified potential contributors, including ex-ante and ex-post moral hazards.

Methods: We implement a household fixed-effect panel data regression model, drawing on three rounds of household survey data collected face to face in districts where CBHI scheme is operational and in districts where it is not operational in Ethiopia.

Results: The findings show that enrolment in CBHI does not significantly influence household behaviour regarding preventive care activities such as water treatment before drinking and handwashing before meals. However, CBHI significantly increases delay in treatment-seeking behaviour for diseases symptoms. Particularly, on average, we estimate about 4–6 h delay for malaria symptoms, a little above 4 h for tetanus, and 10–11 h for tuberculosis among the insured households.

Conclusions: While there is evidence that CBHI improve the utilization of outpatient or primary care services, our study suggests that insured members may wait longer before visiting health facilities. This delay could be partly due to moral hazard problems, as insured households, particularly those from rural areas, may consider the opportunity costs associated with visiting health facilities for minor symptoms. Overall, it is essential to identify the primary causes of delays in seeking medical services and implement appropriate interventions to encourage insured individuals to seek early medical attention.

1. Introduction

High costs of care in developing countries are recognized as a leading cause of poor health care utilization, poor health outcomes and a key factor in precipitating poverty. With the aim of ensuring that all people have access to the health services they need without financial hardships, community-based health insurance (CBHI) schemes have been introduced since the second half of the 19th century in the developing world.[1,2] CBHI scheme is typically used to reduce inequalities in health care utilization by reducing the cost of care among the poor. This scheme are established on the basis of existing principles of social solidarity, operate at the community level and allow community involvement in scheme management.[3] Typically, membership fees are low and substantial portion of healthcare costs are, therefore, subsidized by the government. The scheme differs from social health insurances, which is primarily for employed individuals, and publicly funded health insurance programs, which are essentially free at point of use and tax funded.

Extensive studies have evaluated CBHI's impact on healthcare utilization and out-of-pocket spending.[4–11] While CBHI shows promise in improving healthcare utilization, concerns about its sustainability remain.[12–14] For example, in Tanzania, the presence of large claims has led policymakers to confront a tradeoff between reducing the health benefit package or increasing revenues to facilitate the nationwide expansion of the existing insurance scheme.[15] Similarly, in Ethiopia, excess claim costs and negative net income have been observed in specific districts, highlighting sustainability challenges.[13,16] These large claims can re-

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sult from ex-ante and ex-post moral hazards, where beneficiaries either neglect preventive practices or overutilize healthcare services once insured.[17]

Although empirical evidence on CBHI-related adverse behavior is limited, studies on other insurance schemes show mixed results. In developed countries, some evidence suggests health insurance can lead to unhealthy behaviors among policyholders.[18–21] However, risk-averse individuals may avoid risky behaviors due to potential health consequences. This aligns with studies indicating increased preventive care utilization without evidence of risky behaviors among insured individuals.[17,22–24] In developing countries, research has focused on behavioral responses to insurance schemes, particularly regarding healthcare needs when sick and preventive activities such as use of malaria bed nets.[25–27]

This paper examines behavioral responses to Ethiopian CBHI by assessing preventive care activities and the timing of care-seeking for symptoms of malaria, tetanus, and tuberculosis. Our main departure from the literature is while previous studies primarily focused on the treatment methods chosen by beneficiaries[10,26,28,29] our study looks at when would households decide to seek care upon the onset of disease symptoms. This topic is particularly relevant for policymakers as delayed care seeking behavior among beneficiaries can have cost implications for the insurer and potentially affect financial sustainability of the CBHI scheme.

The Ethiopian CBHI scheme, implemented since 2011, aims to provide financial protection and improve healthcare utilization among low-income families, contributing to universal health coverage. Initially covering four regions (Tigray, Amhara, Oromia, and Southern Nations, Nationalities, and People's Region (SNNPR)), the scheme has expanded based on district selection criteria, including local authority willingness, support, geographical accessibility, healthcare quality, and local revenue retention policies.[30] Enrolment is voluntary at the household level, and all members required to present a family insurance card to access healthcare benefits.

Premiums are fixed, set by the federal government and stakeholders, and have increased from 126 ETB–180 ETB annual fee in 2011 to 240 ETB (7 USD)–350 ETB (10 USD) in 2020 depending on urban or rural residence. This cost represents 0.5%–1% of monthly household income.[31] The scheme also offers fee waivers to the poorest households, though uptake has been low.[30]

The CBHI benefit package includes inpatient and outpatient treatment but excludes non-medical costs like transportation. Treatment options are available in urban public hospitals following referral procedures, with no co-payment or service limits. However, treatments from private facilities (unless unavailable publicly) or abroad, and cosmetic treatments, are not covered. By June 2022, 879 districts across 6 regions and 2 city administrations had joined the scheme, enrolling over 40% of the population. As part of the Health Sector Transformation Plan, the goal is to cover 80% of districts and enroll 80% of households nationally.[16]

2. Methods

2.1. Study design

In this paper, we used three rounds of household panel data from rural Ethiopia, which was collected as part of the research project on Poverty Dynamics, Health Shocks and Coping Strategies in Ethiopia. This was a collaboration project of the International Institute of Social Studies (ISS) of Erasmus University Rotterdam, the Ethiopian Economics Association and the Organization for Social Science Research in Eastern and Southern Africa.

The first round of surveys was collected between March and April in 2011, a few months before the launch of the CBHI program. The subsequent rounds were collected again between March and April in 2012 and between March and April in 2013 after the launch of the CBHI. The data collection involved 8 teams, each comprising 4 enumerators and 1 supervisor. Each team was assigned to collect data from 2 districts.

The surveys cover 16 districts located in four main regional states of Ethiopia, namely Tigray, Amhara, Oromia and SNNPR. Twelve of these districts operate CBHI program, while one district in each region did not start offering CBHI. The survey includes information about individuals, households and community level questions. When collecting the data, 6 villages from each district were selected randomly and 17 households from each village were randomly selected from lists kept by the village administrations. The first round of the survey thus included 1,632 households which were tracked longitudinally. In the second survey round (in 2012) it was possible to resurvey 1,599 households, leading to a 2% attrition. The third survey round contain 1583 of the households, with an overall 3% attrition from the original sample.

Given that enrollment is accepted at a household rather than the individual level, we are interested in household level lifestyle and timing of treatment seeking measures. Our outcome variables are the following. First, we construct a binary indicator variable that takes a value "1" if individuals in a household wash hands before and after meals and "0" otherwise. Second, another binary indicator variable that takes a value "1" for households that treat water before drinking (filters, boils or apply other methods to make it safe) and "0" otherwise.

2.2. Data collection

In the data we have information about what households would do if symptoms of disease, specifically malaria, tetanus, and tuberculosis, were detected in an adult member of the household. Respondents were asked what they would do if they or someone in their household——were to experience some disease symptoms themselves. Only one answer per question was allowed. Interviewers were instructed to emphasize that respondents should state what they would do – not what they think should be done. More than 95% of the households stated that they would take them to modern healthcare providers. There is a follow-up question asking when they would take them to their choice of modern care. The answer to this question for Malaria, Tetanus and Tuberculosis (TB) is categorically 1 if they would take them immediately, 2 if they would take them the next day if symptoms persist, 3 if they would take them after two days if symptoms persist, 4 if they would take them to care between three days and a week, 5 if they would take them to care after a week if symptoms persist, and 6 if they would take them to care after more than a week if symptoms persist. Each stage indicates household behavioral response to waiting time for each illness episode, allowing us to investigate the effects of CBHI on whether the insured tends to receive immediate or delayed treatment. These outcomes are based on clinical health need vignettes, where each household responded to hypothetical scenario questions.

Generally, the literature assessing the association between health insurance and lifestyle mainly focuses on individual behavior in relation to diet, smoking, alcohol drinking and exercise.[17,19,21,32] Unfortunately, we do not have this information to extend our analysis in this direction. However, we believe these outcomes would only be marginally relevant for our purposes as we expect lower prevalence of smoking or alcohol consumption and little physical activity due to limited infrastructure in the rural areas where our data were collected.

In our study, the selection of washing hands and treat water or not as key outcomes stems from a clear perspective. While CBHI is traditionally expected to promote health-conscious behaviors, we recognize that in certain contexts, it might lead to riskier behavior due to the financial security it provides. This paradoxical effect may also extend to the timing of healthcare-seeking behavior for illness symptoms. Specifically, while having CBH expected to encourage immediate care-seeking, can, in fact, lead individuals to perceive minor symptoms as less urgent and delay care. Particularly, the reduction in financial barriers can lead some to feel less urgency in seeking care for what they consider minor symptoms. Additionally, the insured may incur additional costs when

Table 1
Household level enrolment and drop-out of CBHI in the pilot regions in 2012 and 2013* [*n* (%)]

Characteristc	Tigray	Amhara	Oromia	SNNPR	Total
Enrolled					
2012	99 (25.65)	146 (37.15)	132 (33.25)	107 (27.3)	484 (30.87)
2013	145 (37.66)	185 (47.07)	132 (33.08)	107 (27.3)	569 (36.27)
Drop-out	26 (26.53)	10 (6.85)	28 (21.21)	23 (21.3)	87 (18.01)
New members	73 (25.44)	49 (19.84)	28 (10.49)	23 (8.07)	173 (15.93)

CBHI: community based health insurance; SNNPR: Southern Nations, Nationalities, and People's Region. In this table, "*n*" is for the count of households. *Data in this table are all balanced.

visiting a healthcare facility, including transportation, lost work time, accommodation, meals, and incidentals. Even though the medical costs are covered, some may perceive their symptoms as not worth the related expense, leading to delayed care.

2.3. Ethics statement

Ethics approval for the study was obtained from the Ethics Committee at the International Institute of Social Studies, Erasmus University Rotterdam (Reference No.: iss0001946). Committee is chaired by the Deputy Rector for Research Affairs (then, Professor Mohamed Salih).

Our study participants are household heads and we interviewed individuals who are aged above 18 years old and consent regarding child participants is not applicable in our case.

The data collection involved sequential rounds of household recruitment, starting on March 1, 2011, and concluding on April 30, 2011, with subsequent rounds conducted at one-year intervals and two-year intervals at the same time window. Participants (household heads) provided verbal informed consent for their participation in the study. The verbal consent process involved a detailed explanation of the study purpose, procedures, and potential benefits. Participants verbally expressed their willingness to participate, and this process was documented by the interviewer's team.

2.4. Statistical approach

To examine the impact of CBHI on household lifestyles and timing of healthcare seeking, we implement a household fixed-effect model, exploiting the longitudinal nature of our data. We specify our fixed effects model as follows:

$$Y_{ht} = \alpha + \beta CBHI_{ht} + \sum_j \mu_j X_{jht} + \delta \mathrm{h} + \delta_t + \eta_{ht}$$

Where Y_{ht} represents the household-level outcomes at time t, which includes handwashing before meals, water treatment before drinking, and the timing of care-seeking for illness symptoms (Malaria, Tetanus, and TB). CBHI is a binary outcome that distinguishes the insured and uninsured households. Hence, β is our parameter of interest, which capture the effect of being insured by CBHI. We include a vector X_{jht} of covariates that might potentially influence both the outcomes and CBHI enrollment. The controls included are indicator for male household head, household size, number of under 6 years old children, number of male youth (6–15 years), number of female youth (6–15 years), number of working age women (16–64 years), number of elderly (over 64 years old), time to nearest health center, time to nearest hospital, time to all-weather road, households with improved water and modern light sources. We also include education level of the head of household, education level of the spouse, marital status of the head of household, his/her main religion, household consumption per capita, and the region of residence of the household. δ_h and δ_t represent household and time fixed effects, respectively. The household fixed effect allows us to control for any observed or unobserved time invariant characteristics that affect the outcomes and enrollment decisions. And by including time fixed effect, we take into account general changes in lifestyle over the years. η_{ht} denotes the idiosyncratic error term.

To account for potential correlation across households within the same geographic area, we cluster standard errors at the village level.[33]

3. Results

3.1. Enrollment and dropout rate in CBHI

In Table 1, we show household enrollment, drop-out and new membership rate in CBHI for each region and across years. The overall enrollment rate was 30.87% (484/1,568) in 2012 but increased to 36.27% (569/1,569) in 2013. In 2012, 18.01% (87/484) of households enrolled dropped out, and 15.93% (173/1,086) of uninsured households in 2012 became insured in 2013. Enrollment, drop-out and membership renewal varies across regions where pilot districts reside. Scheme uptake seems to be higher in the Amhara region with greater enrollment rates, lower dropout rates and the second highest new membership rate. The lowest enrollment incidence is recorded in SNNPR in both years. Tigray regions show the highest new membership rate at the same time experienced highest dropout rate.

3.2. Baseline characteristics of the insured and insured households

Table 2 reports the 2011 baseline characteristics of insured and uninsured households in both pilot and non-pilot woredas. In our sample, both groups are comparable in terms of household composition, but insured households are, on average, farther from health centers, hospitals, and all- weather roads. Access to improved water, and modern light sources is slightly better among the insured.

The insured households have better-educated heads and spouses. The heads are more married, less divorced, and widowed compared to uninsured household heads. In terms of religious denomination, most of the heads of the insured are Orthodox Christians, while Muslims are relatively dominant among the uninsured. On average, per capita consumption is higher for insured households. The majority of the insured group in our sample originates from Amhara, which is Ethiopia's second most populated region. In contrast, higher proportion of uninsured households are located in the SNNPR.

Informal education of the head and spouse refers to learning that occurs outside traditional educational institutions such as knowledge and skills acquired within communities, families, and through practical experiences, rather than through structured classroom settings.

3.3. Trends in lifestyle measures and healthcare seeking behavior

In Table 3, we show the trends in the average value of each outcome among the insured and uninsured households residing in pilot and non-pilot districts. The statistics prior to CBHI implementation is based on enrollment status in post CBHI intervention period (2012 and 2013). Washing hands before meals shows a slight increase across years among the insured and uninsured households. In the case of water treatment, there is a downward trend among the insured, with relatively more decline from 2012 to 2013. The trend is positive among the uninsured

Table 2
Baseline characteristics of control variables between insured and uninsured in 2011 with balanced panel* (Mean ± SD)

Independent variables	Insured households (n = 862)	Uninsured households (n = 708)
Household composition		
Sex of household head (Male = 1)	0.88 ± 0.32	0.85 ± 0.36
Household size	6.06 ± 2.17	5.6 ± 2.19
Share of children aged < 6	0.14 ± 0.15	0.16 ± 0.17
Share of young male (6–15 years, %)	0.16 ± 0.15	0.15 ± 0.16
Share of young female (6–15 years, %)	0.15 ± 0.14	0.14 ± 0.15
Share of working age female (16–64 years, %)	0.25 ± 0.14	0.25 ± 0.15
Share of elderly (age > 64, %)	0.04 ± 0.11	0.06 ± 0.16
Travel time to health center (min)	67.5 ± 45.04	60.6 ± 40.7
Travel time to hospital (min)	113.6 ± 67.3	105.9 ± 68.7
Travel time to all weather road (min)	37.7 ± 37.7	31.93 ± 35.9
Have improved water source	0.78 ± 0.41	0.77 ± 0.42
Have modern light source	0.08 ± 0.27	0.07 ± 0.25
Education status		
No education	Ref.	Ref.
Head education informal[a]	0.16 ± 0.37	0.09 ± 0.29
Head education primary	0.37 ± 0.48	0.35 ± 0.48
Head education secondary	0.05 ± 0.21	0.03 ± 0.18
Spouse education informal[a]	0.08 ± 0.27	0.03 ± 0.17
Spouse education primary	0.18 ± 0.38	0.17 ± 0.38
Spouse education secondary	0.02 ± 0.13	0.02 ± 0.12
Marital status		
Single	Ref.	Ref.
Married	0.87 ± 0.34	0.83 ± 0.38
Divorced	0.05 ± 0.22	0.06 ± 0.24
Windowed/other	0.07 ± 0.26	0.10 ± 0.30
Religion		
Other or no religion	Ref.	Ref.
Orthodox	0.59 ± 0.49	0.43 ± 0.49
Protestant	0.14 ± 0.35	0.26 ± 0.44
Muslim	0.27 ± 0.44	0.27 ± 0.44
Per capita consumption (ETB)		
Quintile 1	Ref.	Ref.
Quintile 2	0.18 ± 0.39	0.23 ± 0.42
Quintile 3	0.21 ± 0.41	0.19 ± 0.39
Quintile 4	0.22 ± 0.42	0.18 ± 0.39
Quintile 5	0.21 ± 0.40	0.18 ± 0.39
Region		
Tigray	Ref.	Ref.
Amhara	0.33 ± 0.47	0.15± 0.36
Oromia	0.26 ± 0.44	0.24±0.43
SNNPR	0.18 ± 0.38	0.34± 0.47

SD: standard deviation; SNNPR: Southern Nations, Nationalities, and People's Region; Ref.: reference group.
* The statistics are derived from a balanced panel dataset, meaning that data for all households are available for every survey round included in the dataset.
[a] Informal education of the head and spouse refers to learning that occurs outside traditional educational institutions such as knowledge and skills acquired within communities, families, and through practical experiences, rather than through structured classroom settings.

Table 3
Trends in household lifestyle indicators by enrolment status with balanced panel in years 2011–2013 (Mean ± SD)

Dependent variable	Insured households			Uninsured households		
	2011	2012	2013	2011	2012	2013
Wash hands	0.95 ± 0.21	0.97 ± 0.16	0.99 ± 0.08	0.88 ± 0.33	0.93 ± 0.25	0.94 ± 0.23
Water treatment	0.18 ± 0.38	0.17 ± 0.38	0.07 ± 0.26	0.10 ± 0.30	0.14 ± 0.34	0.07 ± 0.25
Seek care malaria	2.23 ± 1.12	2.30 ± 1.04	2.12 ± 1.14	2.59 ± 1.35	2.31 ± 1.01	2.24 ± 1.16
Seek care tetanus	2.19 ± 1.32	2.03 ± 1.14	2.23 ± 1.36	2.68 ± 1.51	2.20 ± 1.12	2.29 ± 1.31
Seek care TB	2.76 ± 1.53	2.72 ± 1.39	2.79 ± 1.70	3.32 ± 1.72	2.80 ± 1.31	2.74 ± 1.61

TB: Tuberculosis.

household. Among the insured, the preferred waiting time for Malaria symptoms slightly increased immediately after CBHI rollout in 2011 and eventually declined in 2013. This trend is the reverse for tetanus and TB symptoms. Among the uninsured household, there is a minor, but consistent downward trend in timing of treatment for malaria and TB symptoms, while the trend for tetanus is more like a V shape. Overall, the changes in these outcomes across years, whether upward or downward, is meaningful small.

3.4. Baseline estimates

Table 4 reports the estimated effects of enrolment in CBHI on household lifestyle indicators. These effects are determined using a household fixed-effect panel data regression model described in the previous section. For each outcome, we present the estimates in two columns. The first column compares the outcomes of insured households with uninsured households in the pilot districts only. The second column com-

Table 4
Impact of CBHI on household lifestyle: fixed effect estimates with balanced panel

Dependent variable	CBHI[a] (SE)	Observations (*n*)	Control[b]	Average outcome[c]
Wash hands				
Pilot districts	0.020 (0.018)	3,345	YES	0.945
Pilot and non-pilot districts	0.007 (0.017)	4,390	YES	0.940
Treat water				
Pilot districts	−0.040 (0.027)	3,348	YES	0.107
Pilot and non-pilot districts	−0.026 (0.028)	4,394	YES	0.118
Time to seek care for malaria				
Pilot districts	0.266 (0.092)***	3,276	YES	2.256
Pilot and non-pilot districts	0.182 (0.090)**	4,264	YES	2.285
Time to seek care for tetanus				
Pilot districts	0.190 (0.098)*	3,246	YES	2.217
Pilot and non-pilot districts	0.160 (0.098)	4,228	YES	2.259
Time to seek care for TB				
Pilot districts	0.454 (0.145)***	3,282	YES	2.777
Pilot and non-pilot districts	0.424 (0.127)***	4,298	YES	2.823

CBHI: community based health insurance; SE: standard error; TB: Tuberculosis.
[a] The coefficient should be understood as a unit increase on this scale, indicating the delay in seeking treatment, which ranges from 1 (immediately) to 6 (after more than a week). Standard errors in parenthesis are clustered at village level.
[b] All control variables previously described are included.
[c] Average outcome indicates the average value of the dependent variables.
*** Significance levels at $P \leq 0.01$.
** $P \leq 0.05$.
* $P \leq 0.1$.

pares the outcomes of insured households with uninsured households from both pilot and non-pilot districts, which serve as the control group. This approach enables us to assess the sensitivity of the effects based on the composition of comparison households, providing insights into the generalizability of the findings.

Our findings indicate that enrolment in the CBHI scheme does not have a significant impact on households' behaviour related to handwashing and water treatment before drinking, regardless of the location or composition of control households. However, we find a statistically significant increase in delay in the timing of treatment seeking. Particularly, for malaria symptoms, the coefficients on CBHI status indicates that insured households, on average, have a delay in seeking treatment that is 0.18 to 0.27 units higher on the scale compared to uninsured households in pilot and non-pilot districts, respectively. Given that the outcome scale ranges from 1 (immediately) to 6 (after more than a week), this translates to an approximate increase of 7.86% (0.18/2.29)–11.95% (0.27/2.26) delay for seeking treatment. Alternatively, given that the average time to seek treatment for malaria is 2.26 and 2.29, which falls into the "next day if symptoms continue" category, a 0.18–0.27 unit increase represents about 4–6 h, roughly a quarter of the average increment between scale points. Assuming the scale increments are in days such as 1, 2, 3, etc. 0.18 unit ≈ 0.18 day or a little more than 4 h (0.18 day × 24 h ≈ 4.32 h), 0.27 unit ≈ 0.27 day or a little more than 6 h (0.27 day × 24 h ≈ 6.48 h).

There is also a marginally significant 0.19 unit increases in delay for Tetanus treatment among the insured compared to the uninsured in the pilot districts only. This is translated to approximately 9% increase on the dependent variable scale or equivalently a little above 4 h delay. Regarding TB symptoms in adult member of the household, the insured households, on average, have a delay in seeking treatment that is 0.42–0.45 units higher on the scale compared to uninsured households in pilot and non-pilot districts, respectively. This is equivalent to 15%–16% increment, or 10–11 h delay in seeking treatment for TB symptoms.

3.5. Robustness

3.5.1. Dichotomizing timing of treatment seeking behaviour

We assess the sensitivity of our baseline estimates by converting treatment seeking outcome variables into binary indicators, measuring the effect on extensive margin. Specifically, we create an outcome that takes a value of one if a household would seek care immediately or the next day and zero otherwise for each illness symptoms (malaria, tetanus, and tuberculosis). Similar to the baseline, we assess the impact in a setting where the control groups are initially the uninsured in pilot districts and where the controls consist of uninsured households in pilot and non-pilot districts.

Table 5 shows that our findings are robust except for tetanus. In particular, we find a reduction in immediate or next-day medical care seeking behavior among insureds compared to uninsured in pilot districts or uninsured in both pilot and non-pilot districts. In fact, the effect on tetanus is also robust, since initially the effect on tetanus symptoms was weaker. In overall, the estimates confirm that, as compared to those who are uninsured, the incidence of seeking immediate medical care for insured individuals are less by 7%–10% for malaria and by 7%–7.4% for tuberculosis.

3.5.2. Fixed effect ordered logit estimator

Our baseline findings obtained through a linear fixed effect estimator are based on the assumption of equidistant intervals between the six categories of the timing of treatment-seeking outcome. We explore the sensitivity of our results to this assumption by employing a fixed effect ordered logit model with blow-up and cluster estimator. Unlike the linear model, the ordered logit estimator only assumes the ordered nature of response options and does not presuppose equal intervals between them.[25] To investigate the effects of CBHI in this setting, we used the 'feologit' user-written Stata command.[34]

The results in Table 6 are generally in agreement with the baseline finding. Particularly, insured households exhibit 1.36 to 1.61 times higher odds of falling into a higher wait time category for malaria symptom treatment and 1.70 to 1.77 times higher odds for tuberculosis treatment compared to uninsured households, with all other model variables held constant. Similar to the baseline, this estimator shows a weak effect in the case of tetanus symptoms. Overall, this estimator appears to sustain the baseline finding that enrolment in CBHI is associated with delay in treatment.

4. Discussion

Overall, while we do not find changes in preventive care activities, CBHI appears to increase delays in seeking care for illness symptoms.

Table 5
Impact of CBHI on treatment seeking behaviour: extensive margin with balanced panel

Dependent variable	CBHI[a] (SE)	Observations (*n*)	Control[b]	Average outcome[c]
Time to seek care for malaria				
Pilot districts	-0.097 (0.034)***	3,277	YES	0.620
Pilot and non-pilot districts	-0.065 (0.033) *	4,266	YES	0.606
Time to seek care for tetanus				
Pilot districts	-0.054 (0.034)	3,247	YES	0.638
Pilot and non-pilot districts	-0.044 (0.033)	4,229	YES	0.616
Time to seek care for TB				
Pilot districts	-0.074 (0.040) *	3,282	YES	0.501
Pilot and non-pilot districts	-0.066 (0.036)*	4,298	YES	0.479

CBHI: community based health insurance; SE: standard error; TB: Tuberculosis.
[a] The coefficient should be understood as a unit increase on this scale, indicating the delay in seeking treatment, which ranges from 1 (immediately) to 6 (after more than a week). Standard errors in parenthesis are clustered at village level.
[b] All control variables previously described are included.
[c] Average outcome indicates the average value of the dependent variables.
*** Significance levels at $P \leq 0.01$.Delete "**$P \leq 0.05$." please.
* $P \leq 0.1$.

Table 6
Impact of CBHI on the timing of treatment seeking behaviour: ordered logit regression

Dependent variable	CBHI[a] (SE)	Observations (*n*)	Control[b]	Average outcome[c]
Time to seek care for malaria				
Pilot districts	1.608 (0.260) ***	2,869	YES	2.288
Pilot and non-pilot districts	1.359 (0.208)**	3,692	YES	2.326
Time to seek care for tetanus				
Pilot districts	1.336 (0.201)*	2,792	YES	2.292
Pilot and non-pilot districts	1.281 (0.192) *	3,565	YES	2.352
Time to seek care for TB				
Pilot districts	1.772 (0.317) ***	2,978	YES	2.829
Pilot and non-pilot districts	1.703 (0.269)***	3,872	YES	2.875

CBHI: community based health insurance; SE: standard error; TB: Tuberculosis.
[a] The coefficient should be understood as a unit increase on this scale, indicating the delay in seeking treatment, which ranges from 1 (immediately) to 6 (after more than a week). Standard errors in parenthesis are clustered at village level.
[b] All control variables previously described are included.
[c] Average outcome indicates the average value of the dependent variables.
*** Significance levels at $P \leq 0.01$.
** $P \leq 0.05$.
* $P \leq 0.1$.

Delayed use of primary healthcare could increase the risk of developing worse health conditions and may substantially increase healthcare costs. This could also create considerable challenges for the financial sustainability of insurance schemes.[13,35,36]

Since the Ethiopian CBHI is primarily intended for rural residents who are largely poor, an immediate visit for illness symptoms would be costly for them. In rural areas, only health posts are typically available, and these facilities focus on providing preventive and promotional health services, not curative care. To receive medical care, households need to travel to urban areas where health centers and hospitals are established. Visiting these facilities involves transportation and subsistence costs that are not covered by the CBHI scheme. Existing evidence also indicates that transportation barriers are a significant reason for the low utilization of modern care in rural Ethiopi.[37,38]

On the other hand, one reason for delaying care could be moral hazard. With CBHI covering a significant portion of healthcare expenses, insured households might feel less urgency to seek immediate medical attention or underestimate the severity of their symptoms, believing they can access care later without significant financial burden. In addition, especially for minor symptoms, seeking immediate care for rural people would result in disruption of productive activity and loss of income while off farming. This opportunity cost might weigh more than the benefit from the household's perspective.[39] This rationale aligns with evidence from rural China, where factors such as involvement in farming, longer distances to the hospital, and awareness were significantly associated with higher odds of delaying care for TB.[40] Lack of knowledge is likewise reported as key factor in delaying TB treatment in Ethiopian context[41,42] and for malaria higher waiting time at the health facility was associated with increased delay in treatment.[43] However, our finding may contrast with a study, which finds a higher rate of delayed treatment-seeking behaviour for actual TB symptoms among the uninsured individuals.[44]

In the context of preventive care, our findings align with studies which also report insignificant impacts of other health insurance schemes.[23,45–47] However, the broader literature paints a varied picture, with the majority of studies showing significant effects that depend on the scope of insurance coverage and the country of study. For instance, a study on the Ghanaian national health insurance scheme reported a significant increase in unhealthy practices related to the use of malaria protective materials.[27] However, this finding contradicts the results of a randomized experiment.[25] Similarly, involvement in China's Rural Cooperative Medical Scheme promotes risky behaviours, including smoking, heavy drinking, low physical activity, consumption of high-calorie food, and obesity.[19] Studies conducted in countries with advanced insurance programs have demonstrated an increase in unhealthy individual behaviours, such as heavy smoking, weight gain, and lack of exercise, associated with private insurance and Medicare.[20,21,48] In contrast, other studies suggest that participation in insurance programs can enhance preventive care activities.[17,22,32] This disparity is likely due to variations in outcomes considered, research methodologies, and contextual factors.

Overall, empirical evidence suggests that public health insurance may exacerbate unhealthy behaviours more than private insurance.[18] This indicates that public health insurance schemes, such as those in

Ethiopia, may struggle to control unhealthy practices like delayed care-seeking among beneficiaries and developing efficient insurance programs.[18] Our findings shed new light on the impact of CBHI schemes beyond their primary objectives of promoting healthcare utilization and reducing out-of-pocket health expenditures. While many CBHI schemes in developing countries aim to counteract adverse selection, little attention has been given to potential adverse behavioural responses from members. This study highlights the need to identify and address the primary causes of delayed medical service-seeking among insured members. Addressing these delays is crucial to promoting early use of services and maintaining the financial sustainability of the Ethiopian CBHI scheme.

5. Conclusion

There is an increasing number of studies highlighting concern about the financial sustainability of CBHI schemes in developing countries. We partially respond to such concern by examining the potential contribution of lifestyle and delayed care seeking behaviours in the context of Ethiopian CBHI. We find that CBHI increased waiting for the treatment of malaria, tetanus, and tuberculosis symptoms. These delays can contribute to worsening health outcomes and increased costs for the insurer, indicating the need for interventions to encourage earlier treatment-seeking behaviour among insured households. If there are many such insured households delaying treatment, perhaps the CBHI could collapse due to a large claim for reimbursement of care costs.

Expanding CBHI in conjunction with supply-side investment particularly healthcare accessibility could mitigate such behavioural responses from members. Also, improving the quality of care and increasing the supply of medical personnels could potentially reduce waiting times at the health center, which could partially reduce the opportunity cost of seeking immediate care.

Due to data limitation, we could not further explore behavioral responses in terms of other indicators such as physical exercise, smoking, and alcohol consumption and potential underlying mechanisms for the reported results. There is, therefore, ample scope for future research in this area, including our limitations. CBHI is often considered a better alternative to out-of-pocket expenditure on the path towards achieving universal health coverage. Therefore, finding out other dimensions of factors that contribute to counteracting CBHI in developing country is important.

Data availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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Ethical approval and consent to participate

Ethics approval for the study was obtained from the Ethics Committee at the International Institute of Social Studies, Erasmus University Rotterdam (Reference No.: iss0001946), chaired by the Deputy Rector for Research Affairs (then, Professor Mohamed Salih). Our study participants were household heads aged above 18 years old. Prior to participation in the study survey, participants provided verbal informed consent after being thoroughly briefed on the purpose, procedures, and potential benefits of the study.

Competing interest

The authors declare that they have no known competing interests or personal relationships that could have appeared to influence the work reported in this paper.

CRediT authorship contribution statement

Zecharias Fetene Anteneh: Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Anagaw D. Mebratie:** Writing – review & editing, Supervision, Resources, Project administration, Methodology, Investigation, Funding acquisition, Data curation, Conceptualization. **Zemzem Shigute:** Writing – review & editing, Supervision, Resources, Project administration, Methodology, Investigation, Funding acquisition, Data curation, Conceptualization. **Getnet Alemu:** Writing – review & editing, Supervision, Resources, Project administration, Methodology, Funding acquisition. **Arjun S. Bedi:** Methodology, Resources, Investigation, Writing – review & editing, Supervision, Project administration, Funding acquisition.

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