Social Science & Medicine 371 (2025) 117870

Contents lists available at ScienceDirect

Social Science & Medicine

journal homepage: www.elsevier.com/locate/socscimed

Comprehensive assessment of the impact of mandatory community-based health insurance in Burkina Faso

Delphine Boutin [a,b,*,1], Laurène Petitfour [c,d,1], Yvonne Allard [e], Souleymane Kountoubré [e], Valéry Ridde [f]

[a] Bordeaux School of Economics, University of Bordeaux, CNRS, BSE, UMR 6060, F-33600, Pessac, France
[b] The Institute of Labor Economics (IZA), Germany
[c] Heidelberg Institute for Global Health, Medical Faculty, University of Heidelberg, Im Neuenheimer Feld 130.3, Heidelberg, 69120, Germany
[d] Aix Marseille University, Inserm, IRD, SESSTIM (Economic and Social Sciences of Health and Medical Information Processing), ISSPAM, 27 Bd Jean Moulin, 13005, Marseille, France
[e] Tond Laafi, Zone du Bois, Ouagadougou, Burkina Faso
[f] Centre Population et Développement (Ceped), Institut de Recherche pour le Développement (IRD) et Université Paris Cité, Inserm ERL 1244, 45 Rue Des Saints-Pères, Paris, 75006, France

ARTICLE INFO

Handling editor: Joanna Coast

JEL classification:
I13
I15
O12
G21
O55

Keywords:
Health insurance
Financial protection
Healthcare utilization
Informal sector
Burkina Faso

ABSTRACT

Health coverage for informal workers in Sub-Saharan Africa remains a major challenge. This study evaluates an alternative approach: bundling health insurance with microcredit. We conducted a randomized controlled trial in Ouagadougou, Burkina Faso, to assess the impact of mandatory health insurance linked to microcredit. The study covered 88 microcredit groups (44 treated, 44 control), analyzing outcomes for 1,095 individuals who reported illness episodes in the six months preceding the final survey in January–February 2022. Results show that the insurance requirement did not lead to program dropout, with loan renewal rates remaining stable between groups. Health insurance had a significant positive impact on financial protection: out-of-pocket expenses decreased by over 50% and payment difficulties by 36%. The study also reveals changes in health-seeking behaviors. Use of modern healthcare facilities increased by 7%, while reliance on traditional medicine decreased by 61%. Insured individuals also sought care more quickly, with 23% more seeking care on the same day symptoms appeared. However, no significant impact was observed on physical or psychological health outcomes. These findings suggest that bundling health insurance with other services like microcredit can be a viable solution for deploying mandatory health coverage to populations working in the informal sector. This approach provides significant financial protection against health risks and improves access to healthcare.

1. Introduction

Identified as a cornerstone of the Sustainable Development Goals (SDGs) set in 2015 for 2030, Universal Health Coverage (UHC) aims to ensure that all individuals can access quality health services when and where they need them, without facing financial hardship. Despite notable progress in recent decades, public health expenditures remain insufficient in many countries, and financing mechanisms are often inadequate to achieve UHC. In particular, out-of-pocket payments continue to represent a significant portion of health expenditures in Africa, reaching up to 57% in Chad and 73% in Cameroon, which exacerbates economic inequalities and contributes to household impoverishment (Wagstaff et al., 2018). By contrast, in high-income countries, out-of-pocket payments make up a substantially lower share of total

* Corresponding author. Bordeaux School of Economics, University of Bordeaux, CNRS, BSE, UMR 6060, F-33600, Pessac, France.delphine.boutin@u-bordeaux.fr
E-mail addresses: laurene.petitfour@ird.fr (L. Petitfour), yvonne.allard@atia-ong.org (Y. Allard), souleymane.kountoubre@tondlaafi.org (S. Kountoubré).

[1] Delphine Boutin and Laurène Petitfour share first authorship.

We thank Adrien Cascarino, Louise Deroo, Brendan Farrell, Claire Pasquato, and the teams from Atia, Tond Laafi and Yikri for their essential help, insights, adaptability, and enthusiasm, which significantly enhanced our data collection and collaborative efforts. Our gratitude extends to Yikri for providing data that strengthened this analysis, and to Olivier Bargain, Tanguy Bernard, Quentin Stoeffler, and the five anonymous reviewers for their guidance and encouragement throughout the project. Anonymized data will be available upon request. This research was funded by the Agence Française de Développement (AFD), the Coopération Monégasque, the University of Bordeaux, and the French State through the Investments for the Future programme IdEx université de Bordeaux / GPR HOPE

https://doi.org/10.1016/j.socscimed.2025.117870
Received 25 June 2024; Received in revised form 12 February 2025; Accepted 20 February 2025
Available online 25 February 2025
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health expenditures (e.g., 9% in France, 10% in the US),[2] underscoring the need for alternative financing mechanisms and effective risk-pooling systems (Hsiao and Yip, 2023).

Health insurance has been recognized as a promising means to enhance health protection at multiple levels (Das and Do, 2023; Ly et al., 2022a). As a key component of social protection, it provides financial security against health shocks by reducing out-of-pocket expenditures (Kuwawenaruwa et al., 2019; Powell-Jackson et al., 2014; Thornton et al., 2010), lowering the prevalence of catastrophic expenditures (Fink et al., 2013; Levine et al., 2016), and decreasing the use of potentially harmful coping strategies, such as taking on debt (Yilma et al., 2015). Health insurance also influences healthcare utilization patterns, primarily by shifting healthcare consumption from non-contracted to contracted facilities (Levine et al., 2016; Rabbani et al., 2022; Thornton et al., 2010; Acharya et al., 2012) and reducing delays in seeking care. Although evidence is more limited, health insurance can impact health outcomes. While no significant effects on physical health have been identified (Levine et al., 2016; Rabbani et al., 2022; Thornton et al., 2010), one study reported a positive impact on mental health through stress reduction (Haushofer et al., 2020).

Ongoing discussions about the optimal configuration of prepayment systems involve considerations of voluntary versus mandatory participation, contribution-based versus tax-based funding, and the choice between national or community-based insurance structures. Various models have been evaluated according to several criteria (Cashin and Dossou, 2021): resource mobilization for health, population insurance coverage, and financial protection (measured as the share of out-of-pocket expenditures). Some key conclusions have emerged from the literature. Firstly, voluntary health insurance schemes consistently face low enrollment rates due to generally low demand for health (Platteau et al., 2017), which limits the risk-pooling base. Barriers to enrollment include factors such as unattractive benefit packages, implementation flaws (Ridde et al., 2018; Schneider, 2023), and socio-economic constraints (Michielsen and Criel, 2023; Mladovsky et al., 2023; Mladovsky, 2014). Furthermore, if adverse selection is present (Akerlof, 1970), individuals who choose to enroll may have characteristics associated with higher health expenses, which can jeopardize the scheme's financial stability (Fink et al., 2013). Low take-up rates and adverse selection also complicate the statistical and methodological identification of health insurance impacts. Many studies struggle to detect effects on those enrolled (i.e., the treated) due to limited statistical power, and any intention-to-treat effect is often obscured by the low proportion of treated individuals in the sample, leading to conclusions of limited potential for health insurance to protect households (Raza et al., 2016). In contrast, compulsory health insurance enhances risk pooling, minimizes socioeconomic and informational biases in enrollment, and poses fewer methodological challenges in identifying the impact of health insurance.

Secondly, contributory insurance has been shown to be ineffective on several levels (Yazbeck et al., 2023). Premiums present a significant barrier to enrollment (Banerjee et al., 2021; James and Acharya, 2022), raising equity concerns (Watson et al., 2021), and the benefits of this model in terms of additional resources mobilized for health remain unclear (Barasa et al., 2021). Despite these limitations, several African countries have recently adopted contributory community- and labor-based schemes to expand health insurance coverage (Barasa et al., 2021; Ly et al., 2022b). These schemes are generally mandatory for formal employees but voluntary for informal workers (Cashin and Dossou, 2021), which leaves substantial portions of the population without coverage (Barasa et al., 2021). Notable exceptions include Ghana and Ethiopia, which have achieved higher coverage rates by implementing voluntary insurance schemes.

In light of these considerations, advancing toward UHC in Sub-Saharan African countries requires alternative and effective strategies to protect informal workers against health-related risks. Community-based health insurance (CBHI) schemes, characterized by risk-pooling, community-level management, and the involvement of community members, have a long history in Sub-Saharan Africa. Most of these schemes were voluntary and suffered from low enrollment rates (Ridde et al., 2018; Waelkens et al., 2017). Two primary factors contribute to this low demand for insurance: limited capacity to pay and lack of awareness, as most households lack prior experience with insurance and may not fully understand its benefits (Platteau and Ontiveros, 2021), as well as administrative barriers that complicate enrollment in insurance schemes (Wood, 2023). However, isolated successful experiences demonstrate the potential of CBHI when effectively implemented and bundled with other services. In Ethiopia, for example, a CBHI scheme integrated into the local social protection administration benefited from strong staff incentives to enroll members, resulting in increased healthcare utilization among insured individuals (Mebratie et al., 2019). This suggests that anchoring health insurance to an established social structure can encourage high enrollment and potentially amplify the impact of health insurance. Empirical evidence on similar experiences remains limited, especially in African settings. In Bangladesh, for instance, a factory bundled a micro health insurance subscription with contracts for its predominantly female workforce. This inpatient-oriented health insurance was well adopted, and the scheme achieved financial sustainability (Rabbani et al., 2022). The insurance increased hospital service use, especially among women, leading to a rise in visits to contracted hospitals. Literature on interventions bundling micro health insurance with microcredit presents mixed results and additional challenges, particularly regarding the potential for clients to reject the microcredit. In India, a microfinance institution (MFI) faced high rejection rates when bundling health insurance with new microcredit contracts (Banerjee et al., 2014). Conversely, a similar model was found to increase retention rate, especially on younger members of the MFI (Hussain and Ahmed, 2019).

This research evaluates the impacts of a mandatory health insurance scheme bundled with microcredit loans for informal micro-entrepreneurs in Ouagadougou, Burkina Faso. Ouagadougou exemplifies characteristics typical of Sub-Saharan urban centers: widespread poverty affecting nearly half of the population, a predominantly informal economy (with over 80% of the active workforce), and limited access to formal banking services (BCEAO, 2022), leaving many households vulnerable to health shocks from disease or accidents. While Burkina Faso has pursued UHC through various initiatives, including the elimination of maternal and infant care fees (Ridde and Yaméogo, 2018) and the promotion of both community-based (Fink et al., 2013) and state-based (Bicaba et al., 2020) health insurance schemes, overall coverage remains limited. As of 2021, less than 10% of the population was covered by any form of health insurance (Demographic and Health Survey, 2021). Although the International Labor Organization (ILO) projects that ongoing reforms will extend mandatory coverage to three million public and private sector workers by 2025, with free coverage for the most vulnerable populations, the coverage of informal workers is expected to continue relying on voluntary enrollment. In response, we evaluated an innovative approach to extend health coverage to informal workers by leveraging their significant participation in microfinance institutions (MFIs). This model bundled comprehensive health insurance (covering both inpatient and outpatient care) with access to loans. We estimated its impact on financial protection, healthcare utilization, timeliness of care-seeking and health outcomes using a cluster randomized controlled trial, with randomization at the microcredit group level. Impact analyses focused on outcomes measured in January 2022, after 16 months of implementation, and included 1,095 individuals (557 control and 538 treated) who reported illness episodes in the six months preceding the survey.

Our study enhances the understanding of providing financial protection against unexpected health expenditures in contexts where health

[2] World Health Organization Global Health Expenditure database.

insurance options are typically voluntary. We enrich the literature by several means. First, we used a cluster RCT to evaluate the impacts of a mandatory health insurance product that is financially viable and replicable in various contexts due to its integration with microfinance loans. The compulsory nature of the insurance scheme ensured that all individuals randomly assigned to treatment were enrolled, reducing the risk of adverse selection and enabling risk-pooling across a large group of beneficiaries. Additionally, we observed no significant opt-out from the MFI following the introduction of this insurance; insured members did not exit the MFI at a higher rate than non-insured individuals. This acceptance of microinsurance by MFI members is essential for the model's sustainability. Secondly, beyond the importance of the mandatory nature, the health insurance package included a comprehensive benefit structure, which played a crucial role in influencing health behaviors. Our findings extend those of Rabbani et al. (2022), whose insurance product offered limited financial protection as it primarily covered inpatient expenses and excluded drug and examination costs. This limited scope reduced the insurance's effectiveness in providing financial protection, as drug and diagnostic costs are increasingly recognized as a major source of catastrophic health expenditures. Additionally, refusal or delay in seeking care is more likely for outpatient services (Eze et al., 2022; Capuno et al., 2019). The health insurance scheme studied here may influence health-seeking behaviors by reimbursing hospital fees, medications, and complementary tests.

The first outcome studied was financial protection, measured by out-of-pocket health expenditures, difficulties in credit repayment due to health expenses, and the reported impact of health expenditures on economic activity. We found a strong protective effect of health insurance: it decreased out-of-pocket expenditures by 50–56% and reduced payment difficulties by 36–39 %. Our second outcome category concerned health-seeking behaviors. While previous studies primarily analyzed healthcare seeking as a binary outcome (i.e., whether or not an individual visited a facility, Levine et al. (2016); Rabbani et al. (2022)), we found that health insurance increased the use of modern healthcare facilities (7–8%) and a decrease in reliance on traditional medicine (61–68% reduction). We also observed positive impacts on the timing of care-seeking, with individuals more likely to seek care on the same day symptoms appeared (23–26% increase). Finally, unlike some previous studies, we did not find evidence of effects on physical health or emotional well-being.

This article is structured as follows: Section 2 presents the intervention and its implementation. Section 3 details the methods used to assess the program. Section 4 reports the impact evaluation results, which are further discussed in Section 5. Section 6 concludes.

2. Health micro-insurance intervention

2.1. Context and enrollment process

The intervention evaluated in this study is a mandatory health micro-insurance scheme implemented within a microfinance institution (MFI) in Ouagadougou, Burkina Faso. This program was developed through a partnership between two NGOs specializing in microfinance and microinsurance, respectively. The MFI operated through a network of local agencies, with beneficiaries organized into microcredit groups of 15–40 members. These groups met monthly for financial transactions and training sessions. While group membership facilitated information sharing, loan liability remained individual. The MFI's interest rates (1.5% monthly, 12–17% annually, depending on loan duration, amount, and the risk profile of the associated activity) complied with social microfinance regulations in Burkina Faso. The health micro-insurance program was introduced in response to observed loan repayment challenges caused by unexpected healthcare expenditures among members. Indeed, evidence of health shocks undermining financial stability motivated the MFI to implement compulsory health coverage for its beneficiaries.

Prior to the intervention's launch, the health insurance NGO conducted a preliminary survey to assess the socio-economic status of MFI members, including their levels of vulnerability, healthcare habits (such as the types of care and facilities they typically used), healthcare expenses, and willingness to pay for health insurance. Based on this information, they designed a benefit package that aligned with members' healthcare usage patterns to promote acceptance and adoption, was affordable given the members' capacity and willingness to pay, and ensured actuarial fairness through a sufficient monthly premium to cover prepayment and reimbursement costs. During this preliminary phase, the NGO received guidance from an international NGO specializing in CBHI scheme development, which provided expertise during these critical planning stages. The assessment of healthcare consumption and prevailing costs indicated that a monthly fee of 1,000 FCFA (approximately 1.5€) was required to cover expected reimbursements. An additional 1,000 FCFA for operating costs was subsidized by the international NGO, ensuring that the product remained actuarially fair.

The health insurance enrollment process followed a standardized three-phase protocol. First, MFI facilitators introduced the program during regular group meetings. Next, a representative from the health insurance NGO conducted three dedicated informational sessions to explain the benefits package and operational procedures in detail. Insurance enrollment was then systematically integrated into the loan application process following these mandatory sessions. Coverage activation was synchronized with loan disbursement, at which point beneficiaries received an insurance identification card, documentation of reimbursement procedures, and a directory of contracted healthcare facilities offering direct billing services. The provider network included public healthcare facilities and selected private providers within the geographic areas of the microcredit groups. During the intervention, the network of contracted facilities was expanded to include additional providers that demonstrated consistent claims activity and expressed interest in participating in the insurance scheme's prepayment system.

2.2. Scope of insurance coverage and benefit structure

Enrollment in the insurance scheme required a monthly premium of 1,000 FCFA, covering the subscriber and up to three household members. The benefit package provided comprehensive coverage for both outpatient and inpatient services, including consultations, prescribed medications, and hospitalization, with a uniform 60% reimbursement rate and no ceiling or deductible. The package covered four primary healthcare domains: hospitalization services (medical, surgical, and observational care), primary care consultations (by nurses, general practitioners, and midwives), specialized care across 18 medical specialties (including hematology, nephrology, otorhinolaryngology, odontology, traumatology, urology, cardiology, surgery, dentistry, dermatology, diabetology, gastroenterology, gynecology, neurology, ophthalmology, pulmonology, pediatrics, and rheumatology), and maternity services (vaginal and cesarean deliveries).[3] The insurance NGO covered 60% of costs directly at contracted facilities, leaving 40% as out-of-pocket expenses for the insured, while reimbursing 60% of costs for non-contracted providers after claim submission. The insurance team included doctors who reviewed and adjudicated reimbursement claims based on submitted prescriptions, as well as staff members (referred to as animators) who provided information on contracted facilities and guided insured members through the insurance procedures. These support services were available both in-person at MFI agencies and via a hotline. A detailed description of these micro-insurance features is provided in Table 1.

[3] While delivery care was included, claims were expected to be minimal due to Burkina Faso's 2016 policy eliminating fees for maternal and under-5 care.

Table 1
Benefit package of the micro health insurance product.

Features	Description
Eligibility	Mandatory for new loan applicants; optional for members using only savings services
Premium	1,000 FCFA (approximately 1.5€) per month (covers the subscriber and up to three additional household members)
Coverage Period	Matches the duration of the loan
Covered Services	General and specialized consultations, medications (excluding drugs for chronic conditions), deliveries, hospitalization, tests, and diagnostic examinations
Not Covered Services	Costs related to chronic conditions and specific specialties (e.g., ophthalmology, dentistry)
Deductible/ Copayment	No deductible, no ceiling; 40% copayment
Payment Modality	Prepayment in contracted facilities; reimbursement after claims for non-contracted facilities
Type of Providers	Public facilities in microcredit group areas; selected private facilities in the same areas

Source: Health insurance NGO documentation.

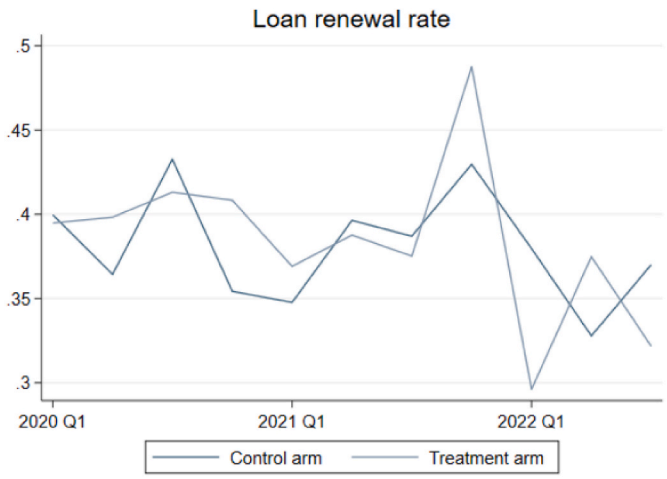


Fig. 1. Evolution of the loan renewal rate by group.
Notes: Authors' calculations using MFI administrative data on all loans contracted between January 2020 and March 2022.

2.3. Cluster randomized controlled experiment design

We implemented a cluster randomized controlled trial (AEARCTR-0008548),[4] using a two-stage randomization process at the microcredit group level in January 2020. We obtained the ethical approval for the study in November 2019 (reference A031-2019 from the *Comité d'Ethique Institutionnel pour la Recherche en Sciences de la Santé* (Bobo-Dioulasso, Burkina Faso). First, we randomly drew 101 microcredit groups from a pool of 158 eligible groups (those with a minimum of 15 members per group) across two MFI agencies. The two agencies had similar characteristics, such as geographical proximity in Ouagadougou, comparable beneficiary profiles, and analogous microcredit services, eliminating the need for differentiated comparisons. In the second stage, we randomly assigned the selected groups to either the treatment (N = 49) or control (N = 52) arm (Figure A1), using agency level stratification to ensure balanced representation. Cluster randomization was chosen to prevent within-group spillover effects, while maintaining operational feasibility and program acceptability among participants. Following group assignment randomization in January 2020, enrollment in the micro-health insurance scheme became mandatory for all participants in the treatment group starting in August 2020, while control group participants had no access to the insurance. Control groups were informed of a planned insurance roll-out in spring 2022, with program novelty and capacity constraints given as justification for the delay.[5] The individual and nominative nature of the insurance scheme ensured that control group participants had no access to its benefits.

3. Empirical strategy

3.1. Data

This study began in January 2020 with randomization and baseline data collection (N = 1,724) (Figure A1). Although a one-year follow-up was initially planned, the COVID-19 pandemic caused significant implementation delays, postponing the endline survey to January 2022. During this extended period, the sample evolved through several stages (Figure A1 and Figure A2). Of the initial 101 microcredit groups, 13 had dissolved by 2022 (8 control, 5 treatment). Multiple indicators demonstrate these dissolutions were not driven by the insurance requirement: a lower dissolution rate in treatment groups, similar credit characteristics between dissolved and remaining groups (Table B1), and comparable loan renewal patterns between treatment and control groups over time (Fig. 1). The remaining 88 active groups were equally divided between treatment and control conditions. Within these remaining groups, we conducted endline surveys with 1,387 individuals, combining re-interviewed participants from baseline (N = 774) and newly surveyed members from the same credit groups (N = 613). Our empirical analysis focused exclusively on the endline data, examining 1095 respondents (N = 557 control, N = 538 treated) who reported illness episodes in the six months preceding the survey. Although baseline data was available for approximately 55% of these respondents (N = 390 control, N = 384 treated), this partial availability did not compromise our identification strategy, as treatment was implemented at the group level, ensuring that all members were consistently either treated or controlled throughout the study period (Figure A1 and Figure A2).

Survey data were complemented by administrative records from the micro health insurance NGO to monitor implementation fidelity and insurance utilization patterns. These administrative data included two key components: individual-level insurance claims, which could be matched with our survey data, and monthly aggregated data on insurance contracts (both new and ongoing) for each agency. This additional data source served three purposes: tracking actual insurance uptake throughout the study period, monitoring potential contamination between treatment and control groups, and documenting the program's implementation across agencies. By combining survey and administrative data, we could verify the integrity of the intervention and ensure it was implemented without unintended cross-group influences.

Lastly, we accessed administrative data from the MFI that included loan amount, duration, disbursement dates, and planned reimbursement completion dates. We used this data to provide background information on microcredit characteristics and to check for insurance rejection—that is, whether MFI members required to enroll in the health insurance had lower loan renewal rates compared to those who could not enroll.

3.2. Internal validity

Ensuring the validity of our analysis required addressing three potential selection issues, each of which could affect the internal validity of

[4] The pre-registration included women's empowerment as a primary outcome. These results will be presented in a companion paper focusing on women's barriers to healthcare access, combining the RCT results with additional quantitative and qualitative analyses.

[5] Field reports from loan officers and facilitators indicated no dissatisfaction among control groups regarding delayed insurance access.

our results in different ways.[6] First, group dissolution between baseline and endline could indicate three types of selection: treatment-related dissolution (suggesting insurance rejection), health-related dissolution (indicating adverse selection), or socioeconomic-related dissolution (potentially affecting the model's generalizability). Our data provided strong evidence against these concerns: treated groups exhibited lower dissolution rates (−13.53 percentage points, $p < 0.01$), dissolved and remaining groups displayed similar health status (difference of 0.11 points, $p = 0.976$), and group dissolutions aligned with natural loan cycle completion patterns (Table B1). This contrasted favorably with similar studies, such as Banerjee et al. (2014) in India, where mandatory health insurance led to significant rejection within MFIs.

Second, although baseline data were available for only 55% of endline respondents, this partial coverage did not compromise our identification strategy. All individuals in the selected groups were consistently exposed to their assigned treatment condition (either treatment or control) since 2020 or upon joining these groups, regardless of baseline interview status. Baseline data were used in an ANCOVA specification to enhance precision, not for identification. While re-interviewed respondents differed somewhat from others in credit characteristics and baseline health status (−9.61 percentage points, $p < 0.001$), these differences were balanced across treatment and control groups (difference in treatment assignment: 1.52 percentage points, $p = 0.557$) (Table B2). This suggests that our estimates remain internally valid, though they may be more representative of healthier and more established microfinance clients.

Third, our focus on individuals reporting illness episodes introduced some selection bias, as these individuals tended to be older, more educated, and have larger loans.[7] However, treatment assignment remained balanced in this subsample (difference: 5.32 percentage points, $p = 0.106$), and illness reporting patterns were similar between treated and control groups (Table B3). Thus, while our results may not generalize to the entire microfinance population, they provide unbiased estimates for the population experiencing illness episodes.

These validity checks were further supported by balanced baseline characteristics between treatment and control groups across all selection stages, along with high compliance rates (98% in the control group and 92% in the treatment group). The individual and nominative nature of the insurance scheme, combined with strong monitoring, ensured that only treatment group beneficiaries could access health insurance from August 2020 onward. This process contributed to an overall compliance rate of 95.16%, reflecting effective program implementation.

3.3. Identification strategy and estimators

Although health insurance was compulsory for treated individuals, some had not yet utilized this service at the time of the endline survey.[8] To address this, we adopted a conservative approach and estimated the intention-to-treat (ITT) effect, focusing on treatment assignment rather than actual utilization of the health insurance scheme (obtained from administrative databases). The ITT effect captures the average impact of offering the program and is considered the most relevant treatment effect for policy making, as it reflects a real-world scenario where not all eligible individuals utilize the service, even when available (Rabbani et al., 2022). Our empirical strategy employed an ANCOVA specification to account for partial baseline data availability:

$$Y_i = \alpha + \beta T_i + \gamma Y_{iO} + \delta Di + X_i' \Theta + \epsilon_i$$

where Y_i represents the outcome variable for individual i, T_i is the treatment assignment indicator, Y_{iO} represents the baseline value of the outcome, Di is a dummy variable equal to 1 if baseline data is available, X_i' is a vector of controls, and ϵ_i is the error term clustered at the lending group level. The coefficient β represents the ITT effect of the micro-insurance program. The vector of controls X_i' includes baseline characteristics such as gender, education, nationality, loan amount, microcredit seniority, subjective physical health, household size, wealth score, and risk aversion.[9] For individuals not surveyed at baseline but present at endline, baseline values are imputed using the mean value of their microcredit group at baseline, leveraging contemporaneous information from peers with similar characteristics and group-level conditions. The dummy variable Di captures any systematic differences between these two types of respondents. Baseline controls Y_{iO} include outcomes consistently measured across waves: payment difficulties, type of healthcare use, timing of healthcare-seeking (same day and within two days), and subjective health status. For other outcomes, baseline measures were unavailable either because they were not initially collected (e.g., health expenditures, emotional well-being, objective health measures) or because measurement methods evolved between waves (e.g., impact on activity). In these cases, we use related baseline indicators as proxies; for example, baseline subjective health status serves as a control for objective health outcomes, and baseline healthcare timing controls for waiting behavior.

To address potential bias from attrition, we implemented a two-level inverse probability weighting approach. First, we corrected for group-level attrition by estimating each group's survival probability based on treatment status and initial group characteristics. Second, we accounted for individual-level attrition by predicting the probability that baseline individuals were observed at endline. The final weights, calculated by multiplying group and individual weights and trimmed at the 1st and 99th percentiles, helped reconstruct a sample representative of the initial population.

Additionally, we employed a two-stage procedure to estimate the Treatment on the treated. In this approach, we used the treatment assignment variable as an instrument for actual health insurance utili-

[6] While COVID-19 delayed insurance implementation and our endline survey by one year, it did not compromise our identification strategy. Treatment assignment occurred before the pandemic and remained unchanged. Moreover, our key outcomes measure health behaviors in the six months preceding the endline survey (July 2021–January 2022), after the main COVID-19 disruptions in Burkina Faso. The extended period between surveys likely contributed to higher attrition due to natural group turnover in the microfinance context, but attrition patterns remained similar across treatment arms (See Appendix B).

[7] Focusing on the 78.95% of endline individuals reporting illness episodes aligns with our primary interest in examining how insurance affects healthcare-seeking behaviors and financial protection specifically when healthcare is needed. Analyzing the entire population, including those without recent illness episodes, would dilute these effects, as key outcomes like healthcare expenditures and payment difficulties are only meaningful for those who required care. This approach is also consistent with the literature on health insurance impacts, which typically focuses on conditional utilization and financial outcomes. While selection on illness reporting exists, our data show similar patterns across treatment and control groups, ensuring unbiased estimates within this subsample.

[8] Non-compliance with the insurance scheme in the treatment groups (8%) was primarily due to two factors: (i) administrative delays between loan approval and insurance registration, and (ii) participants in treatment groups who had not yet renewed their loans at the time of the endline survey, and thus were not yet enrolled in the mandatory insurance scheme. Importantly, this non-compliance did not stem from members actively refusing insurance or switching groups to avoid it, as the insurance was mandatory for all new loans within treatment groups.

[9] Due to comprehension difficulties with the risk aversion questions among some respondents, our final analytical sample was restricted to 1,077 individuals who provided valid responses across all survey components.

zation. Unlike ITT estimates, which measure the average effect of offering the program, ToT estimates focus on the impact of the insurance for those who took it up because of their assignment.[10]

3.4. Outcome variables

We organized our outcome variables into three main categories: financial protection, healthcare utilization, and health outcomes. For financial protection, our primary objective was to evaluate the effectiveness of integrating health insurance with microfinance credit in reducing the financial burden of health expenditures among the insured. Our first outcome variable measured declared payment difficulties for medical treatment following an illness or accident affecting a household member in the year preceding the survey.

The second outcome captured the self-estimated amount of healthcare and hospitalization expenses reported by respondents for the same period. Although this measure is subject to potential reporting bias, it served as a useful indicator of financial protection.[11] The third outcome variable was a binary indicator equal to one if the respondent reported that healthcare expenditures impacted their income-generating activities. Healthcare utilization was measured by identifying the initial place where respondents sought care, if they sought care at all. Options included formal healthcare facilities (e.g., public and private hospitals and modern health centers covered by the health insurance scheme), traditional healers, or self-medication (using previously obtained medications or directly purchasing medications from street vendors). We also assessed the timeliness of care-seeking by measuring the time elapsed between the onset of symptoms and the decision to seek medical attention. Specifically, we examined the proportion of respondents who sought care on the same day symptoms appeared and within two days, indicating immediate and prompt healthcare-seeking behavior. Sample sizes were smaller for timing indicators, as these questions targeted specific subgroups: care-seeking delay (same day, within two days) was only asked of individuals who visited primary healthcare centers or hospitals, while waiting behavior was assessed only for those who sought care in contracted facilities.

Finally, we measured both physical and emotional health status. The first indicator was based on self-assessed health, where respondents rated their overall health on a scale from 1 (excellent) to 4 (poor). The second health indicator involved an objective assessment of physical health. This standardized health score, ranging from 0 to 100, was derived from a series of questions about the respondents' ability to perform tasks such as carrying a bucket of water for 20 m, walking 5 km, climbing two flights of stairs, and standing for 1 h. We also investigated whether health insurance influenced emotional well-being, hypothesizing that financial protection might reduce anxiety and enhance emotional well-being (Bialowolski et al., 2021; Rabbani et al., 2022). Inspired by the PHQ-9, respondents were asked about the frequency over the past four weeks of experiencing low emotional states, including feelings of worry or anxiety, frequent crying or feeling like crying, trouble sleeping, waking up feeling depressed or without energy due to fear, difficulty concentrating, decreased performance in work or daily activities, and feelings of loneliness.

To account for multiple testing across grouped outcome variables, we applied the Benjamini et al. (2006) resampling procedure. This approach allowed us to calculate sharpened q-values, which adjusted p-values for multiple tests within each hypothesis panel but not across all outcomes in the analysis. By using sharpened q-values, we controlled the false discovery rate within each panel, ensuring that multiple comparisons within specific sets of variables were adequately accounted for.

4. Results

4.1. Evolution of microcredit activity throughout the intervention

In the MFI groups participating in the study, a total of 5,163 loans were contracted over the survey period (i.e., from July 1, 2020 to March 31, 2022), with 2,558 loans (49.54%) contracted in control groups and 2,605 loans (50.46%) in treatment groups.

The average loan amount was 251,292 FCFA (approximately 383€), with a median loan of 200,000 FCFA (approximately 305€). The average loan duration was 6.52 months, with more than half of the loans planned to last 6 or 7 months (Table 2). Looking at the evolution of loan amounts over time (Figure B1), we observed slightly but significantly lower loan amounts in the treatment groups compared to the control groups. However, we regressed the amount of the loans on the time, the treatment assignment and the interaction of the first two variables, and found no statistical evidence of a treatment effect, whether in level or trend. Therefore, we concluded a parallel trend of borrowing behavior between control and treatment groups throughout the study period. Furthermore, an analysis of loan renewal rates between 2020 and 2022 revealed no systematic differences between treatment and control groups. Renewal rates fluctuated between 35% and 45% for both groups, following similar trends over time (Fig. 1).

4.2. Actual use of micro health insurance services

Between August 1, 2020 (the date when insurance was first offered to the treatment groups) and December 31, 2021, a total of 4,325 claims were submitted, with 1,718 (40%) from the first agency and 2,607 (60%) from the second. These claims came from both survey participants and non participants.

In total, they involved 1,472 primary subscribers (treated members) and 2,507 covered individuals (household members included in the coverage). The average cost of care was 10,630 FCFA (approximately 16.20€), while the average reimbursed amount was 6,358 FCFA (approximately 9.69€).

Regarding diagnostic categories, malaria (both simple and severe) was the most common, representing 30% of claims. In terms of healthcare service types, nurse consultations accounted for the majority of interactions at 48.8%, followed by general practitioner consultations at 10.1%, and hospital observations at 22.9%. Other types of care represented smaller proportions. When examining costs and reimbursements, claims for hospitalization and specialized care had similar average unit costs (approximately 10,000 FCFA, or 15.24€), although hospitalization claims were more numerous (1,107 for hospitalization vs. 742 for specialized care). Primary care claims had a significantly lower average cost (2,700 FCFA or 4.12€) but were more frequent (nearly 2,500 claims) (Fig. 2). Delivery care exhibited the highest unit cost on average, although it only accounted for 24 cases. Since maternal care has been free in Burkina Faso since 2016, delivery reimbursements from the insurance NGO pertained to facilities not covered by the national policy. Overall, hospitalization care accounted for 43.7% of total costs,

[10] First-stage estimates indicated a very strong relationship between treatment assignment and insurance status (coefficient = 0.904, SE = 0.018, t = 50.14). The F-statistic of 541.20 ($p < 0.001$) and R-squared of 0.829 confirm the strength of the instrument, reflecting the mandatory nature of the intervention and high compliance levels. Complete first-stage results are available upon request.

[11] The health expenditure outcome, which asked respondents to estimate their total healthcare and hospitalization expenses over the past year, has a smaller sample size as many respondents could not recall or estimate this annual amount. We couldn't calculate these health expenses as a percentage of household income because income questions were poorly received during the pilot survey, and many respondents declined to answer. Most participants work in the informal sector, where incomes fluctuate widely from week to week, making it difficult to get accurate income estimates. To address this, we asked respondents how much income they would lose if they didn't work during the survey week. This gave us an indirect income estimate. We then adjusted this weekly estimate to obtain an annual income figure, which we used to compare with the annual healthcare expenses.

Table 2
Descriptive statistics on microcredit loans.

Variable	Average	Std. Dev.	Q1	Median	Q3
Amount (FCFA)	251292	196742	100000	200000	300000
Duration (months)	6.52	1.64	6.00	7.00	7.00
Fee/loan (%)	3.80	2.31	2.22	3.33	5.00

Notes: Authors' calculations using MFI administrative data on all loans contracted between July 2020 and March 2022 (N = 5,163 loans). Values for Amount are in FCFA (1,000 FCFA ≈ 1.5€).

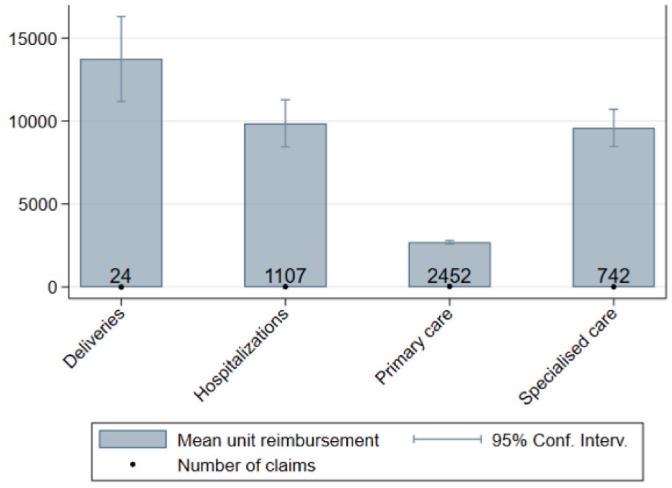


Fig. 2. Characteristics of the claims, per type.
Notes: Authors' calculations using health insurance NGO administrative data on all claims submitted between August 1, 2020 and December 31, 2021 (N = 4,325 claims). The figure shows mean reimbursement amounts in FCFA by type of care, with 95% confidence intervals. Numbers at the bottom of bars indicate the total number of claims for each type of care.

specialized care for 28.5%, primary care for 26.5%, and deliveries for 1%.

Focusing on insurance utilization by the insured respondents of our endline survey sample only, half (50%) of their claims consisted of primary care (41% nurse consultations, 4% midwife consultations, and 15% general practitioner consultations). Hospitalizations accounted for 28% of claims (including 25% for observation hospitalization), while specialized outpatient care represented 22% of claims. More than 76% of the payments for these claims were prepayments rather than reimbursements, this proportion being significantly higher for primary care, in line with the priority given to primary care in the enlisted health facilities.

4.3. Endline sample descriptive statistics

Approximately 89.5% of the microfinance NGO members were women, with an average age of around 41.8 years. Less than half of the respondents (45.9%) had attended school, and 67.93% of those had achieved a primary level of education. Employment rates were high, with 95.1% of respondents reporting employment in the previous week. The main economic sectors were fixed-location retail (67.8%), itinerant commerce (16.6%), agriculture/livestock (15.0%), and crafts (10.5%). The poverty score, calculated based on a multiple correspondence analysis of owned assets, was 48.2 on a scale of 0–100.

In terms of health outcomes, 12.5% of respondents rated their health as excellent, 75.3% as good, and 12.2% as poor. The objective health status had an average score of 70.6 on a 0 to 100 scale, while emotional well-being had a mean score of 43.6. Over the past four weeks, specific indicators of emotional well-being showed that 18.1% of respondents never felt worried or anxious, 43.0% never cried or felt like crying, 22.1% never had trouble sleeping, 34.1% never felt depressed, 35.3% never had difficulty concentrating, 36.3% never noticed a decline in performance, and 59.1% never felt lonely. A substantial portion of respondents (83.6%) sought healthcare when feeling ill, with 77.2% of them visiting formal healthcare facilities. Additionally, 24.5% engaged in self-medication, and 2.5% used traditional medicine. Many respondents used multiple types of healthcare, either simultaneously or successively. Only 38.2% of respondents sought medical treatment on the same day they experienced their first symptoms, while 61.0% sought care within two days. Furthermore, 54.0% of respondents reported typically waiting before seeking care when symptoms appeared. In terms of financial protection, 12.9% reported difficulties in paying for medical treatment in the past year, with an average self-estimated healthcare expense of 77,316 FCFA (approximately $324.73). Additionally, 26.2% indicated that healthcare expenses had impacted their income-generating activities.

While the randomization process led to some statistically significant differences between treatment and control groups (Table C1), these differences remained small in magnitude. For instance, the standardized differences ranged from −0.02 to 0.52 in absolute value, with most differences being below 0.2 standard deviations. Moreover, our ANCOVA specification explicitly controlled for these baseline characteristics, ensuring that any remaining small imbalances did not bias our impact estimates.

4.4. Impacts of health insurance

All tables follow the same structure. For each outcome, we present the coefficient and standard errors (in parentheses) of both the intention-to-treat (ITT) estimates, measuring the average effect of offering the insurance, and the Treatment on the Treated (ToT) estimates, measuring the effect on those who actually took up the insurance when offered. All estimates were weighted using a two-level inverse probability weighting approach to address both group-level and individual-level attrition between 2020 and 2022. Additionally, we report the p-value and the sharpened False Discovery Rate (FDR) q-values. To help interpret the magnitude of the results, we provide the mean value for the control group and the relative effect for each estimate within their respective tables. We also computed Lee bounds to assess the robustness of our results to differential attrition between treatment and control groups.

4.4.1. Financial protection

We found strong statistical evidence that health insurance enrollment decreases the likelihood of encountering payment difficulties to seek healthcare ($p = 0.013$, Table 3). Specifically, the probability of experiencing payment difficulties was reduced by 5.8 percentage points (ITT) or 6.4 percentage points (ToT), corresponding to a 36–40% reduction. Individuals who received treatment experienced large reductions in out-of-pocket health expenditures of approximately 50.4% (ITT, $p < 0.001$) to 55.7% (ToT, $p < 0.001$). Among the respondents in the control group, 28% reported a deteriorating impact of healthcare expenditures on their income-generating activities. Access to insurance decreased this probability by 5.5 (ITT) to 6.1 percentage points (ToT), a 19.6–21.7% reduction relative to the control group mean ($p = 0.108$). Ultimately, our results were confirmed when controlling for multiple hypotheses testing (all sharpened q-value are below 0.05, and the

Table 3
Impact of micro-insurance on financial protection - illness episode last 6 months.

	Payment difficulties		Health expenditure (ln)		Impact on activity		Financial protection index[a]	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment (Health insurance)	−0,058**	−0,064**	−0,504***	−0,557***	−0,055	−0,061	0,047***	0,052***
	(0.023)	(0.025)	(0.108)	(0.119)	(0.034)	(0.037)	(0.013)	(0.015)
P-value	0.013	0.013	0.000	0.000	0.108	0.108	0.001	0.001
Sharpened q-value	[0.011]	[0.009]	[0.001]	[0.001]	[0.034]	[0.028]	[0.001]	[0.001]
Relative effect (%)	−36.11	−39.93	−4.77	−5.28	−19.58	−21.65	8.03	8.87
Nb. Obs	1076	1076	812	812	1077	1077	1077	1077
Nb. cluster	87	87	85	85	87	87	87	87
Control Mean	0.16	0.16	10.56	10.56	0.28	0.28	0.59	0.59
Type	ITT	ToT	ITT	ToT	ITT	ToT	ITT	ToT

Notes: Controls include age, poverty score, education, seniority in microcredit, total amount of credit, health status, household size, risk aversion. Standard errors are reported in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1. Lee-bounds: For Payment difficulties: ITT = [-0.057, −0.057], ToT = [-0.063, −0.063], For Ln health expenditure: ITT = [-0.522, −0.506], ToT = [-0.577, −0.560], For Impact on activity: ITT = [-0.054, −0.055], ToT = [-0.060, −0.061], For Financial protection Index: ITT = [0.047, 0.047], ToT = [0.052, 0.052].

[a] Standardized weighted index (Swindex) of the three indicators (payment difficulties, health expenditure (ln) and impact on activity).

financial protection index increased with the health insurance (4.7–5.2 percentage points, p = 0.001).

4.4.2. Healthcare utilization

Access to health insurance influenced the utilization of the healthcare system in case of illness. Table 4 presents the estimates of healthcare utilization based on the type of care sought by respondents. While health insurance reduced the overall use of healthcare by 7.3–8.1% (p = 0.039), a detailed examination revealed interesting shifts in healthcare-seeking behavior. Access to health insurance increased the use of modern healthcare facilities by 5.4% (ITT) to 6.0% (ToT), a noteworthy result given the high initial utilization rate of 75% in the control group. Furthermore, the reliance on traditional medicine as a healthcare option was reduced by 2.5–2.7 percentage points (p = 0.015), representing a decrease of 61–68% from the control group's rate of 4%. However, we could not conclude from this result, as once multiple hypothesis testing was controlled for, the sharpened q-value raised to 0.13.

While the high p-value associated to self-medication (p = 0.241) suggested an absence of impact of health insurance, the sharpened q-values are much lower (q = 0.04; q = 0.63). They provided some statistical evidence that health insurance decreases the use of self-medication by 3.5–3.9 percentage points (about 13.5–15% reduction from the control mean of 26%). Altogether, these results suggested that health insurance induced a shift from traditional medicine and self-medication towards modern healthcare facilities.

We found evidence that health insurance impacted healthcare-seeking promptness. As shown in Table 5, insured individuals were more likely to seek care on the same day of illness onset, with an increase of 7.9–8.7 percentage points (p = 0.041), representing a 23.1–25.6% increase from the control group mean of 34%. Similarly, the likelihood of seeking care within two days increased by 6.6–7.3 percentage points (p = 0.079), an 11.6–12.8% improvement over the control group's rate of 57%. While there was a slight decrease in those who reported usually waiting (−0.9 to −1.0 percentage points), this effect was not statistically significant (p = 0.813). The overall positive impact on healthcare-seeking timeliness was confirmed by a improvement in the delay index (p = 0.057). Nonetheless, these effects are not robust to the multiple hypothesis testing.

4.4.3. Health outcomes

We did not find any evidence of differences in health outcomes between the treated and control groups following the introduction of health insurance (Table 6). The results showed a small negative effect on subjective physical health, with a high p-value (−6 to −6.6 percentage points, p = 0.125) and objective physical health (−0.36 to −0.39 points on a scale of 100, p = 0.710). While we observed a small positive effect on emotional well-being (+0.80 to +0.88 points from a baseline of 42.85 in the control group, representing a 1.9–2.1% increase), we could not reject the null hypothesis (p = 0.631). Overall, we were not able to reject the hypothesis of the absence of impact of health insurance on health outcomes (p = 0.416).

5. Discussion

Access to healthcare for informal workers is a well-recognized issue, with few effective solutions currently available. In Burkina Faso, many households pay for medical expenses out of pocket, representing a substantial financial burden given the high cost of healthcare relative to their low incomes. To manage these expenses, families often resort to borrowing money, selling valuable assets, or using savings intended for income-generating investments, which can jeopardize their activities and lead to long-term impoverishment. Many individuals turn to self-medication, using medicines purchased from local shops or traditional herbal remedies, which are generally cheaper in the short term but may not be as effective as professional medical care (Fink et al., 2013). Integrating health insurance with microcredit offers several promising benefits for health coverage. By shielding households from healthcare costs, it has the potential to financially secure subscribers, safeguard their income-generating activities, and ultimately support loan repayment. Additionally, it can improve healthcare-seeking behaviors and potentially enhance health outcomes. Through a cluster RCT, we evaluated a compulsory micro health insurance product for members of a MFI in Ouagadougou, Burkina Faso.

Our study confirmed that access to health insurance significantly enhances financial protection for informal workers. The reduction in out-of-pocket expenditures and the decreased likelihood of facing financial difficulties when accessing healthcare are consistent with findings from other studies in similar contexts (Acharya et al., 2012; Rabbani et al., 2022; Fink et al., 2013; Das and Do, 2023). For instance, Rabbani et al. (2022) observed that mandatory health insurance in Bangladesh reduced hospitalization costs, providing financial relief to insured individuals. Similarly, Acharya et al. (2012) found that insurance schemes in low- and middle-income countries often offer substantial protection against high out-of-pocket expenses, though the impact on poorer populations can be more limited. This underscores the importance of comprehensive benefits packages in enhancing financial

Table 4
Impact of micro-insurance on healthcare use - illness episode last 6 months.

	Use of healthcare		Modern healthcare		Traditional medicine		Self-medication	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment (Health insurance)	−0,064**	−0,071**	0,054*	0,06*	−0,025**	−0,027**	−0,035	−0,039
	(0.030)	(0.034)	(0.032)	(0.036)	(0.010)	(0.011)	(0.030)	(0.033)
P-value	0.039	0.039	0.099	0.099	0.015	0.015	0.241	0.241
Sharpened q-value	[0.066]	[0.085]	[0.043]	[0.063]	[0.133]	[0.138]	[0.043]	[0.063]
Relative effect (%)	−7.34	−8.12	7.19	7.95	−61.32	−67.81	−13.52	−14.95
Nb. Obs	1076	1076	900	900	900	900	900	900
Nb. cluster	87	87	87	87	87	87	87	87
Control Mean	0.87	0.87	0.75	0.75	0.04	0.04	0.26	0.26
Type	ITT	ToT	ITT	ToT	ITT	ToT	ITT	ToT

Notes: Controls include age, poverty score, education, seniority in microcredit, total amount of credit, health status, household size, risk aversion. Standard errors are reported in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1. Lee-bounds: For Use of healthcare: ITT = [-0.066,-0.064], ToT = [-0.073,-0.071]; For Modern healthcare: ITT = [0.058, 0.046], ToT = [0.064, 0.051]; For Traditional medicine: ITT = [-0.023, −0.021], ToT = [-0.026, −0.023]; For Self-medication: ITT = [-0.066, −0.064], ToT = [-0.073, −0.071].

Table 5
Impact of micro-insurance on delay - illness episode last 6 months.

	The same day		Within 2 days		Used to wait		Delay index[a]	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment (Health insurance)	0,079**	0,087**	0,066*	0,073*	−0,009	−0,01	0,055*	0,061*
	(0.038)	(0.042)	(0.037)	(0.041)	(0.038)	(0.042)	(0.029)	(0.032)
P-value	0.041	0.041	0.079	0.079	0.813	0.813	0.057	0.057
Sharpened q-value	[0.138]	[0.119]	[0.138]	[0.119]	[0.263]	[0.256]	[0.138]	[0.119]
Relative effect (%)	23.12	25.57	11.61	12.84	−1.64	−1.82	11.71	12.95
Nb. Obs	900	900	900	900	695	695	900	900
Nb. cluster	87	87	87	87	87	87	87	87
Control Mean	0.34	0.34	0.57	0.57	0.55	0.55	0.47	0.47
Type	ITT	ToT	ITT	ToT	ITT	ToT	ITT	ToT

Notes: Controls include age, poverty score, education, seniority in microcredit, total amount of credit, health status, household size, risk aversion. Standard errors are reported in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1. Lee-bounds: For The same day: ITT = [0.076, 0.082], ToT = [0.084, 0.090], For Within 2 days: ITT = [0.066, 0.068], ToT = [0.073, 0.075], For Used to wait: ITT = [-0.009, −0.009], ToT = [-0.010, −0.010], For Delay index: ITT = [0.054, 0.057], ToT = [0.060, 0.063].
[a] Standardized weighted index (Swindex) of the three indicators (the same day, within two days and use to wait).

Table 6
Impact of micro-insurance on health outcomes - illness episode last 6 months.

	Physical health (subj)		Physical health (obj)		Emo. Well-being		Health index[a]	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment (Health insurance)	−0.060	−0.066	−0.356	−0.394	0.797	0.881	−0.009	−0.010
	(0.039)	(0.043)	(0.956)	(1.057)	(1.654)	(1.829)	(0.011)	(0.012)
P-value	0.125	0.125	0.710	0.710	0.631	0.631	0.416	0.416
Sharpened q-value	[1.000]	[1.000]	[1.000]	[1.000]	[1.000]	[1.000]	[1.000]	[1.000]
Relative effect (%)	−2.96	−3.27	−0.50	−0.55	1.86	2.06	−1.61	−1.78
Nb. Obs	1077	1077	1077	1077	1077	1077	1077	1077
Nb. cluster	87	87	87	87	87	87	87	87
Control Mean	2.03	2.03	71.12	71.12	42.85	42.85	0.54	0.54
Type	ITT	ToT	ITT	ToT	ITT	ToT	ITT	ToT

Notes: Controls include age, poverty score, education, seniority in microcredit, total amount of credit, health status, household size, risk aversion. Standard errors are reported in parentheses. ***p < 0.01, **p < 0.05, *p < 0.1. Lee-bounds: For Physical health (subj): ITT = [-0.058, −0.057], ToT = [-0.065, −0.063], For Physical health (obj): ITT = [-0.554, −0.158], ToT = [-0.613, −0.175], For Emo. well-being: ITT = [0.616, 0.876], ToT = [0.682, 0.969], For Health index: ITT = [-0.010, −0.007], ToT = [-0.011, −0.007].
[a] Standardized weighted index (Swindex) of the three indicators (subjective physical health, objective physical health and emotional well-being).

protection. By covering a wide range of services beyond hospitalizations, insurance reduces the burden of hidden costs that often deter individuals from seeking care (Eze et al., 2022; Capuno et al., 2019).

The impact of health insurance on healthcare utilization is also notable. Our findings highlighted a shift from traditional medicine and self-medication towards modern healthcare facilities. This aligns with Rabbani et al. (2022), who found that insurance increased the use of formal healthcare services, particularly for inpatient care. Additionally, the encouragement of immediate healthcare-seeking behavior through health insurance suggests a reduction in delays, a crucial factor for

long-term health improvement. The observed improvements in healthcare utilization could be attributed to several factors. The comprehensive and attractive benefits package—including outpatient services, medications, and diagnostic exams—likely increased the insurance utilization, particularly as outpatient care is more frequent than hospitalizations and promotes visits to health centers over self-medication.

Implementation fidelity was closely monitored, ensuring a positive experience with health insurance. Effective communication and sensitization efforts, such as informational meetings and ongoing support, were instrumental in informing members about the insurance benefits. Financial training provided by the MFI may have further facilitated understanding and adoption of the insurance product, while regular group meetings allowed members to share positive experiences, which in turn encouraged greater utilization. This is corroborated by findings from other studies emphasizing the importance of information dissemination in enhancing the uptake and utilization of health insurance (Platteau et al., 2017; Bocoum et al., 2019).

Despite the positive impacts on financial protection and healthcare utilization, our study did not observe improvements in physical health outcomes. This aligns with findings from Rabbani et al. (2022), Acharya et al. (2012), Banerjee et al. (2014), who also reported no significant impact on physical health measures. The study's relatively short duration and the indirect nature of the pathways from health insurance to health outcomes likely explain why no impact on physical health was detected. Similarly, we did not observe improved emotional well-being due to health insurance, contrasting with the "peace of mind" effect identified by Haushofer et al. (2020). The difference in measurement approaches between our studies (self-reported depressive symptoms in our case vs. an objective measurement of a specific hormone level in theirs) may also account for this discrepancy.

Our study provided valuable insights into the benefits of combining health insurance with microfinance. Nevertheless, generalizing and scaling up this model requires careful consideration of key elements to prevent potential adverse effects. First, ensuring the financial viability of the scheme is essential. Both the benefit package design and scheme monitoring require particular attention to avoid financial imbalance and ensure the program's sustainability. Some schemes cover only essential services, such as hospitalization and maternity costs, to control expenses and mitigate moral hazard risks (over-utilization of healthcare services) (Rabbani et al., 2022; Banerjee et al., 2014).

In contrast, the insurance product studied in this article offers a comprehensive reimbursement package that includes medications and diagnostic exams. Its actuarial fairness relies on two main components: (i) prescription control by an internal doctor to ensure adherence to care standards and referral guidelines (e.g., no specialized care at CSPS, first-level facilities) and (ii) a focus on primary care services with relatively low unit costs to prevent severe illnesses that may lead to costly hospitalizations. Since the research project concluded, the NGO has closely monitored the financial viability of the insurance product. Due to increased healthcare utilization among the insured and subsequent costs, the premium was adjusted to a sliding scale from 0 to 3,500 FCFA based on loan size, averaging 1,500 FCFA to improve equity and maintain viability. New MFI members typically start with smaller loans and initially pay lower or no premiums, with higher premiums applying as loan sizes increase. Full financial autonomy may require additional premium increases, which would need careful consideration to maintain acceptability. Monitoring the financial viability of the product includes reviewing claims and prescriptions to limit moral hazard among individuals and providers. For instance, moral hazard can lead to over-prescription when doctors prescribe more expensive treatments, knowing that insurance will cover the costs. This phenomenon is more common when benefit packages include medications and diagnostic exams (Das and Do, 2023), as in our case. Achieving "efficient" moral hazard (increased healthcare utilization due to improved access and income effects) rather than "inefficient" moral hazard (excessive healthcare utilization due to substitution effects) is a key challenge in implementing sustainable healthcare systems (Nyman et al., 2018; Li et al., 2023). In our case, the 40% out-of-pocket expense and adherence to care standards helped mitigate these risks.

The second concern involves the potential drop-out of microcredit clients due to the introduction of mandatory health insurance. In a context of low demand for insurance, bundling health insurance with microcredit means that MFI members who would not otherwise choose to enroll are required to do so to secure a new loan. Consequently, in a competitive microcredit market, clients may opt out of the MFI after loan repayment, jeopardizing the institution's activity, as observed by Banerjee et al. (2014). Their study found that many clients (16 percentage points) preferred to forego their loans rather than accept the bundled microcredit and health insurance product, leading to a decline in loan renewals, even after the insurance requirement was removed. This suggests that bundling may negatively impact client loyalty to the MFI. Therefore, acceptance of health insurance is crucial, and two mutually dependent factors must be closely monitored: the perceived attractiveness of the benefits package and the fidelity of its implementation. Attractiveness includes both the package's features (premium amount, covered services) and the way MFI members understand and perceive these as beneficial. Thus, providing ongoing information and guidance about insurance procedures is essential, beyond the initial contract signing. In this study, three initial information sessions were complemented with in-person support and a hotline to ensure insured members could access information when needed. NGO staff encouraged experience sharing among insured members, either during monthly group meetings or through informal, bilateral discussions. This approach increased both utilization and satisfaction with the insurance. As a result, insured members reported high levels of satisfaction with the insurance.[12] The microcredit renewal rate was unaffected by the bundling of microcredit with health insurance. Clients valued the financial protection provided by the insurance, which helped cover unexpected health expenses and enabled them to repay loans even when facing costly illness or accidents, confirming findings from Agier et al. (2016). The hotline and field presence of NGO staff allowed for early detection and resolution of dissatisfaction, strengthening trust in the insurance scheme, which was crucial for retaining members in both the health insurance program and the MFI.

The last crucial factor to consider when deploying such schemes, in order to avoid MFI drop-out, is implementation fidelity. Health insurance experience must meet or exceed expectations to enhance satisfaction and encourage positive experience sharing. From the perspective of the insured, administrative processes—such as enrollment, premium collection, and reimbursement—must be smooth and efficient to build trust and foster utilization. Lack of clarity and delays in these processes can erode client trust and loyalty, creating barriers to insurance awareness and adoption, as observed in similar programs (Banerjee et al., 2014). For contracted healthcare providers, timely and fair reimbursements are essential to avoid reluctance in treating insured patients. Providers may offer lower-quality care to insured patients if they are dissatisfied with the insurance scheme, as noted by Fink et al. (2013) in Burkina Faso and Banerjee et al. (2014) in India. The literature

[12] The high implementation fidelity is reflected in members' satisfaction: 92% of treated individuals could name three beneficiaries and 99% knew the premium amount, indicating effective communication of the insurance features. Members rated their satisfaction 8/10 on average, primarily appreciating the reduction in healthcare expenses (96%), while 87% of the control group expressed willingness to join the scheme. Implementation fidelity was ensured through a comprehensive approach: preliminary surveys to design an adequate benefit package aligned with healthcare needs and willingness to pay, dedicated full-time staff for claims processing and provider relationships, close monitoring of reimbursement deadlines and member satisfaction by the MFI, and strong oversight from an experienced French NGO that provided both technical expertise and financial support throughout the implementation process.

frequently associates CBHI schemes with implementation challenges that limit their effectiveness in protecting households (Ridde et al., 2018; Schneider, 2023). In this project, high implementation fidelity was reported through qualitative feedback, requiring significant human resources, including dedicated full-time staff for claims processing and provider relations, to ensure timely and complete reimbursement for both members and healthcare providers. The involvement of an international NGO, which trained staff and provided technical expertise and financial support, was a critical asset throughout the implementation process. While high implementation fidelity can lead to increased operating costs, it is essential for insurance acceptability, risk pooling, and, ultimately, the financial sustainability of the program.

While our results provide strong evidence of the impact of bundled health insurance, several methodological challenges should be considered. First, our analysis faced significant attrition between baseline and endline surveys, with only 55% of baseline respondents being re-interviewed. While our reweighting approach helps address this issue, attrition could still affect our estimates if unobserved characteristics driving both attrition and outcomes differ between treatment and control groups. Second, our final analytical sample is restricted to individuals who reported illness episodes, introducing potential selection bias. However, the similar illness reporting rates between treatment (49.13%) and control groups (54.45%) suggest this selection is unlikely to be driven by treatment status. Third, baseline differences in some characteristics, though small in magnitude, indicate imperfect randomization. Our ANCOVA specification helps control for these initial differences.

Regarding the potential direction of these biases: the lower attrition rate in treatment groups suggests that, if anything, we might underestimate the true impact of insurance, as individuals leaving the control groups might be those who would have benefited most from insurance. Similarly, the slightly higher illness reporting rate in control groups could lead to underestimating insurance effects if healthier individuals are more likely to report illness in treatment groups. Finally, the baseline differences are controlled for in our analysis and show no systematic pattern favoring either group. Therefore, while these various sources of potential bias exist, they are unlikely to systematically overestimate the impact of insurance, suggesting our estimates provide credible, and possibly conservative, measures of the insurance's causal effects.

While our study population may seem specific (members of a microfinance institution), it shares many characteristics with a substantial portion of the Burkinabè population and other groups inthe subregion: urban informal workers with limited formal education, economic vulnerability, reliance on microfinance to support income-generating activities, and reluctance to enroll in voluntary health insurance. Health insurance products can be bundled with various types of contracts, such as commercial agreements (Rabbani et al., 2022) or social protection programs (Shigute et al., 2017), to address the persistently low uptake of health insurance and extend health coverage to informal workers. In Burkina Faso, the government is implementing Universal Health Insurance, which combines state-managed compulsory insurance for formal workers with a national network of diverse insurance schemes for the remaining 85% of the population. The government has also committed to allocating tax-based funding to increase universal health coverage. In this context, the positive experience demonstrated by this study—a CBHI scheme that improves financial protection and healthcare-seeking behavior while being actuarially fair and requiring only partial subsidies—is timely and relevant. According to the latest inventory of CBHI schemes conducted in 2021, these schemes remain limited in number and coverage, with only 171 operational schemes and low penetration in urban areas like Ouagadougou (below 1%). For the government, providing technical and financial support to CBHI schemes offers a promising approach to expanding coverage for the active informal workforce and advancing universal health coverage. This conclusion is applicable to other countries in the subregion, where the informal sector constitutes the largest share of the economy and where similar strategies to enhance health coverage are being pursued.

6. Conclusion

Our experimental findings show that bundling health insurance with microcredit effectively provides financial protection, promotes timely healthcare-seeking, and enhances financial stability for clients and institutions. This model is particularly relevant for informal workers in Sub-Saharan countries, where national insurance schemes often fall short, and microfinance institutions play a crucial social and financial role. Integrating insurance with microcredit distributes financial risks and safeguards loan portfolios against health-related defaults.

CRediT authorship contribution statement

Delphine Boutin: Writing – review & editing, Writing – original draft, Supervision, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Laurène Petitfour:** Writing – review & editing, Writing – original draft, Project administration, Formal analysis, Data curation, Conceptualization. **Yvonne Allard:** Project administration. **Souleymane Kountoubré:** Resources, Project administration, Methodology. **Valéry Ridde:** Writing – review & editing, Validation.

Appendix A. Design of the cluster randomized experiment

Figure A1. Treatment Assignment Process: This figure illustrates the two-stage randomization process implemented in January 2020. From an initial pool of 158 eligible microcredit groups across two MFI agencies, 101 groups were randomly selected. These selected groups were then randomly assigned to either treatment (49 groups) or control (52 groups) conditions, using agency-level stratification to ensure balanced representation. Treatment groups received mandatory health insurance while control groups continued with standard microcredit services only.

Figure A2. Sample Size Evolution: This figure depicts the evolution of our study sample from baseline to endline analysis. Starting with 101 groups (1,724 individuals) in January 2020, the sample underwent three main transitions: (1) group dissolution reducing the sample to 88 groups, (2) endline data collection in January 2022 covering 1,387 individuals, including both re-interviewed baseline participants and new group members, and (3) final analytical sample of 1,095 individuals who reported illness episodes. The figure highlights the balanced distribution between treatment and control groups maintained throughout these transitions.

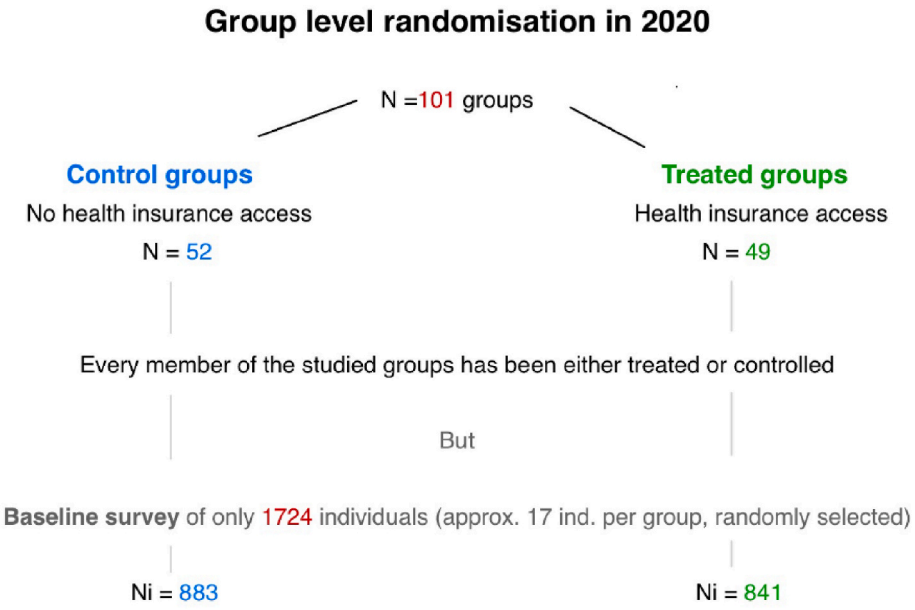


Fig. A1. Treatment assignment process.

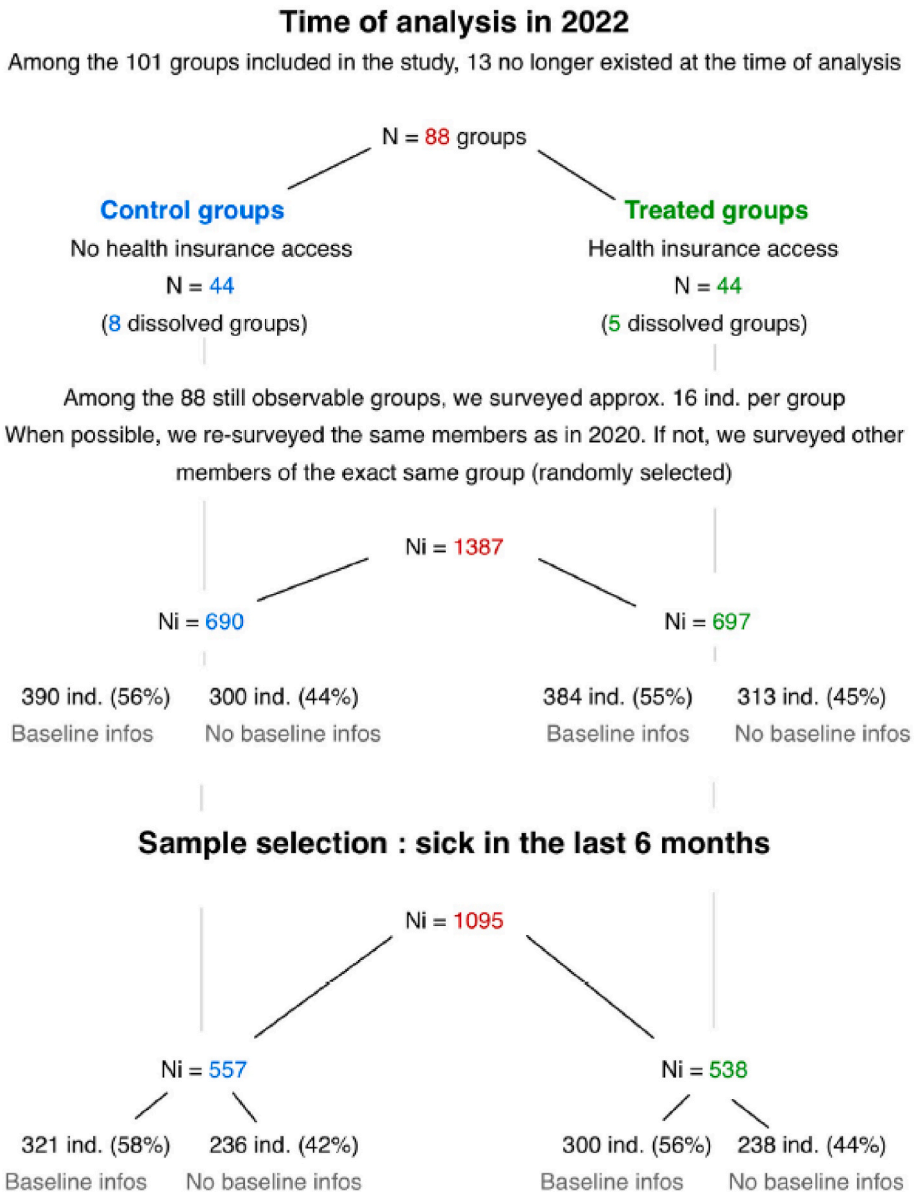


Fig. A2. Sample size evolution.

Appendix B. Selection tests and internal validity

6.1 Group persistence analysis

This section examines whether group dissolution between 2020 and 2022 introduced any systematic selection that could bias our impact estimates. We conducted mean comparison tests using baseline characteristics from 2020, comparing individuals from dissolved groups (N = 232, from 13 groups) with those from continuing groups (N = 1,492, from 88 groups).

Analysis of group dissolution revealed no evidence of selection that could compromise our identification strategy. Among the 101 initial groups, 13 dissolved between 2020 and 2022, with slightly lower dissolution in treated groups (5 groups) compared to control groups (8 groups). Mean comparison tests using baseline characteristics show limited significant differences between dissolved and remaining groups. While dissolved groups had a lower proportion of treated participants (37.07% vs. 50.6%, $p < 0.01$) and slightly fewer women (86.64% vs. 90.75%, $p = 0.05$), other socioeconomic characteristics such as education, poverty level, employment status, and credit amount showed no statistically significant differences. Importantly, we found no evidence of health-related selection: the proportion of individuals reporting good health status was similar between dissolved and remaining groups (difference of 0.11 percentage points, $p = 0.976$), which held across both treatment and control groups. Initial healthcare utilization and payment difficulties also showed no systematic differences, though control groups that dissolved showed slightly lower baseline healthcare use (-8.6 percentage points, $p = 0.028$) and fewer payment difficulties (−6.05 percentage points, $p = 0.034$). These patterns suggested that group dissolution was primarily driven by the natural completion of loan cycles rather than factors related to implementing health insurance or systematic selection on health or socioeconomic characteristics. This finding was particularly reassuring compared to similar studies, such as Banerjee et al. (2014) in India, where mandatory health insurance led to significant rejection of microfinance services.

Table B1
T-test on groups dissolution by treatment status.

	Overall			Assigned to Treatment			Assigned to Control		
	Dissolved before 2022	Still observable	Diff	Dissolved before 2022	Still observable	Diff	Dissolved before 2022	Still observable	Diff
	N = 232	N = 1492		N = 86	N = 755		N = 146	N = 737	
Respondent characteristics									
Women (%)	86,64	90,75	−4,11*	69,77	95,36	−25,59**	96,58	86,02	10,56***
Age	41,49	40,17	1,32*	40,67	39,91	0,76	41,97	40,43	1,54
Have been in school (%)	41,38	37,53	3,85	39,53	39,47	0,06	42,47	35,55	6,92
Poverty score	51,66	49,99	1,67	44,98	50,94	−5,96***	55,6	49,02	6,58***
Worked last week	94,35	91,72	2,63	94,12	91,48	2,64	94,48	91,96	2,52
Not Burkinabe	11,64	9,65	1,99	6,98	9,8	−2,82	14,38	9,5	4,88*
Respondent characteristics									
Total credit (ln)	11,32	11,26	−0,04	11,32	11,18	0,14	11,31	11,54	−0,23
Loan tenure (months)	16,89	16,76	0,13	20,27	16,63	3,64***	14,9	16,9	−2,00**
Outcomes in baseline									
Payment difficulties (%)	6,47	11,06	−4,59**	6,98	9,93	−2,95	6,16	12,21	−6,05**
Healthcare use (%)	86,49	89,26	−2,77	94,59	87,5	7,09	82,43	91,04	−8,61**
Healthcare use in modern facilities (%)	31,03	34,65	−3,62	33,72	34,57	−0,85	29,45	34,74	−5,29
Healthcare use the same day (%)	18,97	20,78	−1,81	17,44	20,13	−2,69	19,86	21,44	−1,58
Healthcare use within two days (%)	34,05	32,44	1,61	29,07	31,39	−2,32	36,99	33,51	3,48
Subjective health (1–4 score)	1,94	1,95	−0,01	1,9	1,98	−0,08	1,97	1,92	0,05
Potential selection bias									
Treatment assignment	37,07	50,6	−13,53***						
Not sick the last 6 months (%)	52,59	52,48	0,11	56,98	52,98	4	50	51,97	−1,97

Notes: Sample includes 1,724 respondents from baseline survey. Differences between dissolved and observable groups are reported with stars indicating significance levels: ***p < 0.01, **p < 0.05, *p < 0.1.

6.2 Sample composition tests

This section examines the implications of partial baseline data availability at endline. Within our 88 active groups in January 2022, only 55% of endline respondents (774 out of 1,387) had baseline data. This partial matching stemmed from three sources: true attrition (individuals leaving their microcredit groups), temporary unavailability during surveys, and technical identification challenges when microcredit codes changed.

Analysis of these tests revealed modest but statistically significant differences between re-interviewed and non-re-interviewed individuals. Re-interviewed respondents had slightly different credit characteristics (higher loan amounts by 0.11 ln points, $p = 0.011$), were less likely to be women (−3.06 percentage points, $p = 0.041$), and showed different healthcare utilization patterns at baseline. Notably, re-interviewed individuals were more likely to report being healthy in the previous six months (+9.61 percentage points, $p < 0.001$) and had lower rates of healthcare facility use (−5.69 percentage points, $p = 0.021$). However, crucially for our identification strategy, these differences were similar across treatment and control groups. Treatment assignment remained balanced between those with and without baseline data (difference of 1.52 percentage points, $p = 0.557$), and similar attrition patterns were observed in both treatment and control groups (all treatment × baseline-availability interaction p-values>0.1). The observed differences in credit characteristics were comparable between treatment (−0.01, $p = 0.031$) and control (−0.01, $p = 0.007$) groups, suggesting that attrition was driven by natural microcredit cycles rather than treatment status. While these patterns suggested our estimates might better represent more established microfinance clients with larger loans, they did not threaten the internal validity of our results as selection patterns operated similarly across treatment conditions.

Table B2
T-test on respondent attrition.

	Overall			Assigned to Treatment			Assigned to Control		
	Baseline only	Baseline & Endline	Diff	Baseline only	Baseline & Endline	Diff	Baseline only	Baseline & Endline	Diff
	N = 718	N = 774		N = 369	N = 386		N = 349	N = 388	
Respondent characteristics									
Women (%)	92.34	89.28	3.06**	96.21	94.56	1.65	88.25	84.02	4.23*
Age	39.74	40.56	−0.82	39.34	40.46	−1.12	40.17	40.66	−0.49
Have been in school (%)	35.93	39.02	−3.08	38.48	40.41	−1.93	33.24	37.63	−4.39
Poverty score	49.75	50.21	−0.46	50.83	51.04	−0.21	48.62	49.39	−0.77
Worked last week	91.04	92.35	−1.31	90.98	91.95	−0.96	91.09	92.75	−1.65
Not Burkinabe	10.58	8.79	1.80	10.30	9.33	0.97	10.89	8.25	2.64
Respondent characteristics									
Total credit (ln)	11.11	11.58	−0.47**	10.95	11.4	−0.44*	11.29	11.77	−0.49***
Loan tenure (months)	16.21	17.28	−1.07**	16.27	16.97	−0.71	16.15	17.58	−1.43**
Outcomes in baseline									
Payment difficulties (%)	10.72	11.37	−0.65	10.03	9.84	0.18	11.46	12.89	−1.43

(*continued on next page*)

Table B2 (*continued*)

	Overall			Assigned to Treatment			Assigned to Control		
	Baseline only	Baseline & Endline	Diff	Baseline only	Baseline & Endline	Diff	Baseline only	Baseline & Endline	Diff
	N = 718	N = 774		N = 369	N = 386		N = 349	N = 388	
Healthcare use (%)	89.21	89.32	−0.11	87.43	87.57	−0.14	91.01	91.07	−0.07
Healthcare use in modern facilities (%)	37.60	31.91	5.69**	36.86	32.38	4.47	38.40	31.44	6.95**
Healthcare use the same day (%)	23.68	18.09	5.59***	21.68	18.65	3.03	25.79	17.53	8.26***
Healthcare use within two days (%)	36.35	28.81	7.54***	34.42	28.50	5.92*	38.40	29.12	9.27***
Subjective health (1–4 score)	1.97	1.93	0.04	1.99	1.97	0.02	1.95	1.89	0.06
Potential selection bias									
Treatment assignment	51.39	49.87	1.52						
Not sick the last 6 months (%)	47.49	57.11	−9.61***	48.78	56.99	−8.21**	46.13	57.22	−11.08***

Notes: Sample includes 1,492 respondents in baseline surveys within 88 still observable groups in 2022. Differences between groups are reported with stars indicating significance levels: ***p < 0.01, **p < 0.05, *p < 0.1.

6.3 Health-related selection analysis

This section examines potential selection bias arising from our focus on individuals who reported illness episodes. Our final analytical sample (N = 1,095) represents a subset of endline respondents (N = 1,387) who experienced illness in the six months preceding the survey. We conducted comprehensive tests to ensure this selection did not compromise our identification strategy.

Our analysis revealed systematic differences between individuals reporting and not reporting illness episodes. Those reporting illness tended to be older (+3.2 years, $p < 0.01$), more educated (+4.5 percentage points in secondary education, $p < 0.05$), and have larger loans (+0.15 ln points, $p < 0.01$). However, several key findings supported the validity of our analysis. First, treatment assignment remained balanced in the illness subsample (difference: 5.32 percentage points, $p = 0.106$), indicating that treatment status did not drive selection into illness reporting. Second, illness reporting rates were similar between treatment and control groups (difference: 2.1 percentage points, $p = 0.453$), suggesting the treatment did not affect the likelihood of reporting illness. Third, the characteristics of individuals reporting illness were similar across treatment conditions (all treatment × illness interaction p-values >0.1). While these results indicate that our final sample was not fully representative of the broader microfinance population - being slightly older, more educated, and more financially established - the balanced treatment assignment and similar selection patterns across treatment conditions ensured that our impact estimates remained internally valid for the population experiencing illness episodes.

Table B3
T-test on final sample selection.

	Overall			Assigned to Treatment			Assigned to Control		
	Has not been sick	Has been sick	Diff.	Has not been sick	Has been sick	Diff.	Has not been sick	Has been sick	Diff.
	N = 292	N = 1,095		N = 159	N = 538		N = 133	N = 557	
Treatment assignment	54.45	49.13	5.32						
Respondent characteristics									
Women (%)	86.30	89.22	−2.92	93.71	94.42	−0.71	77.44	84.20	−6.76*
Age	40.52	41.86	−1.34**	41.25	41.80	−0.55	39.65	41.92	−2.27**
Have been in school (%)	39.73	45.94	−6.21*	40.25	49.63	−9.38**	39.10	42.37	−3.27
Poverty score	45.61	48.22	−2.62**	45.59	49.01	−3.42*	45.62	47.47	−1.84
Worked last week	95.86	95.13	0.73	94.90	95.68	−0.78	96.99	94.60	2.39
Not Burkinabe	6.85	9.32	−2.47	6.92	11.52	−4.61*	6.77	7.18	−0.41
Respondent characteristics									
Total credit (ln)	9.56	10.46	−0.9***	9.46	10.47	−1.01***	9.68	10.44	−0.76***
Loan tenure (months)	31.80	35.26	−3.46***	29.92	33.32	−3.40**	33.99	37.15	−3.16**
Outcomes in baseline									
Payment difficulties (%)	6.51	12.88	−6.37***	6.29	9.67	−3.38	6.77	15.98	−9.21***
Health expenditure (ln)	10.55	10.35	0.20*	10.38	10.13	0.26*	10.73	10.56	0.17
Impact on activity (%)	22.76	27.04	−4.28	0.22	0.25	−0.03	0.24	0.29	−0.05
Physical health (subj)	1.86	2.00	−0.14***	1.89	1.97	−0.08*	1.82	2.02	−0.20***
Physical health (obj)	70.99	70.66	0.33	70.70	70.33	0.37	71.34	70.99	0.35
Emo. well-being	45.69	43.58	2.11	45.37	44.13	1.25	46.08	43.06	3.01
Modern healthcare (%)	91.97	77.18	14.78***	93.53	80.23	13.3 ***	90.00	74.43	15.57***
Traditional medicine (%)	2.41	2.51	−0.01	0.72	1.15	−0.43	4.55	3.74	0.80
Self-medication (%)	14.46	24.45	−10.00***	12.23	22.53	−10.3 ***	17.27	26.2	−8.92*
Use of healthcare (%)	84.86	83.64	1.22	87.1	80.86	6.24*	82.17	86.33	−4.16
The same day (%)	49.4	38.21	11.19***	53.24	42.76	10.48**	44.55	34.1	10.45**
Within 2 days (%)	77.91	61.03	16.89***	79.86	64.37	15.49***	75.45	58.0	17.45***
Used to wait (%)	58.52	54.03	4.48	57.69	53.01	4.68	59.6	55.03	4.57

Notes: Sample includes 1,387 respondents from endline survey. Differences between groups are reported with stars indicating significance levels: ***p < 0.01, **p < 0.05, *p < 0.1.

6.4 Borrowing behavior per treatment arm

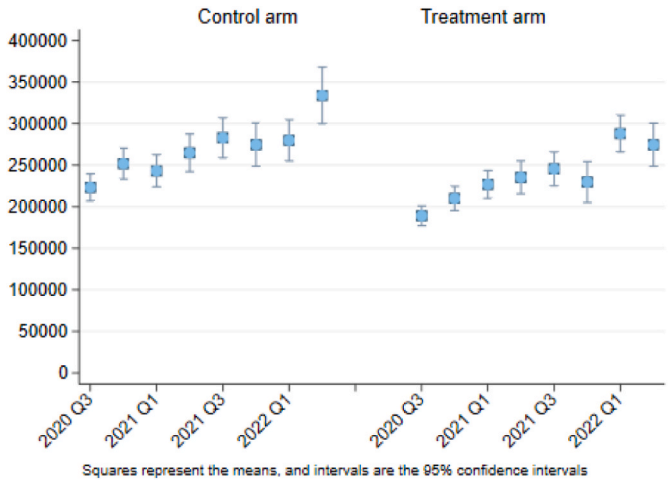


Fig. B1. Evolution of the loan amount per arm. Notes: Authors' calculations using MFI administrative data on all loans contracted between July 2020 and March 2022 (N = 5,163 loans). Squares represent sample means with 95% confidence intervals.

We examined whether the introduction of health insurance affected loan sizes. While we found some statistical evidence of lower loan amounts in treatment groups, the difference was small relative to loan size (never exceeding 10% of the average loan amount). Consequently, we cannot reject the null hypothesis of no change in borrowing behavior following the introduction of health insurance.

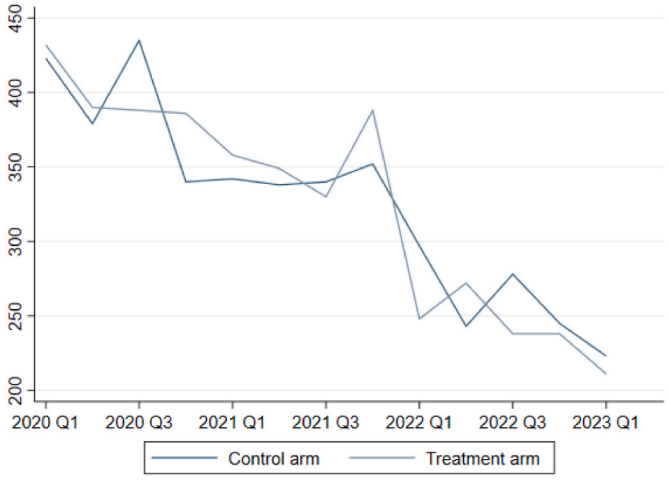


Fig. B2. Evolution of the number of new loans per quarter by treatment arm. Notes: Authors' calculations using MFI administrative data on all loans contracted between July 2020 and March 2022 (N = 5,163 loans). Lines represent the proportion of loan renewals by quarter and treatment status.

Appendix C. Balancing tests

Table C1
Balancing between treated and control groups.

	Overall			**Control**		Treatment		Standard diff
	Mean	Min	Max	Mean	St.Dev.	Mean	St.Dev.	
Women	0.89	0	1	0.84	0.015	0.94	0.0.01	−0.10***
Has been in school	0.46	0	1	0.42	0.02	0.49	0.02	−0.07**
Not Burkinabe	0.10	0	1	0.09	0.01	0.11	0.01	−0.02
Total credit	11.39	0	14.9	11.53	0.0.10	11.25	0.10	0.27*
Seniority (month)	16.57	0	48	16.81	0.34	16.33	0.32	0.47
Physical health (subj)	1.94	1	4	1.91	0.02	1.98	0.02	−0.06*
Household size	6.72	1	25	6.98	0.11	6.45	0.10	0.52***
Wealth score	50.36	1.47	99.66	49.81	0.63	50.36	0.59	−1.13
Risk aversion	2.28	0	3	2.35	0.04	2.21	0.04	0.14 **

Notes: Final analytical sample (N = 1,095 individuals who reported illness episodes in the six months preceding the endline survey, across 88 groups). Differences between groups are reported with stars indicating significance levels: ***p < 0.01, **p < 0.05, *p < 0.1.

Data availability

Data will be made available on request.

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