Reducing petty-corruption in health care with better informed patients: Experimental evidence from Ghana*

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Abstract

We study how health insurance information provision to patients affects out-of-pocket health expenditures (OOPE) due to unauthorized provider fees (petty-corruption) and patient behavior in Ghana's primary healthcare system. We conduct a randomized controlled trial in 41 health facilities in Ghana, where 1,807 patients received one of four information interventions or a placebo message. Providing insured patients with insurance benefit information reduces OOPE by 23%, primarily by decreasing petty-corruption in form of top-up payments. The effect is more pronounced in larger health facilities, where OOPE declines by 46%, suggesting that patient anonymity influences bargaining power. The intervention does not compromise healthcare quality or access, ruling out supply-side constraints as an alternative explanation. Only in larger health facilities do we observe additional changes in health staff behavior, specifically a reduction in drug provision. Despite these improvements, 65% of insured patients continue to report OOPE, underscoring the limitations of patient education alone. Moreover, the four information messages were equally effective, indicating that the mode of delivery plays a lesser role than the priming effect. While health insurance literacy improved, it remains at a low level, indicating the need for further efforts to enhance patient understanding of their entitlements. Our results contribute to the literature on financial protection in healthcare by demonstrating the effectiveness of low-cost interventions in reducing petty-corruption. However, complementary enforcement mechanisms are necessary to ensure compliance with NHIS policies. Future research should examine the long-term sustainability of such interventions and their broader impact on patient-provider interactions and health system accountability.

Keywords: Universal Health Coverage; Out-of-pocket payments; service delivery; health insurance; health insurance literacy; NHIS; Ghana.

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1. Introduction

Universal Health Coverage, one of the central health-related Sustainable Development Goals (SDGs), aims for all people to receive access to quality essential health services without fear of financial hardship (Hogan et al., 2018). Out-of-pocket expenditures (OOPE) for health spending have been decreasing for low- and middle-income counties (LMICs) during the last decades. However, OOPE still accounts for around 40% of current health expenditure in LMICs – pushing many people into poverty (World Bank, 2025).

In order to progressively reduce financial access barriers to health services, many governments implemented a social health insurance scheme. Ghana, as one of the first countries in Sub-Saharan Africa (SSA) to implement a single mandatory insurance scheme, introduced its National Health Insurance Scheme (NHIS) in 2003 (Mills et al., 2012; Nyonator et al., 2014). While the NHIS decreased OOPE substantially (e.g., Aryeetey et al., 2016; Navarrete et al., 2019), evidence indicates persistent challenges. Insured patients continue to incur costs for services and drugs that should be covered, undermining the scheme's intent (Durizzo et al., 2024; Akewongo et al., 2021). Similar findings can also be found for other LMICs, such as Dupas and Jain (2023) for India, and Macha et al. (2012) for Tanzania and South Africa, emphasizing the global relevance of addressing this issue. Especially in Ghana, where NHIS covers over 95% of the disease burden, it is crucial to understand the causes of this unauthorized OOPE and to identify solutions in order to be able to achieve financial health protection.

A critical factor contributing to unauthorized OOPE in LMICs is low health insurance literacy (Durizzo et al., 2024; Dupas and Jain, 2023). The two studies highlight that many insured patients lack a clear understanding of their benefits package, leaving them vulnerable to unauthorized charges ("petty-corruption"), or that they do not benefit from services they could benefit from. Health insurance illiteracy of the patients is a significant issue globally but particularly in LMICs where literacy is already lower and health systems are often poorly resourced and functioning than in high-income countries (HICs) (Macha et al., 2012; Meherali et al., 2020; Jansen et al., 2021; World Bank, 2025). Several studies show that there is a poor understanding of the insured patients of their benefits package and what they are entitled to as clients of the health insurance (e.g., Macha et al, 2012; Jansen et al., 2021; Durizzo et al., 2024). However, there is only little evidence on how to improve the health insurance literacy of patients, especially the most vulnerable ones.

In this study, we explore how information provision to the patients affects OOPE and the mechanisms behind it in the context of primary health care in Ghana. We conduct a randomized controlled trial (RCT) in 41 primary health facilities in southern Ghana, involving 1,807 patients. Participants were randomized to receive either an information message about their NHIS coverage package or a placebo message unrelated to health insurance. Our identification strategy leverages two comparisons: (1)

insured patients with and without the intervention, to assess the direct effect of intervention on OOPE and literacy, and (2) insured versus non-insured patients, as a robustness check to verify that observed effects are not driven by unrelated factors, since OOPE of non-insured should not be affected by the intervention. To understand the mechanics behind the effects, we further explore how the intervention affected health care access and quality outcomes, checking the just mechanically cause of a change in OOPE due to health staff behavior changes.

We first descriptively highlight that insured patients still have to pay for covered health services and drugs besides being insured by NHIS. On average, patients pay 22 Ghanian Shillings (GHS), which is significantly less than non-insured patients with 44 GHS; however, still creates a financial burden that is intended to be removed with the insurance coverage. This amount corresponds to 11%–21% of household income on average, surpassing the WHO-defined threshold for catastrophic health expenditures of 10%. Only 40% of insured patients pay nothing for their visit, as it should be if the provider fully complies to the NHIS coverage package. The magnitude and frequency of this petty corruption are more pronounced in larger facilities, suggesting systemic challenges. Moreover, we descriptively highlight that insured patients overestimate their health insurance literacy and most often do not know what is included or excluded in the health insurance benefit package. Around 80% of the insured patients reported knowing their benefit package, but only about 30% were able to correctly identify the package items.

The results of the information intervention indicate that providing insured patients with information about their NHIS benefits reduces OOPE by 23% (5.50 GHS) and increased health insurance literacy by 14% (9 p.p.), without any decrease in health care quality or access. The reduction in OOPE is largely attributed to a decrease in petty corruption, specifically the top-up payments charged to insured patients for services and drugs covered by NHIS. The channel was to prime patients with the understanding that NHIS covers most primary health care services and it was less important to provide detailed information of the benefit package. The effects are robust across various patient characteristics, suggesting the intervention's broad applicability across patient groups. However, the impact varies significantly by facility size, with larger facilities exhibiting both greater baseline OOPE and stronger reductions following the intervention. These findings underscore the interplay between facility-level incentives and patient behavior in addressing petty corruption. While the intervention successfully primed patients to challenge unauthorized charges, the results also highlight persistent challenges in health facility compliance with NHIS policies. Approximately 65% of insured patients still reported OOPE for covered services, underscoring the need for systemic enforcement alongside patient-focused interventions.

Our contribution to the current literature is threefold. First, we contribute to the literature of OOPE despite the implementation of a health insurance program in Ghana but also more broadly in LMICs.

We provide evidence on how much OOPE occurs during the health service provision and what is due to petty corruption in form of top-up payments. There is anecdotical evidence in the literature that variations in OOPE for insured patients occur due health provider charge unauthorized top-up payments and/or change of health staff behavior in form of quality and availability of services and drugs (e.g., Macha et al, 2012; Duku et al., 2018; Akewongo et al., 2021). Additionally, two studies about NHIS clients in Ghana highlight that patient still pay for covered services, most often for consultation and drugs (Akewongo et al., 2021; Durizzo et al., 2024). However, they were not able to disentangle the reasons for the OOPE. Our findings highlight that OOPE for insured mainly were caused by unauthorized top-up payments - equally for drugs and services but different among the size of the health facility.

Second, only a few studies empirically examine the impact of patients' information on side costs or unfair behaviour in the provision of public service. A study with standardized patients in Uganda tests whether patients' beliefs about diagnosis or information about treatments change vendor behaviour. They show that patient self-diagnosis and information about treatment lowered prices but worsened the correct case management (Fitzpatrick, 2020). Another study shows that patients' signal information about inappropriate antibiotic use reduces over-utilization and drug expenditures and improves information provision to physicians about side effects but has a negative effect on physician-patient interaction (Currie et al., 2014). Recent work from the U.S. focuses on the role of patient information in limiting over-treatment (Radu et al., 2015). The studies highlight that patient information reduces overall costs for the patient; however, it also leads to several adverse effects on health care provision. Our study provides evidence for Ghana and sheds light on a variety of OOPE and other healthcare provision measures. To our knowledge, our study is the first to apply an information experiment to insured and non-insured patients and to test the responsiveness of the interventions with non-insured patients. Additionally, our study provides evidence for real patients receiving the information and not using standardized patients, as done in the studies by Fritzpatrick (2020) and Currie et al. (2014). Thus, we can better understand how the effects will behave in a real-world environment, especially since health literacy responsiveness is a major barrier (Jansen et al., 2021).

Third, there is only one empirical study about insurance literacy in the context of an LMIC, providing evidence of specialized long-term tertiary care in India (Dupas and Jain, 2023). Our results contribute to the findings that providing information is strongly effective, also in the context of low-cost primary health care with patients mostly without chronic diseases are visiting. Furthermore, we can show that even within public health facilities, there is a heterogeneity in the effect among health facility types, with patients in hospitals revealing much stronger effects.

Fourth, to our knowledge, there is no empirical study about which messages improve insurance literacy in the context of an LMIC. A few studies about health literacy empirically test the effect of

information provision about general health issues in the context of an LMIC (Meherali et al., 2020). The studies highlight multiple effective ways to deliver health-related awareness and information. Health education materials in the waiting rooms, such as brochures, seem less effective, whereas verbal and visual information provision seems most effective (Meherali et al., 2020; Jansen et al., 2021). A study from Mongolia distributed maternal and child health handbooks to mothers; however, the intervention only led to a significant improvement for literate mothers (Hikita et al., 2018). Another study from India finds that verbal instructions and pictograms, which they gave the patients to take home, improved the patients' knowledge significantly (Braich et al., 2011). Our study provides insights on effective channels to improve health insurance literacy, more specifically knowledge about the health insurance scheme and its benefits. Since a common channel used by NHIS is to provide patients with an NHIS membership handbook, we provide evidence of the effectiveness of such an intervention. However, it also highlights that the handbook did not lead to an additional effect. Lastly, we also highlight the difficulty of improving health insurance literacy, even in the short term and on a shallow level, emphasizing the great need for further studies.

2. Study Context, Design, Sample and Intervention

2.1 The National Health Insurance Scheme in Ghana

After decades of health sector reforms aiming to expand social health protection, Ghana introduced in 2003, as one of the first countries in Sub-Saharan Africa (SSA), a single mandatory National Health Insurance Scheme (NHIS) (Mills et al., 2012; Amu et al., 2018). The NHIS mandate was to enroll every Ghanaian as a member of the scheme within five years (Agyepong et al., 2008) and to progressively reduce geographic and economic access barriers to health services (Nyonator et al., 2014).

Twenty years after the introduction of NHIS, around 70% of the entire population in Ghana is covered by a health insurance (Census, 2021). Formal sector employees and self-employed who contribute to the Social Security and National Insurance Trust (SSNIT) are automatically enrolled in the scheme. People working in the informal sector need to register at an NHIS district office when they first subscribe to the scheme. NHIS subscribers have to renew their annual membership and pay a premium of around 7.20 GHS to 48 GHS a year, depending on their socio-economic characteristics. There is also an exempted group, such as children and pregnant women, who do not pay any premium fees. With the NHIS membership, over 95% of all disease conditions are covered, particularly general outpatient and in-patient care, normal and assisted maternity care, oral health, eye care, diagnostic tests, generic medicines, and emergency care. An exclusion list defined by NHIS indicates each health care services that is not covered. This includes for example appliances and prosthesis such as optical aids, hearing aids, orthopedic aids and dentures, or drugs that are not on the NHIS Medicines List (full list see Table A.1 in the Appendix). In our context, all provided services and drugs were covered by the health

insurance scheme. Covered health care services can be obtained at any NHIS accredited health facility for free. Most health facilities are NHIS accredited, including public and private health facilities as well as from Community-based Health Planning and Services (CHPS) to tertiary hospitals. All health facilities have to provide the service to the insured patients for free and get reimbursed from the health insurance after submitting the claims. (NHIS, 2022)

From 2003 to 2019, out-of-pocket expenditures (OOPE) as a percentage of the current health expenditures decreased in Ghana from 51% to 36% (World Bank, 2025). Indeed, most recent studies for Ghana showed that health insurance enrollment significantly reduced OOPE (by 86%, Aryeetey et al., 2016), protected households against catastrophic expenditures (by 7%, Navarrete et al., 2019), improved health care utilization (by 15%, Navarrete et al., 2019) as well as increased some health outcomes, for example prenatal care (Abrokwah et al., 2014; Mensah et al., 2010). However, studies for Ghana, based on patient surveys, show that the insured population still pays for services and drugs (Kusi et al., 2015; Akewongo et al., 2021). Since over 95% of all disease conditions are covered by the NHIS, it seems puzzling that the insured still have to pay on average more than 17% of their average income for health care costs (Akewongo et al., 2021).

2.2 Sampling and sample description

In our study, we implemented an information provision experiment with a random sample of patients visiting primary health facilities in eight districts[1] from three regions in the South of Ghana (Central Region, Eastern Region, Greater Accra Region; see Figure A.1 in the Appendix). Within a district, all primary health facilities were included, except those with a patient attendance number of below five patients a day (in total excluded seven CHPS facilities in sample due to low attendance rates). Within each health facility, only patients receiving out-patient services were included, patients above 18 years of age or if they were accompanied by an adult caretaker, and patients that have not visited a health facility during the experiment. Therefore, the sample is representative for all out-patient patients and health facilities at the primary health care level in the given districts. Table A.2 in the Appendix shows that the sample includes 2,284 patients in 41 health facilities. The majority of the health facilities are small health facilities, including CHPS facilities and health centers. Similar than the national average, the share of NHIS insured patients in the sample is 81% (Census, 2021).

Twenty-two enumerators conducted the experiment; all were trained by two of the co-authors and all participated in a pilot the week before the experiment. The experiment took place from the 10th October to 5th of November 2022. In each health facility, two enumerators conducted the experiment: one enumerator was located at the entrance of the health facility to give an information treatment to each patient before entering, and one enumerator at the exit of the health facility to conduct a patient exit

[1] In Central Region: Gomoa West and Twifo-Ati-Mokwa; in Central Region: Akwapim South, Asuogyaman, Upper Manya-Brobo; in Greater Accra Region: Ada West, Ga West, Shai-Osudoku.

survey. To avoid an enumerator bias, the enumerators rotated every half day their position. To avoid a selection bias of the patients at the exit, the enumerators followed the rule that after finishing an interview the next patient who exited the health facility was surveyed. It was possible to survey around 99% of all entering patients at the exit. Previous to the experiment, the enumerators conducted in April/May 2022 a baseline survey of patients and health staff to understand patients' socio-demographics, choice of health facility, health services, health care insurance, satisfaction, and knowledge about NHIS, health facility' administrative characteristics, NHIS reimbursement process, financial situation, as well as health staffs' satisfaction and knowledge about NHIS (see Durizzo et al., 2024). Our final sample represents the primary health care level provision experienced by rural or semi-urban households living within a 200 km radius from the capital city in Ghana, Accra (up to about a four-hour drive by car).

For this experiment, we obtained ethical approval from the University of Ghana (ECH 091/20-21). The information treatment took on average 5 minutes and is explained in detail in Section 2.3. The patient exit questionnaire contained questions on patients' socio-demographics, health care insurance, received health services and drugs, health care satisfaction, and knowledge about NHIS and took about 14 minutes (the questionnaire is available upon request).

Table A.3 in the Appendix provides details of patients' characteristics. Most of the patients are female (71%), with no or secondary level education (41% and 40%, respectively). Out of the females, about one third are pregnant. Since we chose the districts based on middle- and high-poverty incidences, it is not surprising that households, on average, indicated a household income per month of 501-1000 GHS (66-130 USD). Most of the surveyed people are either self-employed (32%) or are not participating in the labor market, e.g., retired persons or homemakers (52%). The average age of the patient is 27 years. Since 31% of the patients are children and were represented by an adult respondent, the age of the respondent is older, on average 38 years. In a short calculation and reading exercise, 62% of the sample demonstrated that they cannot calculate easy calculations (plus, minus, division, multiplication) and 52% cannot read and understand a three-sentence text about the health insurance scheme.

2.3 Intervention and balance table

In a first step, all patients arriving at the health facility were randomly assigned to one control message and four treatment messages. The randomization was not done on the individual level due to concerns about spillover effects within a health facility. The randomization was done by weekday. Therefore, the enumerators stayed five days in a health facility, informing the patients each day with one of the messages (e.g., Monday all patients received control message, Tuesday all patients received the general message, …). To avoid a specific weekday bias, the order of the messages was changed (e.g., in one health facility the control message is on Monday, in another one it is on Tuesday, …). As a robustness

test, we do control if the order of the messages or the weekday has impacted the outcomes; however, we do not find any significant effects (Appendix Tables A.10 and A.11).

In the control group, patients were given a short information about a non-health insurance related topic (detailed message can be found in Appendix Table A.4). As a treatment, patients received either a general information about the NHIS package, with and without the NHIS health insurance booklet, or a specific information about the NHIS package based on their health issue, with and without the NHIS membership booklet[2] (detailed messages can be found in Appendix Table A.4). Each treatment is given to around 380 patients. An exception is the general information that was given only to 264 patients because the treatment arm was not in place in the first of the four weeks (although in the first week of the survey this treatment arm was not given, all results are also robust without the first week of the survey). Table A.3 displays the covariates of all socio-demographic characteristics gathered in the survey for all treatments. To verify the randomization of the patients, we report the mean values for all covariates for each treatment and the p-value testing for equality of means across the control and each treatment arm. We obtain balance across covariates.

3. Empirical Strategy

The key outcomes of interest are OOPE, health insurance literacy, and health care quality and access measures.

We measure OOPE by asking the patients to list all services and/or drugs they received as well as what they reported to have paid for them. We measure the three primary outcomes: total costs of services, total costs of drugs, and total costs of services and drugs (all measured in Ghanaian Shilling (GHS), GHS 1 = US$ 0.07). In some cases, patients did not know or could not remember how much they paid for service and drug items separately, thus, the outcome total costs can have a higher number of observations than the sum of the total costs of services and drugs. Figure A.2 in the Appendix highlights that for most of the values, we do have a perfect 45° line, meaning that the summed up total costs for services and drugs are equal to the total costs of services and drugs. To distinguish if changes in OOPE arise due to more services and drugs given out for free, as the entitlements would require, we additionally create the binary variables of the three outcomes indicating if the likelihood that service or drug was not free.

To understand how our information treatment has affected health insurance literacy, we measure two outcomes – one more general one about what patient think they know (Patient-reported knowledge) and one measuring what they really know what is excluded in their benefit package (Exclusion list knowledge). Patient reported knowledge is classified binary, measuring if patients belief that they know

[2] The NHIS membership booklet is an official Din-A5 handbook that is a guide to register and accessing NHIS benefits. Normally it is distributed by the NHIS when the patients enrolls. We only distributed an extract of eight of the total 72 pages, covering the NHIS Benefits Package and the NHIS Exclusion List. Nevertheless, from the outside the booklet looked the same as the original.

what is covered by the health insurance benefit package (0 if patient said he does not know what is covered). Exclusion list knowledge is classified binary, measuring if patient can correctly answer the question "what services are not covered by NHIS?" (1 if patient mentions at least one item from the exclusion list).

To understand potential channels of OOPE variations and to verify that unauthorized top-up payments drive the results, we have to control that OOPE not just mechanically decreased because access or quality measures decreased. As the literature discusses, some providers do not provide all drugs and services if it is not financially sustainable. Therefore, we measure access by the two outcomes: patient did not receive some services (binary) and patient did not receive some drugs and got a prescription (binary). The quality of service we capture with two patient satisfaction outcomes[3]: satisfaction of availability of services and satisfaction of availability of drugs. Both satisfaction outcomes are measured on a 5-point scale from strongly not satisfied - very satisfied. For each question, a numerical variable from 1-5 was created (1 indicating the lowest satisfaction).

For each of the numerical or binary outcomes described above, we formally estimate the following OLS regression model:

$$Y_i = \beta_0 + \beta_1 * Treatment_i + \varepsilon_i$$

Where Y_i represents the outcome for patient i and $Treatment_i$ (binary for pooled treatment arms) with the control group as a reference group[4]. For the tables we use regional cluster robust standard errors. To be able to distinguish across insured patients and non-insured patients we create for the analysis a subsample of insured vs. non-insured patients.

To further explore heterogenous effects of patient and health facility characteristics, we run equation the with patient or health facility characteristic variables (C) and the interaction term of the treatment and characteristics variable.

$$Y_i = \beta_0 + \beta_1 * Treatment_i + \beta_2 * C_i + \beta_3 C_i * Treatment_i + \varepsilon_i$$

We conducted several robustness checks. First, since we estimate a linear probability model for our binary outcomes to interpret the coefficients easily, we also run a logistic regression model as a robustness check. However, our results do not change. Second, because the treatment arm "general information" was not given in the first of four weeks of data collection (see Section 2.2), we tested all the results again with a sample excluding the first week. Nevertheless, our results stay robust. Lastly, there could be the potential spillover effect that health staff change their behavior over the time of the week when the survey takes place. However, given that we randomize treatment status within health

[3] We also asked patients about their satisfaction about registration process or waiting time, however, they led to the same results.
[4] In Table A.6 we also show the four treatment arms separately, but since they do not differ from each other we continue to estimated them in a pooled model.

facilities each day of the week but also randomize the order of the treatment and control days (see Section 2.2) this is not the case in our research design. Table A.10 and A.11 formally test for this by comparing OOPE on Monday vs. the other days of the week as well as OOPE if the control group is before the treatments vs. after the treatments. In both cases, the difference is not statistically significant.

4. Results

4.1 Low health insurance literacy and high out-of-pocket expenditures (OOPE)

Table 1 presents a descriptive analysis of the key outcomes for health insurance literacy of patients and OOPE in the absence of the information treatment, disaggregated by the size of the health facility.

Panel A of Table 1 reveals that while 80% of insured patients claim to be knowledgeable about the National Health Insurance Scheme (NHIS) coverage, only 30% can accurately identify the specific items covered. Of the 15 items listed on the NHIS exclusion list (see Table A1 in the Appendix), insured patients, on average, correctly identify only 1.2 items. The most commonly recognized exclusions are *Medicine not on the NHIS Medicines List* (30%), *Dialysis for chronic kidney failure* (18%), *Heart and brain surgery* (12%), and *Optical aids* (11%). Non-insured patients exhibit similarly low levels of health insurance literacy, albeit slightly lower than insured patients, as expected given their lack of direct engagement with the NHIS (Panel B, Table 1).

Despite the NHIS's extensive coverage of nearly all health services (95% of all disease conditions), particularly including all primary care services which are provided to the patients in our sample, OOPE remains substantial. Non-insured patients report twice the OOPE per visit compared to insured patients (44.30 GHS vs. 22.40 GHS, see Panels A and B). However, the OOPE burden for insured households is still significant, amounting to 11%–21% of household income on average, surpassing the WHO-defined threshold for catastrophic health expenditures (10% of household income). Drugs constitute a larger proportion of OOPE than services for both insured and non-insured patients. Alarmingly, only 40% of insured patients report incurring no costs per visit, as stipulated by NHIS policy if the provider fully complies to the NHIS coverage package. The total OOPE for drugs are higher than for services for insured and non-insured patients. The likelihood that an insured patient pays nothing is similar for services and drugs, indicating that petty corruption equally to both, services and drugs, with a disproportionately higher financial impact for drugs.

We do find that OOPE significantly differs by health facility size, however, health insurance literacy of patients stays constant by health facility size. This holds for insured as well as non-insured patients (Panels A and B, Table 1). In larger facilities, such as district hospitals and polyclinics, insured patients incur an average OOPE of 46.00 GHS per visit, compared to 15.10 GHS in smaller facilities. For non-

insured patients, these figures rise to 84.30 GHS and 38.20 GHS, respectively, highlighting that larger facilities on average provide more expensive services and drugs.

Table 1: Summary status of key OOPE and health insurance literacy outcomes

	Total		Small- and middle-size health facilities		Large-size health facilities		SMZ = LZ
	Mean	SD	Mean	SD	Mean	SD	p-value
Panel A: Insured patients (only control group) at intervention survey							
Health Insurance Literacy							
Patient-reported knowledge of coverage (binary)	0.8	0.4	0.7	0.4	0.8	0.4	0.05
Measured coverage knowledge (binary)	0.3	0.4	0.3	0.4	0.2	0.4	0.49
Knows items on exclusion list (numerical)	1.2	1.3	1.2	1.4	1.3	1.2	0.26
OOPE							
Costs services (in GHS)	10.5	18.0	7.1	12.1	21.7	27.5	0.00
Costs drugs (in GHS)	14.7	29.3	10.2	20.8	28.0	43.4	0.00
Total costs (in GHS)	22.4	35.1	15.1	23.3	46.0	52.8	0.00
Any costs services (binary)	0.5	0.5	0.4	0.5	0.7	0.5	0.00
Any costs drugs (binary)	0.5	0.5	0.4	0.5	0.7	0.5	0.00
Any total costs (binary)	0.6	0.5	0.6	0.5	0.9	0.4	0.00
Observations	457		351		106		
Panel B: Non-insured patients (only control group) at intervention survey							
Health Insurance Literacy							
Patient-reported knowledge of coverage (binary)	0.6	0.5	0.6	0.5	0.6	0.5	0.05
Measured coverage knowledge (binary)	0.1	0.4	0.1	0.3	0.2	0.4	0.98
Knows items on exclusion list (numerical)	1.0	1.2	1.0	1.2	1.2	1.3	0.14
OOPE							
Costs services (in GHS)	19.3	27.0	16.4	24.6	38.1	35.1	0.00
Costs drugs (in GHS)	38.1	32.7	36.1	30.6	46.3	40.3	0.00
Total costs (in GHS)	44.3	48.7	38.2	44.6	84.3	56.8	0.00
Any costs services (binary)	0.7	0.5	0.6	0.5	0.8	0.4	0.00
Any costs drugs (binary)	0.8	0.4	0.8	0.4	0.9	0.3	0.00
Any total costs (binary)	0.8	0.4	0.7	0.4	0.9	0.3	0.00
Observations	130		112		18		
Panel C: Health facility characteristics at pre-survey							
Number of patients	58.7	161.8	18.9	9.9	240.4	344.0	0.00
Measured coverage knowledge (binary)	0.3	0.5	0.4	0.5	0.3	0.5	0.74
Claim decline rate	10.2	10.7	10.5	11.2	8.6	8.7	0.67
Observations	41		34		7		
Panel D: Insured patients at pre-survey							
Health Insurance Literacy							
Measured coverage knowledge (binary)	0.1	0.4	0.2	0.4	0.1	0.3	0.02
OOPE							
Costs services (in GHS)	10.6	30.8	9.2	19.6	16.3	55.4	0.00
Costs drugs (in GHS)	12.1	21.7	10.6	19.8	18.0	26.8	0.00
Total costs (in GHS)	20.6	39.5	17.7	29.0	31.4	64.6	0.00
Observations	1965		1559		406		
Panel E: Non-insured at pre-survey							
Health Insurance Literacy							
Measured coverage knowledge (binary)	0.1	0.3	0.1	0.3	0.1	0.3	0.03
OOPE							
Costs services (in GHS)	24.7	31.4	20.5	20.0	46.6	59.5	0.00
Costs drugs (in GHS)	32.8	27.5	31.4	27.6	40.2	26.2	0.00
Total costs (in GHS)	51.4	47.0	46.0	37.5	79.3	74.8	0.00
Observations	171		144		27		

Notes: Table shows descriptive statistics of key OOPE and health insurance literacy outcomes. Panel A and B consist of all insured and non-insured patients in the control group of the intervention survey conducted in October-November 2022. Panel C consists of all health facilities characteristics in the baseline survey conducted in April 2022. Panel D and E consists of all insured and non-insured patients in baseline survey conducted in April 2022. Patient-reported knowledge of coverage is a dummy based on question "What services are not covered by NHIS? (binary, 0= does not know). Measured coverage knowledge is based on question "How many disease conditions does the benefit package of NHIS approximately cover?" (binary, 1= correct answer). Knows items on exclusion list is based on question "What services are not covered by NHIS? (numerical, 0 - 15= number of items mentioned from the exclusion list correctly). Small- and middle-sized health facilities consist of Community-Health Based Facilities and health centers. Large-sized health facilities consist of district hospitals and polyclinics. P-value tests if the distribution of small- and middle-sized health facilities is equal to large-sized health facilities.

Panel C in Table 1 summarizes facility characteristics based on a pre-study conducted six months prior to the intervention (see Section 2.2). On average, health facilities have 59 patients per day for out-patient visits. Large facilities handle significantly higher outpatient volumes (240 patients per day) compared to small and medium facilities (19 patients per day). Based a health facility staff pre-survey, we find that the health staff demonstrated similarly low health insurance literacy as patients in the intervention study, with only 30% of facilities having staff able to accurately describe NHIS coverage package. Additionally, facilities reported that approximately 10% of claims are rejected by the NHIA, leading to increased administrative workloads and financial strain. Although small and medium facilities exhibit marginally better staff literacy and higher claim rejection rates, these differences are not statistically significant.

Panels D and E of Table 1 show pre-study health insurance literacy and OOPE trends. In April 2022, insured patients reported average OOPE of 20.60 GHS, while non-insured patients reported 51.00 GHS. Adjusting for patient characteristics and health issues confirms no statistically significant temporal differences, highlighting that the characteristics follow a similar pattern than for the intervention study (see Table A5).

This first descriptive analysis shows that patients have a low health insurance literacy and still pay OOPE for covered services and drugs. We demonstrate that the issue of petty-corruption in health facilities is not a seasonal problem but seems to be constant over the year. The magnitude and frequency of petty-corruption are more pronounced in larger facilities.

4.2 Effects of the information intervention on OOPE and health insurance literacy

Table 2 presents the effect of the pooled information intervention on OOPE and health insurance literacy outcome variables. We will use the non-insured patients as a robustness check.

Panel A of Table 2 demonstrates that insured patients who received information about their NHIS benefit package experienced a significant reduction in OOPE alongside improved health insurance literacy. On average, treated patients incurred 23% lower total costs per visit (-5.50 GHS) compared to the control group receiving a placebo message (column 3). The reduction was more pronounced for drug costs, which declined by 26% (-3.87 GHS), compared to service costs, which fell by 21% (-2.19 GHS) (columns 1 and 2). Treated patients also reported greater confidence in their health insurance literacy, with a 7% (5 p.p.) increase in their self-reported understanding of the coverage package (column 4). Moreover, they were more likely to correctly identify at least one exclusion from the NHIS list, with a 14% (9 p.p.) increase in accuracy (column 5).

Panel B of Table 2 evaluates the robustness of these findings by examining the effects on non-insured patients, who are expected to experience no changes in OOPE given they must pay for services and

drugs regardless of the intervention. As expected, there were no significant effects on OOPE for non-insured patients, who continued to pay approximately 50 GHS per visit across all treatment groups (columns 1–3). However, the null effects are not because they have not paid attention to the intervention. We see that the intervention did lead to substantial improvements in health insurance literacy also among non-insured patients. Their self-reported knowledge of the NHIS coverage package increased by 19% (12 p.p.), and their ability to correctly identify at least one exclusion from the NHIS list rose by 24% (13 p.p.) (columns 4 and 5). Despite these gains, non-insured patients' overall health insurance literacy remained lower than that of insured patients post-intervention.

Table 2: Average effects of treatment on OOPE and health insurance literacy outcomes, pooled treatment

	OOPE			Health insurance literacy	
	Costs services (in GHS)	Costs drugs (in GHS)	Total costs (in GHS)	Patient-reported Knowledge (binary)	Exclusion list knowledge (binary)
	(1)	(2)	(3)	(4)	(5)
Panel A: NHIS insured patients					
Information treatment					
(ref. control message)	-2.19**	-3.87**	-5.50***	0.05**	0.09***
	(0.94)	(1.61)	(1.78)	(0.02)	(0.03)
Constant	10.48***	14.70***	22.36***	0.76***	0.65***
	(0.85)	(1.53)	(1.66)	(0.02)	(0.02)
Observations	1,914	1,532	1,921	1,953	1,953
R^2	0.003	0.01	0.01	0.003	0.01
Control mean	10.48	14.70	23.92	0.76	0.65
Panel B: Non-NHIS insured patients					
Information treatment					
(ref. control message)	3.9	0.8	3.25	0.12**	0.13***
	(2.99)	(4.43)	(5.32)	(0.05)	(0.05)
Constant	19.26***	38.14***	44.27***	0.62***	0.55***
	(2.44)	(3.65)	(4.4)	(0.04)	(0.04)
Observations	405	268	414	443	443
R^2	0.004	0.0001	0.001	0.01	0.02
Control mean	19.26	38.14	50.19	0.62	0.55

Note: Table shows OLS regression results measuring the effect of the information treatment on OOPE and health insurance literacy. Regression consists of a pooled information treatment variable, the separate effects for each information message can be found in Table A2 in the Appendix. Regional cluster robust standard errors are shown in parentheses. Significance levels: * p<0.1, ** p<0.05, *** p<0.01. Panel A consists of all NHIS insured patients and Panel B of all non-NHIS insured patients. Patient-reported knowledge is a dummy variable based on question "What services are not covered by NHIS? (1= if patient says they knows). Exclusion list knowledge is based on question "What services are not covered by NHIS? (for binary 1= if patient mentions at least one item from the exclusion list correctly; for numerical = number of correct items (out of 15) on exclusion list).

Appendix Table A6 details the average treatment effects across the four distinct intervention arms: (i) a general message about the NHIS benefit package, (ii) a general message accompanied by an NHIS handbook, (iii) a specific message tailored to the patient's health issue, and (iv) a specific message with an NHIS handbook (detailed messages see Table A4). For insured patients, the results confirm the robustness of the pooled treatment effects (Panel A, Table A6). There is no significant difference across the treatment arms for insured patients for OOPE and health insurance literacy outcomes, except of the knowledge about the exclusion list. As expected, patients in the specific-message treatment arm, which did not include information about the exclusion list, showed no significant improvement in their knowledge of these items. These findings suggest that the observed OOPE reductions were primarily driven by the introductory message emphasizing that the NHIS covers nearly all primary health care

services and drugs[5], rather than the detailed information provided about the benefits package. Notably, the distribution of the NHIS handbook did not yield additional benefits.

In contrast, for non-insured patients (Panel B, Table A6), improvements in health insurance literacy were primarily driven by interventions that included also the NHIS handbook. A plausible explanation is that non-insured patients were less attentive to verbal explanations from enumerators before entering the health facility but later engaged with the booklet while waiting. Given that both insured and non-insured patients in the sample exhibited similar levels of baseline literacy, differences in the ability to read the booklet can be ruled out as a driver of these effects.

These findings suggest that while the information intervention was effective in enhancing health insurance literacy, its impact on reducing OOPE—particularly the influence on petty-corruption—was largely attributable to priming patients with the understanding that NHIS covers most primary health care services. The detailed benefit package information and the inclusion of the NHIS handbook did not significantly enhance these effects.

4.3 Effects of the information intervention on access, quality, and top-up payments

To determine whether the observed reduction in OOPE for insured patients was driven by changes in health staff behavior—such as reduced access or compromised quality of care—we analyzed self-reported measures of access and quality. Table 3, Panel A, shows that the information intervention had no significant effect on these measures for insured patients. Similarly, Panel B reports no significant effects on the access or quality of care for non-insured patients who received the same daily messages as insured patients. These findings confirm the robustness of the results and suggest that health staff behavior in service provision remained unchanged.

To further explore the mechanism underlying the decrease in OOPE, we examined whether the reduction was due to insured patients paying less frequently or paying lower amounts with the same frequency. Table A7 analyzes the effect of the intervention on the frequency of petty-corruption, measured as the likelihood of any OOPE for covered services and drugs. The results indicate that the information intervention did not significantly impact the frequency with which insured patients incurred OOPE. Instead, the reduction in OOPE was driven by a decrease in the amount paid per transaction, with the frequency of payments remaining unchanged compared to the control group. This suggests that the intervention reduced petty-corruption in the form of top-up payments demanded by health facilities.

[5] Introduction message "Please, did you know that the NHIS covers almost all of services and drugs in NHIS accredited health facilities? This includes all consultation fees, laboratory tests and all drugs on the NHIS medicine list. Only a few services and drugs are excluded and you have to pay for."

Despite the reduction, the prevalence of petty-corruption remains high: 65% of insured patients continued to report OOPE for covered services and drugs. This highlights a persistent lack of compliance among health facilities with the NHIS benefit package policy.

The findings confirm that the observed reduction in OOPE was not associated with decreased access to services, reduced quality of care, or changes in health staff selling behavior. Instead, the reduction was attributable to a decrease in petty-corruption, specifically the top-up payments charged to insured patients for services and drugs already covered under the NHIS. These results emphasize the persistent challenges in enforcing compliance with the NHIS policy.

Table 3: Average effects of treatment on access and quality of health care

	Access		Quality	
	Any service was not available	Any drug was not available and patient received prescription	Satisfaction available services	Satisfaction available drugs
	(1)	(2)	(3)	(4)
Panel A: NHIS insured patients				
Information treatment (ref. control message)	0.0004	-0.02	0.01	0.03
	(0.01)	(0.02)	(0.03)	(0.04)
Constant	0.02***	0.26***	4.45***	4.38***
	(0.01)	(0.02)	(0.03)	(0.03)
Observations	1,953	1,953	1,953	1,952
R^2	0.001	0.001	0.001	0.0005
Control mean	0.02	0.26	4.4	4.4
Panel B: Non-NHIS insured patients				
Information treatment (ref. control message)	-0.03	-0.03	-0.02	0.03
	(0.02)	(0.04)	(0.06)	(0.08)
Constant	0.04**	0.24***	4.45***	4.37***
	(0.02)	(0.04)	(0.05)	(0.07)
Observations	443	443	443	443
R^2	0.01	0.001	0.0003	0.0004
Control mean	0.04	0.24	4.5	4.4

Notes: Table shows OLS regression results measuring the effect of the information treatment on the access and quality of health care. Outcomes refer to the questions: "Have you received a prescription to get a drug elsewhere? (binary)", "Were there any services you wanted to receive, but they were not available in this health facility? (binary)", "How satisfied are you with the following parts of your experience at this health facility?": "Availability of service(s) (scale 1-5)", "Availability of drug(s) (scale 1-5)". Regional cluster robust standard errors are shown in parentheses. Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

4.4 Heterogenous effects by patient and health facility characteristics

This section examines the heterogeneity in the impact of the information intervention on OOPE across patient and health facility characteristics.

The hypothesis was that vulnerable population groups—such as individuals with lower education levels, mothers, and children—might be less able to leverage the provided information effectively. As shown in Table A.8, no significant heterogeneous effects were observed across patient characteristics, including mathematical literacy, maternal and child health services utilization, household income, health expenditures, or frequency of health visits in recent months. These findings suggest that the

intervention's priming effect on insured patients was uniformly effective, reducing petty-corruption in the form of top-up payments regardless of individual patient characteristics.

Similarly, Table 5 demonstrates no heterogeneity in treatment effects based on health facility characteristics, such as the health staff's knowledge of the NHIS benefit package or the facility's claim rejection rate by the National Health Insurance Agency (NHIA). The hypothesis that financial pressure—arising from a limited understanding of health insurance packages or challenges with claims processing—might influence the extent of petty-corruption was not supported by the data. The reduction in OOPE was consistent across facilities regardless of these factors.

Table 4: Total costs of OOPE of insured patient heterogenous effects by health facility characteristics

	(1)	(2)	(3)	(4)
Information treatment				
(ref. control message)	-6.60**	-6.01*	-4.71**	-2.86**
	(2.64)	(3.4)	(1.9)	(1.38)
Health insurance literacy health staff				
(ref. low health insurance literacy)	-9.41***			
	(3.26)			
Treatment * health insurance literacy health staff	1.18			
	(3.48)			
Claim decline rate				
(ref. low claim decline rate)		-0.32		
		(0.28)		
Treatment * claim decline rate		-0.001		
		(0.29)		
Number of patients				
			0.06***	
			(0.01)	
Treatment * number of patients			-0.03**	
			(0.01)	
Large-sized health facility				
(ref. small- and middle-sized)				30.91***
				(5.28)
Treatment * large-sized health facility				-11.33**
				(5.61)
Constant	26.10***	25.76***	20.28***	15.13***
	(2.48)	(3.21)	(1.78)	(1.25)
Observations	1,821	1,785	1,710	1,921
R^2	0.03	0.01	0.05	0.13

Note: Table shows OLS regression results measuring the heterogenous effects of the information intervention on total costs for OOPE for insured patients in Ghanian Shilling (GHS). Regional cluster robust standard errors are shown in parentheses. Significance levels: + p<0.1, * p<0.05, ** p<0.01, *** p<0.001. Health insurance literacy health staff is based on question to the health facility "How many disease conditions does the benefit package of NHIS approximately cover?" (binary, 1= correct answer). High claim decline rate rate is based on question to the health facility: "What percentage of claims you have to correct/ are not approved by NHIS after you handed them in?" (low = <10%; high = >10%). Small- and middle-sized health facilities consist of Community-Health Based Facilities and health centers. Large-sized health facilities consist of district hospitals and polyclinics.

Significant heterogeneity was, however, observed based on health facility size (Table 5, columns 3 and 4). Patients in larger facilities, such as district hospitals and polyclinics (serving an average of 240 patients per day), incurred significantly higher baseline OOPE (31 GHS, 130%) compared to those in smaller and medium-sized facilities, such as community health centers (serving an average of 19 patients per day). Despite this higher baseline, the reduction in OOPE due to the information intervention was also greater in larger facilities, with a significant average decrease of 11 GHS (46%).

The larger reduction in OOPE for patients in large facilities was not solely attributable to a decrease in petty-corruption in the form of top-up payments. As detailed in Table A.9, the intervention also led

to changes in drug provision. In large facilities, the likelihood of receiving prescribed drugs increased by 46% (12 percentage points), while patient satisfaction with drug quality decreased by 7% (0.25 points). These effects were not observed in small- and medium-sized facilities, where the intervention had no measurable impact on access to or quality of drugs (Table A.9, columns 2 and 4).

These results suggest that priming patients in larger facilities not only reduced petty corruption through fewer top-up payments but also led to changes in drug provision. Health staff in larger facilities appear to operate under different organizational structures and incentives than those in smaller facilities. This dynamic may explain why, despite a general reduction in petty corruption, staff in larger facilities adjusted drug provision practices, potentially limiting access and quality for insured patients who voiced concerns after being primed by the intervention.

5. Discussion & Conclusion

Despite progress over the last decade, impoverishing out-of-pocket health expenditures (OOPE) remain burdensome in low-and middle-income countries (World Bank, 2025). While national health insurance schemes aim to promote financial protection and access to health care, challenges such as unauthorized provider fees in many LMICs (e.g., in India (Dupas et Jain, 2023), in Tanzania and South Africa (Macha et al.,2012), in Brazil (Santos and Giovanella, 2014). Additionally, low health insurance literacy of the patients is a significant issue globally but particularly in LMICs where literacy is already lower, causing that patients are not aware of their health insurance benefits (e.g., Dupas and Jain, 2023; Durizzo et al., 2024, Jansen et al., 2021).

This study explores how providing patients with information about their health insurance benefits affects OOPE and the underlying mechanisms shaping patient behavior and health facility dynamics in the context of primary health care in Ghana. We first descriptively highlight that insured patients still have to pay for health services and drugs besides being insured by NHIS. In our context, this is not an issue of patient reimbursement behavior and administrative costs as in other health insurance schemes, as often seen in HICs (Rowan et al., 2013) because health facilities have to provide the services and drugs for free and then get reimbursed form the health insurance. Also, in our context, the OOPE do not include bribing, as it is known to be relevant in many counties (Hunt, 2010), because we collected information for each service and drug item. OOPE are due to petty-corruption of the health facility. On average, patients pay 22 Ghanian Shillings (GHS), which is significantly less than non-insured patients with 44 GHS; however, it still creates a financial burden that is intended to be removed with the insurance coverage, corresponding to corresponds to 11%–21% of household income. The numbers are comparable with other studies in Ghana (Akewongo et al., 2021; Dalinjong et al., 2018; Abuosi et al., 2015). As Akewongo et al. (2021) point out in their cross-sectional study in the Northern, Central, and Ashanti Region in Ghana, substantial differences exist in the magnitude and the types of paid services across regions.

Moreover, we descriptively highlight that insured patients overestimate their health insurance literacy and most often do not know what is included or excluded in the health insurance benefit package. Around 80% of the insured patients reported knowing their benefit package, but only about 30% were able to correctly identify the package. To our knowledge, we are the first study providing evidence for an LMIC context on the discrepancy between reported health insurance literacy and measured health insurance literacy, emphasizing the complexity of capturing health insurance literacy. As discussed in several studies in HICs, low health insurance literacy is associated with delay and avoidance of preventive and non-preventive services (e.g., Tipirneni et al., 2018; Benedetti et al., 2008; Morgan et al., 2008). Understanding this relationship in LMICs is critical for designing effective interventions to enhance healthcare decision-making.

We experimentally test with a randomized controlled trial (RCT) in 41 primary health facilities in the South of Ghana if patients receiving an information treatment about their health insurance benefit package before entering the health facility experience a change in OOPE and health insurance literacy measures, without a decrease in health care quality and access. Our results of the patient exit survey, immediately after the patient received their services at the health facility, show that the provision of information about patients' benefits packages decreased OOPE by 23% (5.50 GHS) compared to the control group receiving a placebo message about a non-health related information. The effect was more pronounced for drug costs (26%) than services (21%). However, the intervention did not alter the likelihood of incurring any OOPE. These results are in line with the findings from an information intervention study of dialysis patients in India, where they found that public sector patients had a 35% decline in OOPE, also with no decrease in the likelihood of paying any OOPE (Dupas et Jain, 2023). Our study extends this evidence by demonstrating that such interventions are also effective in one-time primary care visits in Ghanaian public hospitals. However, since 65% of treated insured patients still reported paying for covered services, our findings highlight that information alone cannot fully address petty-corruption in healthcare. There is a need for systemic enforcement alongside patient-focused interventions.

We find no significant differences in OOPE reduction across the four distinct intervention arms: (i) a general message about the NHIS benefit package, (ii) a general message accompanied by an NHIS handbook, (iii) a specific message tailored to the patient's health issue, and (iv) a specific message with an NHIS handbook. This suggests that the effectiveness of the intervention was driven by priming patients rather than the specific mode of information delivery (verbal vs. verbal and visual, general vs. specific). In contrast to literature about general health education, we do not find that information treatments with a visual component (such as booklet) were most effective (Meherali et al., 2020; Jansen et al., 2021). Nor do we find that literacy levels significantly influenced the intervention's impact (Hikita et al., 2018). This implies that distributing informational booklets—NHIS's current approach

to educating beneficiaries—may not be the most effective strategy. Given the pressing need to improve health insurance literacy, future research should explore alternative information dissemination methods in LMIC contexts.

The intervention increased health insurance literacy by 14% (9 percentage points), however still remains low. Prior studies in India have shown that even repeated information interventions had only a modest effect on self-reported awareness (Dupas and Jain, 2023). Research from HICs highlights that even in well-resourced settings, many individuals struggle to understand their insurance entitlements, particularly marginalized and vulnerable populations (Bardy, 2023; Holst et al., 2022; Paez and Mallery, 2014). This can lead to delays in necessary care and increased financial burden (Adepoju et al., 2019). Thus, more research is needed to develop effective strategies for improving health insurance literacy globally.

The average treatment effects of OOPE mask important heterogeneity by health facility type: Hospitals show a significant higher reduction in OOPE of 46%, alongside with a significant decrease in the likelihood of receiving drugs in the health facility (increase in receipts) of 46% and patient satisfaction of 7%. These effects were not observed in small- and medium-sized facilities, where the intervention had no measurable impact on access to or quality of drugs. Interestingly, we do not find any heterogeneity in the effects across patient characteristics or other facility characteristics, such as financial pressure due to the reimbursement process of the health insurance system. Therefore, in our context, it is important to know where rather to whom an information message was provided. This result is in line with the findings from Dupas and Jain (2023), where they do not find any heterogeneity in the effects for vulnerable population groups but by hospital sector. One key difference, however, is that while their study documented a decline in perceived care quality without an impact on objective quality measures, we find changes in drug provision practices. This highlights the importance of understanding health facility dynamics when designing patient information interventions.

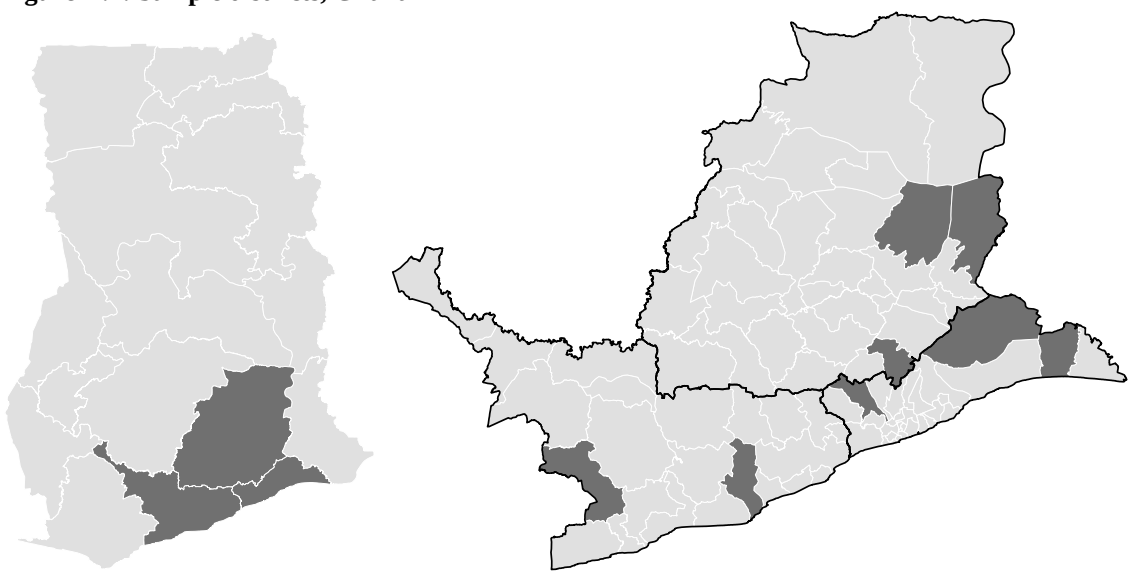
Overall, our findings suggest two mechanisms behind the observed reduction in OOPE. First, priming patients to be more aware of NHIS entitlements reduced petty-corruption through fewer top-up payments. Second, in larger facilities, the intervention also altered drug provision patterns, potentially restricting access to medications for insured patients who asserted their rights. Unfortunately, we cannot fully distinguish and quantify the two mechanisms in hospitals. More studies are needed to understand the impact of information treatments on quality of care, especially because several studies in the context of public service provision highlight that better-informed patients might also have caused a backlash (e.g., worsened the correct case management (Fitzpatrick, 2020), negative effect on physician-patient interaction (Currie et al., 2014). Overall, the results suggest that patient potential higher anonymity in larger health facilities influences bargaining power.

This study has three main limitations. First, discussing the mechanisms of the results in Section 4.4, we cannot fully distinguish and quantify to what extend the reduction in OOPE in hospitals was due to lower drug provision and lower top-up payments. Also, since we could not explicitly ask the patients if and how they bargained with the providers, we cannot distinguish if patients have not raised their voices or if it was not effective. Further studies are wanted to fully understand the bargaining dynamics. Second, we acknowledge that quality of care and health insurance literacy could be measured much more in detail, which, however, would go beyond the scope of this study. We encourage future studies to take a closer look also at these dimensions. Lastly, since we did a patient exit survey, immediately after the health visit, we can only observe short-term effects. More evidence is needed to understand long-term effects and broader health facility dynamics.

Our results demonstrate that a simple information intervention can empower patients to assert their entitlements and encourage providers to adhere to NHIS policies. However, the persistence of unauthorized OOPE and limited improvements in health insurance literacy underscore the need for more comprehensive strategies. Future efforts should combine patient education with stronger enforcement mechanisms to ensure that health insurance schemes fulfill their intended role in reducing financial barriers to healthcare access.

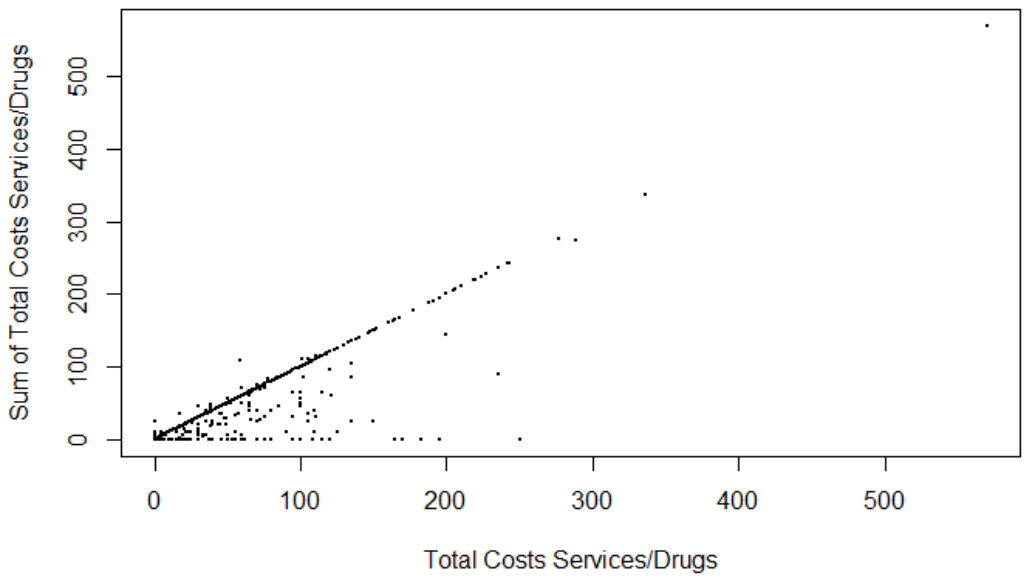
Appendix

Figure A.1: Sample districts, Ghana



Note: The left figure shows the map of the 16 regions in Ghana, dark gray highlighted the three regions, where the experiment took place (Central Region, Eastern Region, Greater Accra Region). The right figure zooms into the districts of the three regions. Dark grey highlighted the districts where the survey took place (in Central Region: Gomoa West and Twifo-Ati-Mokwa; in Central Region: Akwapim South, Asuogyaman, Upper Manya-Brobo; in Greater Accra Region: Ada West, Ga West, Shai-Osudoku).

Figure A.2: Scatterplot of the two outcome variables



Note: Sum of total costs services and drugs was calculated from the two total costs of services and drugs. If a patient could not remember the detailed costs of the services and/or the drugs, the outcome was coded with a missing value. The Total costs services and drugs is the total amount the patients reported when exiting the health facility.

Table A.1: NHIS exclusion list

The following health care services are **not covered** under the NHIS:
- Medicine not on the NHIS Medicines List
- HIV, Tuberculosis and other programme medicine
- Rehabilitation (but physiotherapy is included)
- Appliances and prosthetics (e.g., optical aids, hearing aids, orthopaedic aids, dentures)
- Assisted reproductivity (e.g., artificial insemination and gynaecological hormone replacement therapy)
- Orthoptics (defect eye movement)
- Echocardiography (photograph of heart)
- Angiography (photograph of vessels)
- Dialysis for chronic kidney failure
- Organ transplantation
- Cancer treatment (but for cervical and breast cancer it is included)
- Heart and brain surgery (but from accidents it is included)
- Cosmetic surgeries and aesthetic treatment (but reconstructive surgery it is included)
- Medical checks for administration (e.g., employment, school admissions, visa application, driving license)
- Diagnosis and treatment outside of Ghana
- Photography for visual records of patient's condition
- VIP ward accommodation
- Mortuary Services

Notes: a full list of all benefits can be found in NHIS (2022).
Source: NHIS (2022).

Table A.2: Sample of health facilities

Region	District	# of health facilities	Share of small health facilities (%)	# of total observations	share of insured patients (%)
Central Region	Gomoa West	9	75	379	74
	Twifo-Ati-Mokwa	3	33	170	86
Eastern Region	Akwapim South	4	100	218	79
	Asuogyaman	11	64	647	89
	Upper Manya-Krobo	3	67	160	88
Greater Accra Region	Ada West	3	67	174	72
	Ga West	4	50	270	80
	Shai-Osudoku	4	75	266	74
Total sample		**41**	**61**	**2,284**	**81**

Note: Small health facilities include community-based health planning and service (CHPS) facilities and health centers.

Table A.3: Balance table and descriptive statistics of key characteristics of patients in eight districts in Ghana

	Total	Control Message	Message General	Message General & Booklet	Message Specific	Message Specific & Booklet	p- value control = treatment
	n=2,284	**n=587**	**n=354**	**n=497**	**n=487**	**n=471**	
Interview on behalf of a child	31%	31%	31%	33%	25%	31%	0.71
Patient characteristics							
Age (average in years)	27	27	29	28	30	27	0.32
Female	71%	71%	71%	67%	73%	72%	0.83
Pregnant (% of females)	29%	29%	27%	24%	32%	36%	0.73
Household members total	4.7	4.7	4.8	4.6	5.0	4.8	0.23
Education							
No education level completed	41%	41%	42%	45%	39%	42%	0.80
Primary education completed only	12%	12%	13%	11%	12%	11%	0.74
Secondary education completed only	40%	40%	39%	39%	44%	42%	0.71
Tertiary education completed	6%	6%	7%	5%	5%	6%	0.41
Working status							
Casual worker	6%	6%	8%	5%	5%	3%	0.55
Paid employee	7%	7%	7%	6%	7%	6%	0.70
Self-employed	32%	32%	31%	34%	37%	33%	0.54
Unemployed	3%	3%	3%	2%	2%	3%	0.76
Not working	52%	52%	51%	53%	49%	55%	1.00
Average monthly household income (GHS)							
1-500 GHS	43%	43%	38%	45%	40%	37%	0.22
501-1000 GHS	25%	25%	27%	23%	24%	22%	0.63
1001-1500 GHS	12%	12%	12%	16%	14%	15%	0.28
>1500 GHS	20%	20%	23%	17%	22%	26%	0.27
Health issues							
Maternal care	20%	20%	19%	16%	24%	24%	0.62
Pain	19%	19%	21%	18%	17%	16%	0.63
Malaria related symptoms	15%	15%	16%	14%	13%	15%	0.55
Blood Pressure	8%	8%	11%	12%	12%	11%	0.10
Cough/ Flu	7%	7%	7%	7%	7%	6%	0.90
Child Care	4%	4%	4%	6%	4%	7%	0.25
Other	27%	27%	22%	27%	23%	21%	0.06
Respondent characteristics							
Age of respondent (average in years)	38	38	38	39	38	37	0.53
Calculation illiteracy	62%	62%	61%	58%	60%	58%	0.20
Reading illiteracy	52%	52%	51%	53%	52%	48%	0.78

Note: The table shows a summary of the patients in our sample and the balance table of the control messages and treatment messages. P-value refers to the test of whether the characteristics in the control message and the pooled treatment messages significantly differ from zero. The category “Not working” refers to the categories: Unable to work due to disability, not looking for a job, student, retired person, and homemaker /housewife.

Table A.4: Messages

	Messages
Control	"Dear Madame/ Sir, My name is *name of field assistant* from the University of Ghana Business School, Legon. In collaboration with Ghana Health Service and a university in Switzerland, we are conducting a study to improve access to health in Ghana. Please, did you know that of all children in Ghana aged 5 to 14 years, one in five is involved in hazardous labour such as carrying heavy loads or long working hours of more than 12 hours a week? These hamper child development and can lead to severe illnesses and compromise schooling. Therefore, doctors recommend that for children to stay healthy, they should not accomplish hazardous work and work long hours."
Message General	"Dear Madame/ Sir, My name is *name of field assistant* from the University of Ghana Business School, Legon. In collaboration with Ghana Health Service and a university in Switzerland, we are conducting a study to improve access to health in Ghana. Please, did you know that the NHIS covers almost all services and drugs in NHIS accredited health facilities? This includes all consultation fees, laboratory tests and all drugs on the NHIS medicine list. Only the services and drugs on this list are excluded and you have to pay for. [For Enumerators: Enumerator opens booklet and shows exclusion list] If you have a valid insurance card, NHIS covers almost all of services and drugs in NHIS accredited health. Only the following services are NOT covered under the NHIS: • Medical checks for administration (e.g., employment, school admissions, visa application, driving license) • HIV antiretroviral, Tuberculosis and other programme medicine • Rehabilitation (but physiotherapy is included) • Appliances and prosthetics (e.g., optical aids, hearing aids, orthopedic aids, dentures) • Orthoptics (defect eye movement) • Echocardiography (photograph of heart) • Angiography (photograph of vessels) • Photography for visual records of patient's condition • Dialysis for chronic kidney failure • Organ transplantation • Cancer treatment (but for cervical and breast cancer it is included) • Heart and brain surgery (but from accidents it is included) • Cosmetic surgeries and aesthetic treatment (but reconstructive surgery it is included) • Assisted reproductivity • Medicine not on the NHIS Medicines List"
Message General + Booklet	"Dear Madame/ Sir, My name is *name of field assistant* from the University of Ghana Business School, Legon. In collaboration with Ghana Health Service and a university in Switzerland, we are conducting a study to improve access to health in Ghana. Please, did you know that the NHIS covers almost all services and drugs in NHIS accredited health facilities? This includes all consultation fees, laboratory tests and all drugs on the NHIS medicine list. Only the services and drugs on this list are excluded and you have to pay for. [For Enumerators: Enumerator opens booklet and shows exclusion list] If you have a valid insurance card, NHIS covers almost all of services and drugs in NHIS accredited health. Only the following services are NOT covered under the NHIS: • Medical checks for administration (e.g., employment, school admissions, visa application, driving license) • HIV antiretroviral, Tuberculosis and other programme medicine • Rehabilitation (but physiotherapy is included) • Appliances and prosthetics (e.g., optical aids, hearing aids, orthopedic aids, dentures) • Orthoptics (defect eye movement) • Echocardiography (photograph of heart) • Angiography (photograph of vessels) • Photography for visual records of patient's condition • Dialysis for chronic kidney failure • Organ transplantation • Cancer treatment (but for cervical and breast cancer it is included) • Heart and brain surgery (but from accidents it is included) • Cosmetic surgeries and aesthetic treatment (but reconstructive surgery it is included) • Assisted reproductivity • Medicine not on the NHIS Medicines List **[For Enumerators: give NHIS Booklet to patient]** This booklet is for you. You can look up important NHIS information in this booklet such as what services and drugs are covered by NHIS."

Message Specific	"Dear Madame/ Sir, My name is *name of field assistant* from the University of Ghana Business School, Legon. In collaboration with Ghana Health Service and a university in Switzerland, we are conducting a study to improve access to health in Ghana. Please, did you know that the NHIS covers almost all of services and drugs in NHIS accredited health facilities? This includes all consultation fees, laboratory tests and all drugs on the NHIS medicine list. Only a few services and drugs are excluded and you have to pay for. For which health concern you are here? • [If patient has a valid health insurance card and mentioned a health issue not on the exclusion list, enumerators told: With a valid NHIS membership the treatment for your health issue is covered by NHIS.] • [If patient has a valid health insurance card and mentioned a health issue on the exclusion list, enumerators told: The treatment for your health issue is not covered by NHIS membership.] • [If patient has no valid health insurance card and mentioned a health issue not on the exclusion list, enumerators told: With a valid NHIS membership the treatment for your health issue would be covered by NHIS.] • [If patient has no valid health insurance card and mentioned a health issue on the exclusion list, enumerators told: The treatment for your health issue would not be covered by a NHIS membership.]"
Message Specific + Booklet	"Dear Madame/ Sir, My name is *name of field assistant* from the University of Ghana Business School, Legon. In collaboration with Ghana Health Service and a university in Switzerland, we are conducting a study to improve access to health in Ghana. Please, did you know that the NHIS covers almost all of services and drugs in NHIS accredited health facilities? This includes all consultation fees, laboratory tests and all drugs on the NHIS medicine list. Only a few services and drugs are excluded and you have to pay for. **[For Enumerators: give NHIS Booklet to patient]** This booklet is for you. You can look up important NHIS information in this booklet such as what services and drugs are covered by NHIS. For which health concern you are here? • [If patient has a valid health insurance card and mentioned a health issue not on the exclusion list, enumerators told: With a valid NHIS membership the treatment for your health issue is covered by NHIS.] • [If patient has a valid health insurance card and mentioned a health issue on the exclusion list, enumerators told: The treatment for your health issue is not covered by NHIS membership.] • [If patient has no valid health insurance card and mentioned a health issue not on the exclusion list, enumerators told: With a valid NHIS membership the treatment for your health issue would be covered by NHIS.] • [If patient has no valid health insurance card and mentioned a health issue on the exclusion list, enumerators told: The treatment for your health issue would not be covered by a NHIS membership.]"

Table A5: Differences in total costs for pre-survey and intervention survey patients

Total costs (in GHS)	Insured patients			Non-insured patients		
	(1)	(2)	(3)	(4)	(5)	(6)
Intervention survey						
(ref. pre-survey)	1.31	-0.96	0.22	3.84	2.44	9.43
	(1.89)	(2.01)	(2.18)	(5.33)	(5.13)	(6.17)
Constant	21.04***	28.27***	30.14***	40.43***	35.65***	71.35***
	(0.92)	(2.40)	(7.38)	(3.00)	(3.61)	(26.29)
Control for health issue		X			X	
Control for patient characteristics			X			X
Observations	2,357	2,357	2,357	336	336	336
R^2	0.0002	0.01	0.03	0.002	0.002	0.002

Notes: Table shows OLS regression results measuring the differences in total costs in Ghanian Shilling (GHS) over the two survey periods. We use the full pre-survey sample and the non-treated intervention sample (control group) to run a OLS regression with a dummy if the data collection was in the pre-survey or the intervention survey. Since it is no panel data, we separately control for health issues and patient characteristics, including if it is a child (binary), female (binary), pregnant (binary), household income (four levels), education (four levels). Regional cluster robust standard errors are shown in parentheses. Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

Table A6: Average effects of treatment on OOPE and health insurance literacy outcomes

	OOPE			Health insurance literacy	
	Costs services (in GHS)	Costs drugs (in GHS)	Total costs (in GHS)	Patient-reported Knowledge (binary)	Exclusion list knowledge (binary)
	(1)	(2)	(3)	(4)	(5)
Panel A: NHIS insured patients					
Information treatments					
(ref. control message)					
General message	-2.00*	-3.15*	-4.57**	0.07**	0.10***
	(1.23)	(1.96)	(2.26)	(0.03)	(0.03)
General message with handbook	-2.23*	-3.34*	-4.90**	0.03*	0.08**
	(1.14)	(1.84)	(2.09)	(0.03)	(0.03)
Specific message	-2.11*	-3.56**	-5.47***	0.05*	0.06
	(1.17)	(1.8)	(2.03)	(0.03)	(0.03)
Specific message with handbook	-2.36**	-5.28***	-6.86***	0.06**	0.11***
	(1.17)	(1.76)	(2.05)	(0.03)	(0.03)
Constant	10.48***	14.70***	22.36***	0.76***	0.65***
	(0.85)	(1.53)	(1.66)	(0.02)	(0.02)
Observations	1,914	1,532	1,921	1,953	1,953
R^2	0.003	0.01	0.01	0.004	0.01
Control mean	10.48	14.70	23.92	0.76	0.65
Panel B: Non-NHIS insured patients					
Information treatments					
(ref. control message)					
General message	1.48	-9.02	-2.56	0.08	0.11
	(4.58)	(5.54)	(7.54)	(0.08)	(0.08)
General message with handbook	0.69	2.89	1.64	0.16***	0.15**
	(3.65)	(6.42)	(6.98)	(0.06)	(0.06)
Specific message	7.26*	5.57	10.3	0.07	0.1
	(4.38)	(5.73)	(7.5)	(0.06)	(0.07)
Specific message with handbook	5.53	-0.18	0.71	0.16**	0.18***
	(4.33)	(6.61)	(7.51)	(0.06)	(0.07)
Constant	19.26***	38.14***	44.27***	0.62***	0.55***
	(2.45)	(3.67)	(4.42)	(0.04)	(0.04)
Observations	405	268	414	443	443
R^2	0.01	0.02	0.01	0.02	0.02
Control mean	19.26	38.14	50.19	0.62	0.55

Note: Table shows OLS regression results measuring the effect of the information treatment on OOPE and health insurance literacy. Regression consists of a separate information treatment variables, the pooled effects can be found in Table A2. Regional cluster robust standard errors are shown in parentheses. Significance levels: * p<0.1, ** p<0.05, *** p<0.01. Panel A consists of all NHIS insured patients and Panel B of all non-NHIS insured patients. Patient-reported knowledge is a dummy variable based on question "What services are not covered by NHIS? (1= if patient says they knows). Exclusion list knowledge is based on question "What services are not covered by NHIS? (for binary 1= if patient mentions at least one item from the exclusion list correctly; for numerical = number of correct items (out of 15) on exclusion list).

Table A.7: Average effects of treatment on the frequency of petty-corruption for insured patients

	Insured patients			Non-insured patients		
	Any costs services (binary)	Any costs drugs (binary)	Any total costs (binary)	Any costs services (binary)	Any costs drugs (binary)	Any total costs (binary)
	(1)	(2)	(3)	(4)	(5)	(6)
Information treatment						
(ref. control message)	-0.05	-0.04	-0.04	0.01	0.05	0.01
	(0.03)	(0.03)	(0.03)	(0.05)	(0.05)	(0.04)
Constant	0.48***	0.48***	0.65***	0.66***	0.84***	0.80***
	(0.02)	(0.03)	(0.02)	(0.04)	(0.04)	(0.04)
Observations	1,914	1,532	1,953	405	268	443
R^2	0.002	0.001	0.001	0.0001	0.005	0.002
Control mean	0.48	0.48	0.65	0.66	0.84	0.8

Notes: Table shows OLS regression results measuring the effect of the information treatment on the frequency of petty-corruption for insured patients Regional cluster robust standard errors are shown in parentheses. Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

Table A.8: Total costs of OOPE of insured patient heterogenous effects by patients characteristics

	(1)	(2)	(3)	(4)	(5)	(6)
Information treatment						
(ref. control message)	-9.59**	-6.41***	-6.41***	-7.20**	-4.98**	-8.28**
	(3.9)	(2.03)	(2.37)	(3.21)	(2.07)	(3.96)
Mathematical illiterate patient						
(ref. mathematical literate)	1.3					
	(4.16)					
Treatment * illiterate	4.95					
	(4.38)					
Pregnant patient						
(ref. non pregnant)		2.25				
		(3.86)				
Treatment * pregnant patient		3.74				
		(4.2)				
Child health service						
(ref. non child health service)			-7.22**			
			(2.98)			
Treatment * child health service			2.54			
			(3.25)			
Monthly household income						
(ref. 501 – 1000 GHS)						
1 – 500 GHS				-6.92*		
				(3.58)		
1001-1500 GHS				1.44		
				(5.39)		
> 1500 GHS				10.98*		
				(5.87)		
Treatment * 1 – 500 GHS				5.6		
				(3.89)		
Treatment * 1001 - 1500 GHS				2.69		
				(5.79)		
Treatment * > 1500 GHS				-5.34		
				(6.19)		
Household health costs in last 12 months					0.004	
					(0.004)	
Treatment * Household health costs in last 12 months					0.001	
					(0.004)	
Household health visits in last 12 months						-0.52
						(0.6)
Treatment * Household health visits in last 12 months						0.47
						(0.63)
Constant	21.35***	21.81***	24.62***	22.80***	20.76***	25.41***
	(3.73)	(1.91)	(2.23)	(2.99)	(1.94)	(3.75)
Observations	1,921	1,921	1,921	1,921	1,809	1,916
R^2	0.01	0.01	0.02	0.03	0.02	0.01

Note: Table shows OLS regression results measuring the heterogenous effects of the information intervention on total costs for OOPE for insured patients in Ghanian Shilling (GHS). Regional cluster robust standard errors are shown in parentheses. Significance levels: + p<0.1, * p<0.05, ** p<0.01, *** p<0.001. In the last 12 months, how much have you and all your household members paid for services and drugs?

Table A.9: Insured patient heterogenous effects by health facility size

	Access		Quality		Frequency petty-corruption
	Any service was not available	Any drug was not available and patient received prescription	Satisfaction available services	Satisfaction available drugs	Any total costs (binary)
	(1)	(2)	(3)	(4)	(5)
Information treatment					
(ref. control message)	-0.004	0.004	0.01	0.09**	-0.03
	(0.03)	(0.01)	(0.04)	(0.04)	(0.03)
Large-sized health facility					
(ref. small- and middle-sized)	-0.03	0.11***	0.06	0.12*	0.27***
	(0.05)	(0.01)	(0.06)	(0.07)	(0.04)
Treatment * large-sized health facility	0.02	0.12***	-0.004	-0.25***	-0.02
	(0.06)	(0.01)	(0.07)	(0.09)	(0.05)
Constant	0.03	0.23***	4.43***	4.35***	0.59***
	(0.02)	(0.01)	(0.03)	(0.04)	(0.03)
Observations	1,953	1,953	1,953	1,952	1,953
R^2	0.002	0.003	0.002	0.01	0.05

Notes: Table shows OLS regression results measuring the heterogenous effects of the information intervention on the access and quality of health care, and if any total costs occurred. Outcomes refer to the questions: "Have you received a prescription to get a drug elsewhere? (binary)", "Were there any services you wanted to receive, but they were not available in this health facility? (binary)", "How satisfied are you with the following parts of your experience at this health facility?": "Availability of service(s) (scale 1-5)", "Availability of drug(s) (scale 1-5)". Regional cluster robust standard errors are shown in parentheses. Significance levels: * p<0.1, ** p<0.05, *** p<0.01. Small- and middle-sized health facilities consist of Community-Health Based Facilities and health centers. Large-sized health facilities consist of district hospitals and polyclinics.

Table A.10: Monday-effect on total costs of out-of-pocket health expenditures

	Costs services	Costs drugs	Total costs
	(1)	(2)	(3)
Monday			
(ref. not Monday)	-2.45	-2.56	-5.37
	(2.32)	(4.15)	(4.62)
Constant	15.32***	24.71***	38.07***
	(1.89)	(3.37)	(3.76)
Observations	405	316	421
R^2	0.003	0.001	0.003

Note: Subsample of only the control message group. OLS regressions in Ghanian Shilling (GHS). Regional cluster robust standard errors are shown in parentheses. Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

Table A.11: Control order-effect on total costs of out-of-pocket health expenditures

	Costs services	Costs drugs	Total costs
	(1)	(2)	(3)
Control before treatment			
(ref. Control after treatment)	-4.27	-5.55	-5.77
	(3.66)	(5.75)	(6.71)
Constant	19.26***	27.31***	38.85***
	(2.72)	(4.67)	(5.3)
Observations	405	316	421
R^2	0.01	0.01	0.004

Note: Subsample of only the control message group. OLS regressions in Ghanian Shilling (GHS). Regional cluster robust standard errors are shown in parentheses. Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

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