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ABSTRACT

Fees charged at the point of use can be a barrier to the users, especially for the poorest. Fifteen years ago, the Ministry of Health of Cambodia introduced the so-called health equity fund strategy (HEF), a waiver scheme which tries to enhance access to priority public health services for the poor without undermining the economic situation of health facilities. At its origin, the strategy was to focus the assistance by the scheme to hospital services. Substantial evidence suggests that hospital-based HEFs effectively remove financial barriers and reduce households' out-of-pocket health expenditures. There is much less evidence on the effectiveness of the HEF when assistance is extended to health centre curative services.

This paper reports on an impact evaluation of a HEF extended to health centres. The research design is a prospective observational study in two neighbouring districts where the HEF strategy was not yet in place in 2011 but has been implemented in one out of two in 2012. The main approach of the study is to compare health seeking behaviours of poor households with a HEF card living in the intervention district, where health centres provide services to HEF holders for free, versus households with a HEF card but living in the control district, where HEF cards are not yet effective.

A total of 900 pre-identified HEF households were selected for the data collection. There were two waves of surveys, one before and one 16 months after the implementation of HEF in the intervention district. In-between, monthly data on daily health seeking behaviour and expenditure was collected.

Descriptive analysis and t-test for differences in means validate the design. Difference-in-difference methods are used in order to identify the net impact of health centres' HEF scheme on health seeking behaviour. While HEF was well understood by households and seems to effectively remove user fees at public health providers, according to survey data, health centre utilization of sick and poor people only slightly increased from a low 10% to 12% in the intervention district; self-medication and private provider consultations remained the preferred

health seeking behaviours, even if more expensive. Difference-in-difference and econometric estimates as well as the monthly data analysis confirm that HEF had no impact on health seeking behaviour at public health centre. Finally, HEF did not allow for less coping strategies such as borrowing but instead resulted in a shift from paying cash to receiving free care for those that could already afford their health expenditure.

Despite their new entitlement to free services at health centre level, poor households continue to disregard public health centres as a place to get curative services. It suggests that price was not the main barrier preventing the poor to use the health centres -prices were already low-, but instead that the service itself is not attractive enough.

Keywords: user fees, insurance, access to health, poverty, difference-in-difference, Cambodia

1 - INTRODUCTION

Fees charged at the point of use can be a barrier to the users, especially for the poorest. User fees being a component of their health care financing system, many governments of low-income countries face a difficult choice: either they keep the user fees but then limit access by the poor to public services or they remove user fees, but they then deprive their health facilities from a direct and easy access to cash and may disrupt their health system (1). The Ministry of Health of Cambodia and its technical and financial partners have been particularly committed to address this problem. Fifteen years ago, they designed an original strategy to assist the poor to avail health services without compromising the economic situation of public health facilities: the Health Equity Fund (HEF) (2).

The HEF is a demand-side health financing mechanism to enhance access to priority public health services for the poor. The management of the funds is entrusted to a third party, usually a local nongovernmental organization (NGO), which operates independently of the health facility (3). HEF beneficiaries are identified according to pre-defined eligibility criteria either at the community before health care demand (pre-identification) or at the health facility through interviews by NGO staff (post-identification). At the health facility, eligible poor patients get support from HEFs for the cost of user fees, transportation cost, food allowance and cost for funeral in case of death. In comparison to other solutions, the HEF model is original in at least two ways: first, it tries to address the various barriers constraining the poor in their utilization of services (information, user fees, transport and self-esteem) (3,4); second, through a split of functions, it ensures that targeting of resources is accurate and that the health facility faces an economic incentive to accept the poor.

Since the first pilots in 2000, HEFs have been gradually scaled up nationwide. By 2013, HEFs were implemented in 48 health districts, covering 70% of the referral hospitals and 45% of the

health centres in the countries. Historically, HEF have focused first on the barriers for using hospital services. As a further policy development stage, some HEFs have expanded their benefit package to health centres. Available evidence suggests that hospital-based HEFs effectively address financial barriers to accessing public health services for the poor and reduce their out-of-pocket health expenditures (5,6). Today, there is no rigorous evidence on the effectiveness of health centre-based HEFs.

This paper reports on the impact evaluation of an extension of HEF to health centre services by comparing health seeking behaviours of poor households in two neighbouring districts. In the next section, we provide some background information, which includes a description of the settings and the intervention. We then present the research design and the data. The following section present the main results, which are then discussed in a last section.

2 - BACKGROUND

2.1 HEALTH CARE FINANCING IN CAMBODIA

Although it is experiencing a rapid economic growth over the last 15 years. Cambodia remains a low-income country (GDP per capita: PPP\$ 3,109 in 2014). The reconstruction of the health sector had to be done from scratch after the massive killings and destruction under the Khmer Rouge regime. Today, the health sector is highly pluralistic, with a public sector which is dominant in some niches (most preventive services, HIV/AIDS treatment...), but growingly marginalized for other curative needs, for which households prefer to go to a quite unregulated private sector (7).

The Ministry of Health of Cambodia and its technical and financial partners have taken different initiatives to strengthen the public health system, many featuring a health care financing component (2,8–10). The HEF is a key building block in this strategy.

As mentioned in the introduction, HEF have focused first on hospital services and inpatient admissions in particular. There were four main reasons for such a focus. First, while hospital admission rates are rather low in Cambodia, most patients coming to a district hospital in Cambodia come with a severe health problem (7) – this guarantees that the HEF resources address actual medical needs. Second, public hospitals in Cambodia are fairly subsidized by the government and its technical and financial partners. The user fees charged to the patients are only a fraction of the cost. This means that by paying the user fees, the HEF leverage more resources – from the HEF sponsor perspective, this is an assurance of good value for money. Third, although these fees are just a fraction of the cost, they are, together with other utilization costs such as transport, already high enough to deter the poorest to use the hospital services or to generate catastrophic and impoverishing health expenditure (4). The fourth and

last reason was related to transaction costs: administrating such a scheme requires staff, supervision and so on. Focusing on hospitals was a way to limit these costs.

As the evidence supporting the HEF strategy grew, several HEF operators progressively developed interest for extending the HEF benefit package to first line curative services, which in the Cambodian public health system, are provided by health centres. Several arguments pleaded in favour of such an extension, including: 1) the overall under-utilization of health centres, especially for curative services, 2) the need to correct inappropriate health seeking behaviours (self-medication at home or unnecessarily expensive care, often of hazardous quality, in the private sector), 3) the possibility that the user fees charged at health centre level, in spite of their low level, were still a barrier for the poorest and 4) the risk that by its focus on hospital services only, the HEF scheme distorts health seeking behaviours at the detrimental of more cost-effective services of the first line.

2.2 THE STUDY

2.2.1 STUDY SITE

The research design is a prospective observational study in two neighbouring rural health districts in the Province of Battambang, where the 'extended HEF strategy' was not yet in place in 2011 and has been implemented in one out of the two districts in 2012. The two districts, Sampov Luon and Thmar Koul, are quite similar in terms of economy, population and health system performance¹ (Table 1).

In 2010, in both districts, the Ministry of Planning has, jointly with village chiefs and the communities, assessed socio-economic status households, in order to identify those eligible for assistance. Identified poor households were provided with HEF cards in the second half of 2011, which automatically gave them an entitlement for free hospital care (i.e. hospital benefit package with pre-identification²), yet, with a slight difference: HEF households living in Sampov Luon had access to free health care at the local district hospital, while for HEF households living in Thmar Koul, if they wanted to access hospital treatment for free, they had to go to one of the already existing HEF hospitals in the province. This is due to the fact that Thmar Koul district (and its district hospital) had not receive its health equity fund budget before 2013. As for HEF at the health centre level, it started in Sampov Luon district in January 2012, while it started

¹ The main difference lies in the package of services at the hospital level (surgical capacity in Sampov Luon), which is considered to be a limited problem as our study mainly focuses on the impact of a HEF at health center level. Information collected at the baseline also allows us to control for possible confounding factors.

² It is worth noting that mid-2010, URC had already started a HEF in Sampov Luon hospital, though with a post-identification system, i.e. without HEF card: in order to be exempted, potentially eligible patients have to claim for entitlement and to respond to a questionnaire aiming at identifying the poor.

only in summer 2013 in Thmar Koul district. In both districts, the HEF program was operated by a local NGO called Poor Family Development, under the oversight of the American consultancy firm University Research Center (URC).

Table 1. Information on the two districts

District name	Sampov Luon	Thmar Koul
Status	Intervention	Control
Total population (2009)	118,918	190,992
Number of health centers	8	17
New case consultation per inhabitant per year in public health centres, Average (min-max)	0.35 (0.23-0.48)	0.41 (0.28-0.54)
Referral hospital: Number and Type	1 CPA2	1 CPA1
Number of beds (w/o tuberculosis)	65	48
Admission per 1000 inhabitants, Average	10.3	6.1

Source: Research protocol

2.1.2 INTERVENTION

2.1.2.1 Theory of program

Behind the decision to extend the HEF to health centres lies a theory of program, i.e. the identification of a problem and a reasoned proposition of solution. The identified problem is the limited utilization of public health centres by poor households – it is seen by program managers as a welfare loss for the society and the poor. From analysis of the intervention, one understands that this under-utilization is explained by two main barriers: the financial one, i.e. poor cannot afford the user fees at health centre level, and the informational one, i.e. poor ignore the benefits of using those services – versus lower-end services provided in the unregulated private sector or self-medication – and ignore that there is a scheme to assist them in their utilization of public health services.

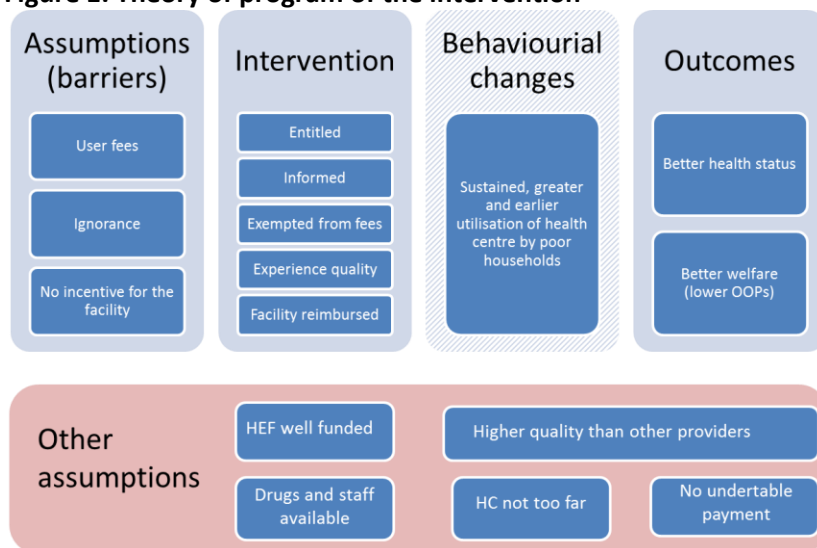
The HEF intervention is designed and implemented as a mechanism to relax these barriers. It guarantees an entitlement to poor people to free care at the health centre (and at the hospital), through the provision of a HEF family card and of information about its use. It is expected that through visiting the health centre, they will experience the quality of the services provided by the public facilities and incentivizes them to come more frequently and in time/earlier (once the health problem appears).

The HEF intervention has also a program theory on the supply side. It focuses on incentives to accept patients for free. As the health facility gets reimbursed for the services provided to the poor and that part of this revenue goes to bonuses, staff are more motivated to receive them, which leads them to provide better services which also increases utilization by the poor.

At the end, the program planner expects greater wellbeing for poor households, through better health status and lower out-of-pockets payments and opportunity cost.

All this depends of course on more systemic assumptions such as whether the HEF is well funded, and the health centre is attractive, including that it is not too far from the poor households (as distance hinders their utilization), does not practice under the table payments and provides good quality services (incl. with drugs and staff available). Figure 1 summarizes this theory of program, as explained in our method section, the main variable of interest for our evaluation was the utilization of the health centre by the newly entitled household.

Figure 1. Theory of program of the intervention



Source: Authors.

2.1.2.2 Roll-out of the intervention

In both districts, the pre-identification of the poor was done by the Ministry of Planning early 2011, while the distribution of the HEF cards and the provision of information on how to use them was done during the second-half of 2011. The HEF scheme effectively started in Sampov Luon in January 2012 (instead of August 2011), while in Thmar Koul it was delayed to summer 2013, which gave us window opportunity to study the impact of this scheme.

Table 2. Roll-out of the intervention in both districts

	Intervention district Sampov Luon		Control district Thmar Koul	
	Status	From...	Status	From...
Entitlement of households + information on HEF	Yes	Second half of 2011	Yes	Second half of 2011
Fee exemption within district (health centre and hospital)	Yes	January 2012	No*	
Facility is reimbursed	Yes	January 2012	No	

*Yet HEF households in Thmar Koul district can be exempted in neighbouring districts since the HEF card is portable. The exemption from fees in their own district started in summer 2013 only.

3 - METHODOLOGY

3.1 RESEARCH DESIGN

The main approach of the study is to compare health seeking behaviours of poor households with a HEF card living in an area where health centres provide services to HEF holders for free (this corresponds to Sampov Luon district, or the ‘intervention district’), *versus* households with a HEF card but living in an area where HEF cards are not yet effective (Thmar Koul district, or the ‘control district’). It follows an impact evaluation design, with a ‘before-after’ comparison coupled with a ‘with-without intervention’, i.e. a difference-in-difference methodology.

We aim to check the program theory (cf. above and Figure 1), and study whether the HEF to health centres intervention generated changes in health seeking behaviour, with a focus on public health centre utilization and related expenditure. More precisely, we aim to answer to the following questions:

Does HEF to health centre intervention improve health seeking behaviour of the poor?

- Does HEF to health centre increase health seeking behaviour among the poor when they are sick?
- Does it modify their choice of providers, with a greater utilization of public health centres and a decrease of their self-medication and utilization of private providers?
- Does it reduce the time between the onset of the problem and the consultation for the public health centre users?

Does HEF to health centre intervention reduce health expenditure and opportunity costs of the poor?

- Does HEF to health centre reduce their average out-of-pocket payments at the public health centre?
- Does it reduce their total health expenditure?
- Does it reduce the opportunity costs (days lost) they incur?
- Does it reduce their risky coping strategies?

Information was obtained through surveys among households identified as poor, before (June 2011) and more than one year after the intervention had been implemented in Sampov Luon district (that is, in May 2013). In-between, monthly data on daily health seeking behaviour and expenditure were collected (cf. Figure 2 for the roll-out of HEF schemes and data collection).

Figure 2. Roll-out of the HEF schemes in both districts and of data collection rounds

	2010	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13		
Intervention																																								
Identification of the poor in both districts		x																																						
Distribution of HEF cards (and information) in both districts														x	x	x																								
<i>Intervention district (SL)</i>																																								
Fee exemption at district hospital via post-identification		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Fee exemption at district hospital via pre-identification																				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Fee exemption at health center via pre-identification																				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Data collection (in both districts)																																								
Baseline											x																													
Monthly data														x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x								
Endline																																							x	

Source: Authors.

3.2 DATA COLLECTION

3.2.1 SAMPLING

This is a two-stage stratified cluster sampling method: first, 30 villages (clusters) are randomly selected in each district; second, 15 pre-identified HEF households³ are randomly selected in each selected village. As the prime objective of the HEF at health centre level is to increase utilization of health centre curative services, the sample size has been calculated with health centre utilization as main reference and the assumption of an increase of it by 75%. With a two-sided significance level of 5%, a power of 90%, and considering the clustering by villages (30 villages per district) and households, as well as the attrition risks, we ended up with a required sample size of 1,780 individuals from approximately 360 households in each district. Finally, 15 households for each of the 60 villages were selected for the study (that is 450 households in each district).

³ They were selected early 2011 from the IDPoor database of the Ministry of Planning that identifies poor households.

3.2.2 DATASETS

3.2.2.1 Household survey data

There were two waves of household surveys, which together make a panel database. For both surveys, a structured questionnaire was administered to each household who accepted the invitation. It included information on household socio-economic status, morbidity, related health seeking behaviours, health expenditures and mechanisms for coping with health care costs.

The baseline survey was performed in June 2011, i.e. before the distribution of HEF cards and the implementation of the HEF in the intervention district. Among the 900 selected households, 868 were interviewed. The ‘endline survey’ was performed in May 2013, i.e. 16 months after the implementation of HEF in the intervention district, and before any HEF related intervention in the control district⁴. Among the 868 households that were interviewed at the baseline, 747 were retrieved and interviewed at the endline.

The absence of the 121 missing households (14%) is mainly explained by labour migration – a phenomenon which has accelerated over the last years in Cambodia; while these households are on average poorer, they have roughly the same health status and seeking behaviour as the 747 households present at the endline. In addition, among the 747 households that were interviewed, disease incidence and health seeking behaviour information was missing for 393 other individuals (10% of all individuals listed at the endline) who were actually mainly reported as “migrants”. Finally, there was a total of 518 new members (13%) at the endline, which characteristics do not differ on average from other individuals (cf. Table 3).

⁴ For both surveys, households and individuals were equally distributed between the intervention and the control groups

Table 3. Characteristics of the baseline and endline surveys' datasets

	Intervention	Control
Baseline		
# households	431	437
# individuals	2016	1961
Follow-up		
# households	373	374
% missing households	8.80%	19.00%
# individuals	2068	1924
% missing individuals	2.80%	3.20%

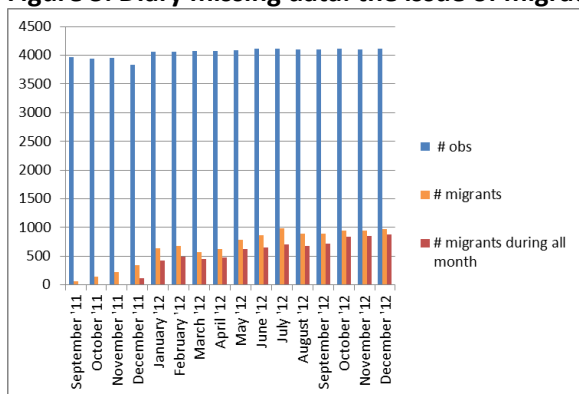
Source: Authors calculations from baseline and follow-up survey data.

Both baseline and endline samples are gender balanced and composed of roughly 13% of under five year children and 13% of elderly (more than 50 years) adults (however age has logically increased in two years). Age and gender distribution in the two districts is roughly the same. While wealth index has got the same distribution in both districts, this is not the case for the poverty level, according to the HEF card. Indeed, the pre-identification tool classifies households into three categories: the “very poor” belong to the first poverty level, the “poor” belong to the second poverty level, and the “non-poor” which don’t get a HEF card. According to the endline survey data, in Sampov Luon, 48% of households responded they belong to the first poverty level and 49% to the second poverty level while in Thmar Koul, 67% of households responded they belong to the first poverty level, 30% to the second poverty level.

3.2.2.2 Household diary data

In addition to the surveys, households interviewed at the baseline were asked to hold a health care diary where they could register their episodes of illness, health seeking behaviours and related expenditure and costs, from September 2011 until December 2012. These data were reviewed, validated and entered by data collectors each month, thus providing information on health care utilization for each household member each month. However there were a lot of missing observations, mainly due again to labour migrations (cf. Figure 3). In addition, it is worth noting that these data should not be compared with the survey data as the recall period is not the same: for the survey data, households were asked to recall their illness episodes during the preceding month, while for the diary data, they were asked to report them daily (that is, as soon as an episode happened) on their logbooks.

Figure 3. Diary missing data: the issue of migrations



Source: Diary data.

3.3 DATA ANALYSIS

The data analysis was performed using Stata version 12, alternatively on survey data (baseline and endline together) and on diary data. Descriptive analysis and t-test for differences in means were performed in order to identify possible differences at baseline between the intervention and the control groups. The endline survey enables to compare with the baseline the differences in access to care between the two groups and to identify the net impact of the health centre HEF scheme. For the diary data analysis, four 4-month periods were considered: the first one before the HEF implementation in the intervention district, that is September-December 2011, and the three following the implementation, that is January-April 2012 (period 2), May-August 2012 (period 3) and September-December 2012 (period 4).

3.3.1 DESCRIPTIVE ANALYSIS

The descriptive analysis aims at getting a general view in terms of sickness incidence and health seeking behaviour and of health expenditure, in both districts and for the different periods: alternatively at the baseline and endline and for each 4-month period. Since the HEF extension to health centres purpose is first to get more patients at the health centre, the analysis focuses on outpatient services and specifically on health centres use. Our first objective is to understand what is the health seeking behaviour when sick. Specifically, we explore whether they sought health services, which ones, and the time passed between the onset of the problem and care. Our second objective is to analyse the health expenditures and costs faced by households seeking care.

Note that, in order to get a balanced panel dataset for the before-after comparisons made from the survey data, we excluded from the analysis all individuals for which we don't have data in both surveys.

3.3.2 IMPACT ON HEALTH SEEKING BEHAVIOUR

Let A_{ihvdt} be an indicator of whether individual i in household h , in village v , in district d , at time period t , has been sick in the last four weeks; B_{ihvdt} be an indicator of whether they sought care when sick; and C_{ihvdt} be an indicator of whether they sought care at the public health centre when sick and sought care.

$$(1) \quad A_{ihvdt} = \begin{cases} 1 & \text{if } i \text{ was sick} \\ 0 & \text{if } i \text{ was not sick} \end{cases}$$

$$(2) \quad B_{ihvdt} = \begin{cases} 1 & \text{if } i \text{ was sick and sought care} \\ 0 & \text{if } i \text{ was sick and did not seek care} \end{cases}$$

$$(3) \quad C_{ihvdt} = \begin{cases} 1 & \text{if } i \text{ was sick and sought care at the public health center} \\ 0 & \text{if } i \text{ was sick and sought care but not at the public health center} \end{cases}$$

Impact on sickness rate. Let assume A_{ihvdt} is determined as follows:

$$(4) \quad A_{ihvdt} = f(\beta_A \cdot HEF_{dt} + X'_{ith} \cdot \theta_A + \tau_{A,t} + \varphi_{A,d} + \varepsilon_{A,ihvt})$$

Where $f(\cdot)$ is the indicator function and the error term $\varepsilon_{A,ihvt}$ is assumed to follow a logistic distribution. The time varying variable HEF_{vt} is equal to 1 in the intervention district in periods in which HEF operates (that is after January 2012) and to 0 otherwise. We control through dummy variables for time effects ($\tau_{A,t}$) that are common across both districts, and district specific effects ($\varphi_{A,d}$) that are common over time. Individual and household (fixed or time varying) characteristics are included to gain precision (X'_{ith}). Among other things, the vector includes age, gender, migration status, economic quantile (median, according to an asset index), literacy, whether the individual suffers from a chronic disease.

Impact on health care seeking behaviour (if sick). Let assume B_{ihvdt} is determined as follows:

$$(5) \quad B_{ihvdt} = g(\beta_B \cdot HEF_{dt} + X'_{ith} \cdot \theta_B + \tau_{B,t} + \lambda_{B,v} + \varphi_{B,d} + \varepsilon_{B,ihvt})$$

Where $g(\cdot)$ is the indicator function and the error term $\varepsilon_{B,ihvt}$ is assumed to follow a logistic distribution. As for the previous model, we control through dummy variables for time effects ($\tau_{B,t}$) that are common across both districts, and district specific effects ($\varphi_{B,d}$) that are common over time; same individual and household (fixed or time varying) characteristics as above are included to gain precision (X'_{ith}). We add information on whether the sickness was reported as serious or not, plus the distance of the household to the public health centre, and we control for (the assigned) health centre fixed effects ($\lambda_{B,v}$).

Let assume C_{ihvdt} is determined as follows:

$$(6) \quad C_{ihvdt} = h(\beta_C \cdot HEF_{dt} + X'_{ith} \cdot \theta_C + \tau_{C,t} + \lambda_{C,v} + \varphi_{C,d} + \varepsilon_{C,ihvt})$$

Where $h(\cdot)$ is the indicator function and the error term $\varepsilon_{C,ihvt}$ is assumed to follow a logistic distribution. We also control through dummy variables for time effects ($\tau_{B,t}$) that are common across both districts, and district specific effects ($\varphi_{B,d}$) that are common over time, as well as health centre fixed effects ($\lambda_{B,v}$). Individual and household (fixed or time varying) characteristics are also included to gain precision (X'_{ith}).

A similar model (as (6)) is applied to observe whether HEF intervention impacted:

- self-medication or drugstore consultation (1,0), among the sick individuals that sought care;
- private providers consultations (1,0), among the sick individuals that sought care.

Logistic estimates are performed for models (4), (5) and (6). In order to check whether some conditions make the intervention works, the models are also run with interactive variables. For instance, a variable multiplying HEF_{vt} with the economic quantile variable will allow to assess whether the intervention works better for the poorest median; other conditions checked include: severity of sickness, having a chronic disease, gender, distance to the health centre, literacy.

Finally, to observe whether HEF impacted on time between the onset of the problem and the visit at the health centre (for those visiting the health centre), we performed Kaplan-Meier estimates and graphs.

3.3.3 IMPACT ON HEALTH EXPENDITURES AND COSTS

Impact for an individual on the probability of occurring positive OOP payments. As in the questionnaire, information on health payments is conditional to the utilisation of health care (which in turn is conditional to whether the individual was sick or not during the last four weeks), then we assess the impact of HEF on OOP payments only on individuals who reported seeking care (with the models above, we check whether HEF had already an impact on these probabilities). We estimate a modified two-part models.

Let D_{ihvdt} be an indicator of whether individual i in household h , in village v , in district d , at time period t , has occurred any OOP payments:

$$(7) \quad D_{ihvdt} = \begin{cases} 1 & \text{if } B_{ihvdt} = 1 \text{ and } i \text{ had positive OOP payments} \\ 0 & \text{if } B_{ihvdt} = 1 \text{ and } i \text{ had no OOP payments} \end{cases}$$

Let assume it follows:

$$(8) \quad D_{ihvdt} = j(\beta_D \cdot HEF_{dt} + X'_{ith} \cdot \theta_D + \tau_{D,t} + \lambda_{D,v} + \varphi_{D,d} + \varepsilon_{D,ihvt})$$

Where $j(\cdot)$ is the indicator function and the error term $\varepsilon_{D,ihvt}$ is assumed to follow a logistic distribution. We control through dummy variables for time effects ($\tau_{D,t}$) that are common across both districts, and district specific effects ($\varphi_{D,d}$) that are common over time, as well as health centre fixed effects ($\lambda_{D,v}$). Individual and household (fixed or time varying) characteristics are also included to gain precision (X'_{ith}). The average effect of HEF on the probability of occurring OOP payments across the population in the intervention district is estimated by β_D .

Impact for an individual on the amount of OOP payments (if positive). The expectation of OOP payments over their positive range is specified as an exponential function:

$$(9) \quad E[OOP_{ihvdt} | OOP_{ihvdt} > 0] = \exp(\beta_{OOP} \cdot HEF_{dt} + X'_{ith} \cdot \theta_{OOP} + \tau_{OOP,t} + \lambda_{OOP,v} + \varphi_{OOP,d} + \varepsilon_{OOP,ihvt})$$

The error of this Generalised Linear Model (GLM) is assumed to follow a gamma distribution. The average effect of a HEF on mean positive payments among those with such payments in the treated population is estimated by β_{OOP} .

Impact for an individual on the amount of OOP payments. Putting the two parts of the model together, the average effect of a HEF on mean OOP payments among the exposed population is estimated by $\beta_D \cdot \beta_{OOP}$.

Impact for a household on the probability of occurring positive health payments and on their amount. In order to assess whether the HEF extended to health centre had an impact on total health expenditure per household, same type of model is used at the household level (with health expenditure expressed per capita), but not conditional to the fact they've been sick.

Impact on the source of financing (if went to the health centre). To assess whether the HEF had an impact on the coping strategies to finance health care, simple comparisons as well as difference-in-difference estimates on the financing sources are performed. Same methods are used to assess the impact on opportunity costs.

4 - FINDINGS

We propose to use the theory of program presented earlier in the paper to review our main findings. We first describe the population and their health seeking behaviour main features, as well as check how balanced the two districts are at the baseline survey. We then look at the effectiveness of the intervention in terms of implementation. Finally, we investigate its effects on the main variables of interest.

4.1 DESCRIPTIVE STATISTICS AND BASELINE COMPARISONS

The design of the study was successful as the data collected in both districts reveals that the samples are comparable in almost all respects: no statistically significant difference between the two districts (intervention and control) was identified for 91 percent of the variables tested, cf. Baseline report (11) and Table 9 in annex, displaying means and differences in means on outpatient variables in annex. However, some differences are worth noting as they might affect the main findings. First, health centre is significantly more utilised in the intervention district (10% among the sick) than in the control district (7%). Moreover, the composition of expenditure is different as the share of transportation costs is significantly higher in the intervention group (16%) than in the control group (8%). This might be due to the fact that Sampov Luon is more remoted. For instance, health centres are more distant on average: in both districts, the median distance to health centre is 5 kilometres; the mean appears however to be significantly lower in the control district (5.8km) compared to the intervention district (7.0km; t-test significant at the 1% level).

Finally, the reasons reported for the choice of providers at the baseline survey already give the idea that user fees are not the main barrier to health centre. The main reason for choosing the pharmacy is because it is the nearest provider (37%), followed by the quality of services (20%). The reason for choosing a private provider is more related to quality of services (34%). Finally, the main reason for choosing health centres is because they provide cheap medicines (44%).

4.2 EFFECTIVENESS OF THE IMPLEMENTATION OF THE INTERVENTION

Our datasets allow to confirm that the intervention was fully implemented. At the endline, almost all households (all 747 but 3) reported they had received their HEF card. Among them, 91% were informed about the use of the HEF card, and 79% had understood that it was for free care at health centre. It is worth noting that the proportion is higher in the intervention group (i.e. 86%) than in the control group (i.e. 73%).

In the intervention district, 61% of households reported they had used their poor card at least once at the health centre. Overall, 92% of households said they were very satisfied with HEF assistance and 90% were not ashamed to have and to use the poor card.

The only implementation problem we heard about was not at the level of the households: there were some public finance management issues in 2012 which led to a funds shortage during the second half of the year and to some delay in the reimbursement of waived user fees to health centres and hospitals. This may have affected the credibility of the program to the eyes of the health facility managers, but we doubt that this problem was noticeable by the users themselves.

There is clear evidence that the health centre staff abided by the rules, i.e. that they waive fee and did not request any under-table payment: in the intervention district, between the baseline and the endline survey (cf. Figure 4 below and Table 9. Mean tests for outpatient care variables – baseline survey data

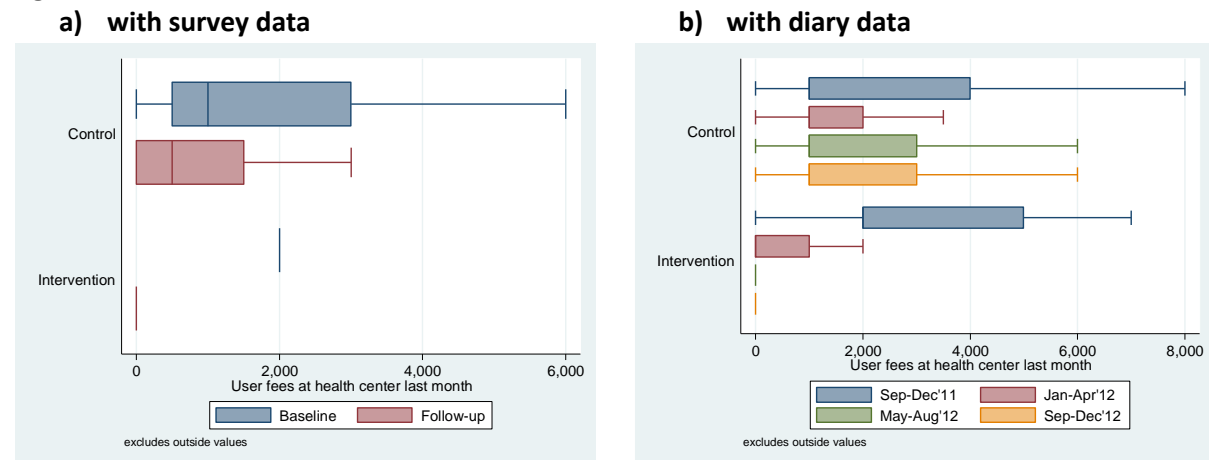
	Total Sample			Intervention Group			Control Group			Diff.I-C	T-test
	Obs	Mean	SD	Obs	Mean	SD	Obs	Mean	SD		
Outpatient care history											
Sick or injured last month	3977	0.62	0.01	2016	0.63	0.02	1961	0.60	0.02	0.03	1.28
# of times sick or injured	2463	2.43	0.10	1279	2.47	0.16	1184	2.39	0.13	0.08	0.41
Serious problem	2463	0.14	0.01	1279	0.15	0.01	1184	0.13	0.01	0.02	1.27
Moderate problem	2463	0.51	0.01	1279	0.48	0.02	1184	0.53	0.02	-0.04	-1.72
Slight problem	2463	0.14	0.01	1279	0.15	0.01	1184	0.13	0.01	0.02	1.27
Still has the problem	2463	0.47	0.01	1279	0.47	0.02	1184	0.47	0.02	0.00	-0.13
Type of care received											
Self-medication	2463	0.29	0.02	1279	0.27	0.03	1184	0.31	0.03	-0.05	-1.26
Outpatient consultation	2463	0.67	0.01	1279	0.69	0.02	1184	0.65	0.01	0.04	1.74
Inpatient care	2463	0.01	0.00	1279	0.01	0.00	1184	0.01	0.00	0.00	0.10
No care at all	2463	0.10	0.01	1279	0.10	0.01	1184	0.11	0.01	-0.01	-0.64
Initiation of treatment											
# of days before care seeking	1657	2.06	0.09	885	2.02	0.11	772	2.11	0.14	-	-
										0.09	0.50
First outpatient consultation											
At hospital	1657	0.02	0.00	885	0.02	0.01	772	0.02	0.01	0.00	-0.14
At health centre	1657	0.13	0.01	885	0.15	0.02	772	0.11	0.02	0.05	1.98
At private provider	1657	0.28	0.02	885	0.28	0.03	772	0.29	0.03	-0.01	-0.19
At pharmacy	1657	0.56	0.02	885	0.55	0.03	772	0.57	0.03	-0.02	-0.49
At traditional healer	1657	0.01	0.00	885	0.00	0.00	772	0.02	0.00	-0.01	-2.97
Health expenditures											
Cost of treatment (% of total)	1611	0.85	0.01	877	0.83	0.01	734	0.88	0.01	-0.04	-2.45
Cost of transport (% of total)	1623	0.12	0.01	882	0.16	0.01	741	0.08	0.01	0.07	4.36
Paid in Cash	1657	0.81	0.02	885	0.84	0.02	772	0.79	0.02	0.05	1.68
Borrowed money	1657	0.15	0.01	885	0.14	0.02	772	0.16	0.02	-0.02	-0.88
Total cost (in 10,000 riels)	1652	3.44	0.28	885	3.32	0.27	767	3.58	0.52	-1.20	-0.44
Days lost											
Number of days lost	1657	3.18	0.16	885	3.47	0.20	772	2.84	0.23	0.63	2.06

	Total Sample			Intervention Group			Control Group			Diff.I-C	T-test
	Obs	Mean	SD	Obs	Mean	SD	Obs	Mean	SD		
Patient's satisfaction											
Satisfied with waiting time	1657	0.91	0.01	885	0.91	0.01	772	0.91	0.01	0.00	0.09
Satisfied with staff attitude	1657	0.99	0.00	885	0.99	0.00	772	0.99	0.00	0.00	-0.38
Satisfied with quality of care	1657	0.99	0.00	885	0.99	0.00	772	0.98	0.01	0.02	2.73

Source: Baseline report (11).

Table 10 in annex), user fees at health centre effectively decreased from a median of 2,000 Riels (USD 0.50) per consultation to none.

Figure 4. Evolution of user fees in health centres

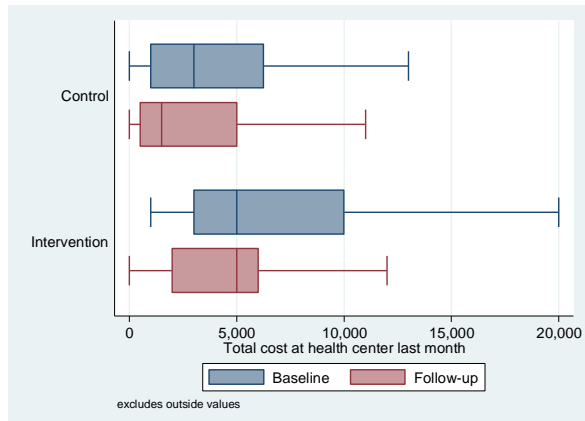


To summarize, households effectively received their card and information on their related entitlement; most understood its use and used it at least once. When they used it, they had the opportunity to see that it was well enforced: it proved to be a strong guarantee for no charge by the health centre.

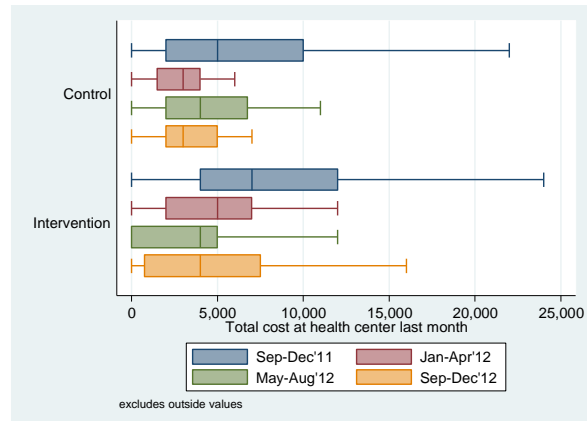
However, it is worth noting that the HEF did not remove some other financial barriers. The total costs for using the health centre in the intervention district remained at a median of 5,000 Riels (USD 1.25; cf. Figure 5 below). This was mainly due to transportation costs. Furthermore, it appears from the survey data that households in the intervention district live significantly further from the health centre they're assigned to than the ones living in the control district. This explains why transportation costs to the health centre remain higher. Finally, it is interesting to note that no extra money was requested at public health facility in none of the groups.

Figure 5. Evolution of total costs in health centres

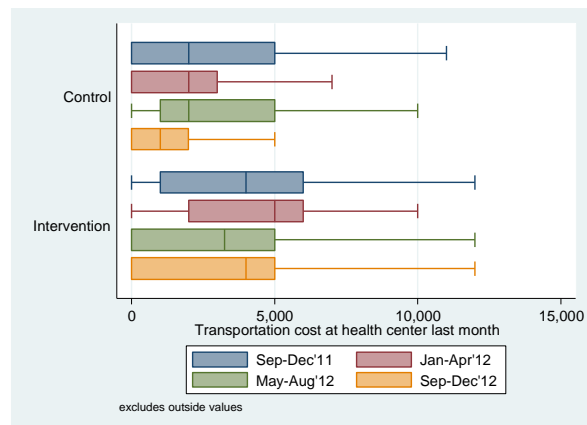
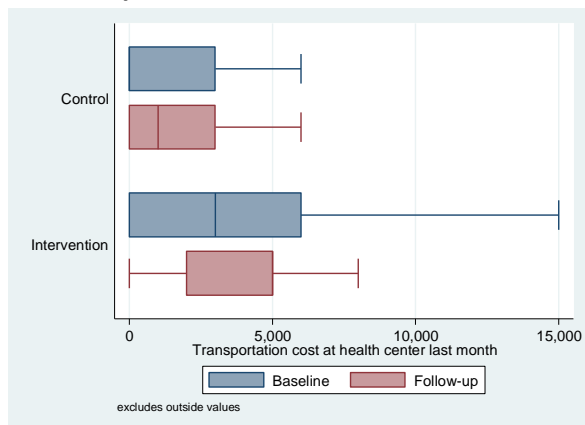
a) with survey data



b) with diary data



Incl. transportation costs at health centre



4.3 EFFECT OF THE INTERVENTION ON HEALTH SEEKING BEHAVIOUR

4.2.1 HEALTH SEEKING BEHAVIOUR

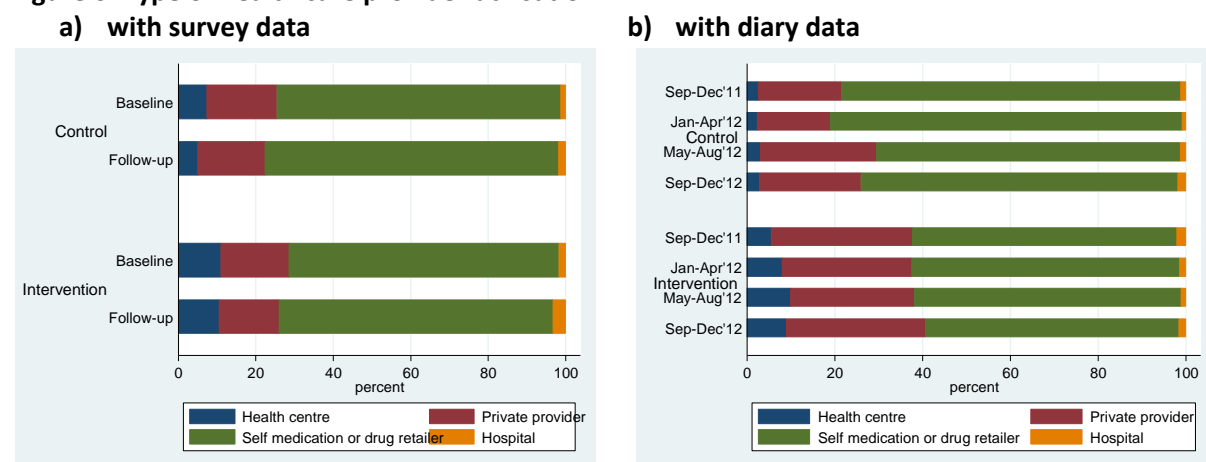
In the endline survey data, 57% of individuals were reported as sick in the previous four weeks. Among those, about 95% sought care (compared to 90% at the baseline survey). These figures are similar among the districts. They mostly self-medicate or consult a drug retailer (about 70%). About 15% used the private providers, and only 7% the public health centre (5% and 10% respectively in the control and in the intervention districts; cf. Figure 6).

It is worth noting that the rate of sickness is far below in the diary data, from 30 to 40% depending on the period. This might be due to the recall bias which is lower than within the surveys, as households are requested to fill in their diaries every week – this provides a track. It might also reflect to some extent a laziness of households or volunteers to fill in properly their diaries.

4.2.2 HEALTH CENTRE UTILISATION

According to both survey and diary data, health centre utilization among the individuals reported as sick was low before the intervention in both districts (according to survey data, 6.6% and 10.4% respectively in the control and in the intervention districts; difference significant at the 5% level), and remained low afterwards in both districts (5.7% and 11.9% respectively in the control and intervention districts, cf. Figure below), suggesting no or very low impact of HEF. The difference-in-difference estimates confirm there was no significant increase of health centre utilization among the poor in the intervention district, both with survey and diary data (tables on demand).

Figure 6. Type of health care provider utilisation



On both sets of data, we ran econometric regressions to control for confounding factors (cf. Table 4). Interestingly, we found significant parameters for several other health seeking behaviour determinants. For instance, one can see that severity and chronicity of the illness influences the choice made by poor households: self-medication is the favourite option when the illness is not severe, private providers when the illness is severe; one can notice the health centre is struggling to find its own 'niche'. Age also seems an important determinant: people go with their young children (below 5) to qualified providers (the health centre or private practitioners) while they self-medicate for all the older age groups. As for gender, one can note that women tend to go more to the health centre than men (1 to 2%pts more depending on the data type). Unsurprisingly, distance to the health centre prevents from its utilization. As visible on the figure above as well, households living in the intervention district tend to use more the health centre than those in the control district, but this pattern is observed both before and after the intervention.

The results also confirm no significant impact of the HEF on health centre utilization, as well as on rival health seeking behaviours. The diary data estimates of conditional effects however strongly suggest that the distance to health centre impedes the effect of HEF on the probability to use the health centre when seeking care: results suggest that HEF increases by 3%pts the probability to use health centre for people living close to the health centre (that is less than 5km), while this effect is cancelled for larger distances (Table 5). However this result is not confirmed with survey data estimates.

We also check another mechanism for the scheme to generate health benefits: whether it induces the health centre users to go to the health centre at an earlier stage of the disease. Descriptive statistics show that the median number of days between the onset of symptoms and care seeking is comparable in both districts and in both surveys – at the baseline and endline rounds – with about 2 days waiting before seeking care, therefore suggesting no impact. Kaplan-Meier estimates allow to provide a more comprehensive picture. Using this technique, survey data show that, at the endline, the difference in timing between the control and the intervention district is significant at the 1% level. This means that, at the endline, health centre users seek care earlier than at the baseline in the intervention district (Figure 7). However the difference in timing in the intervention district between the baseline and the endline is not significant, and the shorter delay in the intervention district cannot be attributed to the HEF to health centre intervention. The analysis from the diary data does not provide more evidence.

Table 4. Effects of HEF on health seeking behaviour

Data	Survey data				Diary data			
Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable: Probability to...	... seek care when sick	... use health centre	... use self medication or drugstore consultation	... use private clinic	... seek care when sick	... use health centre	... use self medication or drugstore consultation	... use private clinic
HEF at health centre	-0.025	0.020	-0.031	-0.021	0.008	0.016	0.039	-0.055
	(0.022)	(0.027)	(0.036)	(0.032)	(0.007)	(0.011)	(0.051)	(0.039)
Age: 6-17	-0.052**	-0.020	0.081***	-0.074***	0.002	-0.006	0.030*	-0.002
	(0.025)	(0.015)	(0.027)	(0.015)	(0.003)	(0.005)	(0.018)	(0.017)
Age: 18-50	-0.080***	-0.036**	0.081***	-0.097***	-0.008	-0.012**	0.028	-0.033**
	(0.020)	(0.014)	(0.028)	(0.020)	(0.006)	(0.005)	(0.023)	(0.015)
Age: +51	-0.101**	-0.037**	0.096***	-0.092***	-0.008	-0.013**	0.048**	-0.015
	(0.047)	(0.015)	(0.029)	(0.017)	(0.006)	(0.006)	(0.022)	(0.020)
Gender: male	0.014*	-0.021**	0.016	0.011	-0.001	-0.006***	-0.008	0.018
	(0.008)	(0.009)	(0.016)	(0.011)	(0.002)	(0.002)	(0.014)	(0.014)
Migration status: away	0.012	-0.019	0.008	0.020	-0.008	-0.003	0.009	-0.006
	(0.011)	(0.013)	(0.024)	(0.021)	(0.005)	(0.005)	(0.014)	(0.014)
Chronic illness	0.010	-0.009	-0.053***	0.065***	-0.002	-0.003	-0.033**	0.007
	(0.010)	(0.013)	(0.019)	(0.022)	(0.003)	(0.004)	(0.014)	(0.015)
Illness severity: moderate	0.011	0.029***	-0.143***	0.138***	0.021***	0.004	-0.186***	0.177***
	(0.007)	(0.009)	(0.020)	(0.018)	(0.006)	(0.004)	(0.025)	(0.018)
Illness severity: serious	0.028***	0.045**	-0.259***	0.278***	0.006*	-0.001	-0.408***	0.344***
	(0.009)	(0.021)	(0.033)	(0.033)	(0.004)	(0.010)	(0.027)	(0.043)
Literacy status: reads	0.007	-0.004	0.015	-0.003	0.002	0.003	0.005	-0.023*
	(0.008)	(0.010)	(0.018)	(0.013)	(0.002)	(0.004)	(0.016)	(0.013)
Farm work	0.016*	0.024	0.003	0.012	-0.000	-0.001	0.010	0.010
	(0.010)	(0.019)	(0.029)	(0.023)	(0.003)	(0.007)	(0.018)	(0.019)
Casual worker	-0.008	0.010	-0.032	-0.002	-0.003	0.006	0.001	-0.024*
	(0.016)	(0.012)	(0.028)	(0.018)	(0.003)	(0.005)	(0.019)	(0.014)
Poorest median	-0.004	0.011	0.017	-0.030**	-0.003	0.003	-0.029**	0.008
	(0.009)	(0.009)	(0.021)	(0.015)	(0.002)	(0.005)	(0.013)	(0.011)
Household head age: 18-50	-0.008	0.020	0.035	-0.048	-0.357***	-0.052	0.098	-0.032
	(0.019)	(0.027)	(0.043)	(0.030)	(0.106)	(0.042)	(0.223)	(0.242)
Household head gender: male	-0.025**	0.003	-0.043	-0.005	-0.001	-0.007	0.010	-0.014
	(0.010)	(0.008)	(0.027)	(0.020)	(0.003)	(0.007)	(0.024)	(0.020)
Household head literacy status: reads	0.017	0.002	0.018	-0.005	0.004*	0.012*	-0.013	-0.002
	(0.011)	(0.014)	(0.026)	(0.017)	(0.002)	(0.006)	(0.016)	(0.014)
Household head work: farmer	-0.005	-0.016	-0.009	0.008	-0.001	-0.005	-0.021	0.047**
	(0.017)	(0.017)	(0.034)	(0.030)	(0.004)	(0.007)	(0.029)	(0.023)
Household head work: casual worker	-0.002	-0.000	0.015	-0.007	0.004	-0.003	0.008	0.030
	(0.012)	(0.013)	(0.024)	(0.023)	(0.004)	(0.007)	(0.021)	(0.020)
Number of hh members below 5y	-0.001	-0.002	-0.003	-0.001	0.004**	-0.001	-0.002	0.014
	(0.005)	(0.006)	(0.012)	(0.010)	(0.002)	(0.004)	(0.013)	(0.009)
Number of hh members above 50y	0.014	-0.028**	0.013	0.031*	-0.003	-0.006	0.001	0.014
	(0.009)	(0.011)	(0.024)	(0.016)	(0.003)	(0.006)	(0.016)	(0.010)
Distance to the health centre: 5-10km	0.007	-0.034***	0.034	0.003	-0.011	-0.011	-0.007	0.017
	(0.015)	(0.010)	(0.027)	(0.020)	(0.007)	(0.009)	(0.046)	(0.032)
Distance to the health centre: +10km	-0.025	-0.050***	0.042	-0.006	-0.009	-0.030***	0.071	-0.009
	(0.019)	(0.011)	(0.034)	(0.025)	(0.009)	(0.008)	(0.056)	(0.049)
Period: follow-up survey	0.049***	-0.006	0.071***	0.008				
	(0.013)	(0.018)	(0.026)	(0.019)				
Period: Jan-Dec 2012					-0.019***	-0.007	-0.015	-0.038
					(0.007)	(0.009)	(0.051)	(0.040)
District: intervention	0.013	0.118***	-0.063	0.020	-0.025***	0.007	0.066	-0.050
	(0.017)	(0.025)	(0.077)	(0.057)	(0.007)	(0.010)	(0.043)	(0.033)
Observations	3724	3659	3724	3724	17099	18251	18890	18890
Pseudo R2	0.0776	0.0594	0.0458	0.0894	0.142	0.115	0.125	0.108

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

All regressions use the Logit estimator. All estimates control for health centre fixed effects; estimates with the diary data control for month fixed effects. Marginal effects are reported.

Table 5. Conditional effects of HEF on health centre utilisation

Dependent variable	Probability to use health centre (when seeking care)									
Data	Survey data					Diary data				
Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Conditioning variable	Poorest median	Sickness rate	Chronic disease	Male	Distance to HC	Poorest median	Sickness rate	Chronic disease	Male	Distance to HC
HEF at HC	0.039 (0.032)	0.002 (0.026)	0.012 (0.026)	0.038 (0.032)	0.006 (0.028)	0.011 (0.012)	0.012 (0.013)	0.014 (0.011)	0.017 (0.011)	0.031*** (0.011)
HEF at HC x cond variable 1	-0.028** (0.011)	0.028 (0.028)	0.050 (0.034)	-0.035*** (0.013)	0.073* (0.041)	0.010 (0.010)	0.008 (0.007)	0.011 (0.010)	-0.001 (0.005)	-0.023*** (0.006)
HEF at HC x cond variable 2		0.020 (0.032)			-0.028 (0.025)		-0.014** (0.007)			-0.003 (0.019)
cond variable 1	0.021** (0.010)	0.022** (0.010)	-0.020 (0.014)	-0.009 (0.010)	-0.053*** (0.013)	-0.002 (0.005)	0.000 (0.005)	-0.008 (0.005)	-0.005* (0.003)	0.006 (0.015)
cond variable 2		0.038 (0.024)			-0.042*** (0.013)		0.008 (0.015)			-0.029*** (0.006)
Observations	3659	3659	3659	3659	3659	18251	18251	18251	18251	18251
Pseudo R2	0.0610	0.0601	0.0608	0.0619	0.0647	0.116	0.116	0.115	0.115	0.120

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

All regressions use the Logit estimator. All estimates control for health centre fixed effects; estimates with the diary data control for month fixed effects. Marginal effects are reported.

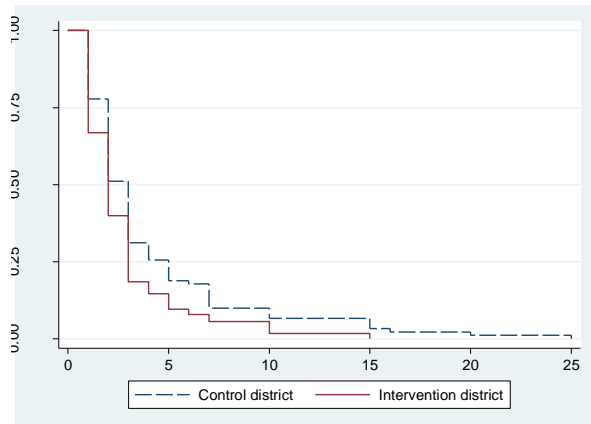
For illness severity, there are two binary conditional variables: variable 1 refers to a moderate rate and variable 2 to a serious rate (both compared to a slight rate). For distance to health centre, there are two binary variables: variable 1 refers to a distance to HC of 5-10km while variable 2 to more than 10km (both compared to a distance less than 5km).

Figure 7. Time between the onset of the problem and consultation at health centre - Kaplan-Meyer survival estimates

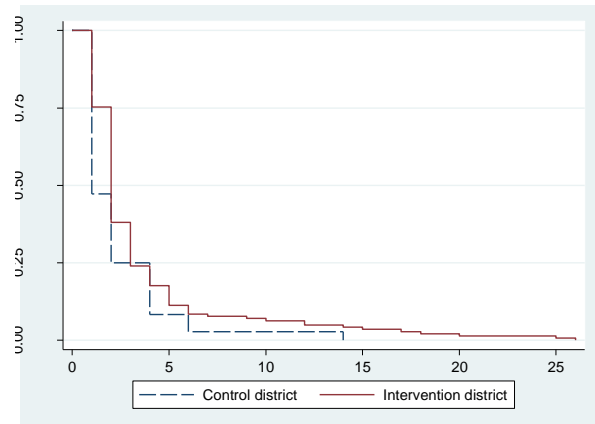
a) with survey data

b) with diary data

Comparisons between control and intervention districts after the intervention

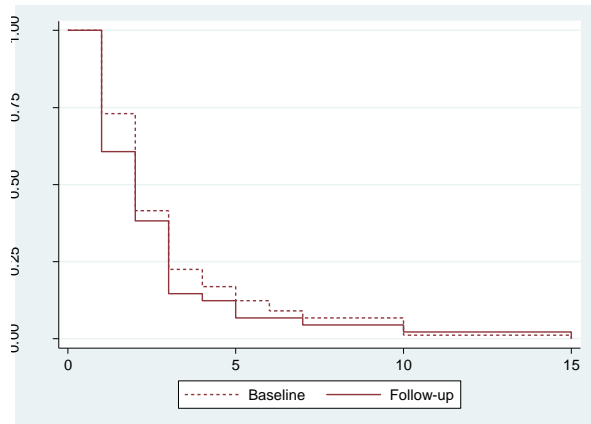


Note: Difference significant at the 1% level



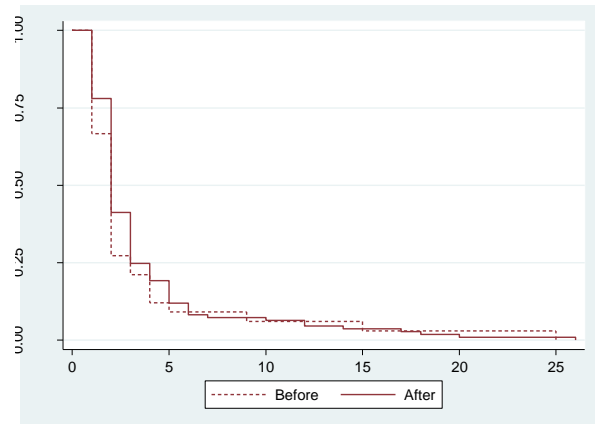
Note: Difference not significant

Before-after comparisons between within the intervention district



Note: Difference not significant

Source: Authors.



Note: Difference not significant

4.3 EFFECT OF THE INTERVENTION ON HEALTH EXPENDITURE

We have seen above that though health centre services are less expensive thanks to the HEF, the program has not managed to convince the poor to use more the health centre. This absence of dramatic change in health seeking behaviours does of course limit the possibility to have any substantial impact on households' total health expenditure (when they use any health care). Indeed, in order to cut the total bill it was key to dramatically reduce the recourse to the private providers, who are by far, the most expensive option (cf. Table 10 in annex, which shows that at the endline a private provider consultation costs around 50,000 Riels (median), that is 10 times the price of a consultation at the health centre, transport costs included; and that this cost even increased between the baseline and the endline in both districts).

4.3.1 OUT-OF-POCKET HEALTH PAYMENTS

Surprisingly, the logistic estimates, from both the survey and the diary data, suggest that the probability of incurring OOP health payments when individuals seek care has decreased with HEF, by 5.2%pts to 8.8%pts depending on the data source (cf. Table 6).

The estimates of conditional effects suggest that the distance to health centre impedes the reducing effect of HEF on the probability of incurring OOP payments. This result is consistent with both types of data (cf. Table 7). HEF impact on this probability is also reduced when an individual suffers from a chronic illness, according to the diary data only; or when he is a male, according to survey data only. This is consistent with the fact that these groups tend to use less health centres and more private providers.

The GLM estimates do not provide any evidence of an impact of HEF on the amount of OOP payments when they occur – both with survey and diary data.

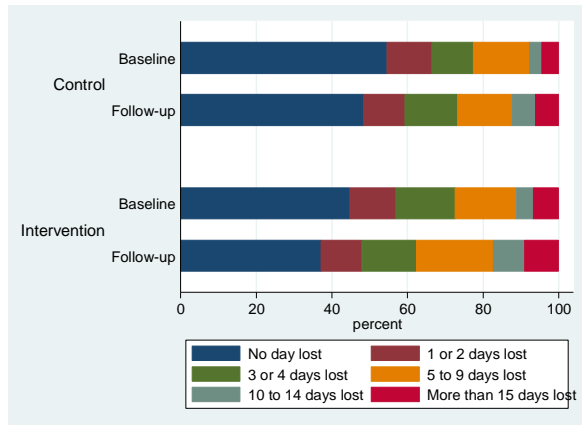
4.3.2 TOTAL HEALTH EXPENDITURE

Econometric estimates displayed in Table 8 suggest that HEF did not have any impact on household total health expenditure, either expressed as a probability of occurring or expressed as an amount in Riels per capita.

4.3.3 OPPORTUNITY COSTS

On average, 50% of outpatient users did not lose any day of work because of illness at the baseline (respectively 45% and 54% in the intervention and the control districts), while it decreased to 45% at the endline (respectively 40% and 50% in the intervention and control districts; Figure 8). We conclude that there was no improvement in that area due to the HEF to health centre intervention, which seems reasonable as this was not the main objective of HEF.

Figure 8. Opportunity costs of outpatient service users, with survey data



4.3.4 SOURCES OF FINANCING

At the baseline, the main source of financing costs associated with outpatient care was cash (i.e. 81%; respectively 84% and 79% in the intervention and control districts), while 15% (14% and 16%) of outpatient users borrowed money so as to pay their care. At the endline, while this picture is roughly the same in the control district, it has changed in the intervention district: around 15% received free health care (at the health centre), 69% paid cash (at the level of other providers), however still 15% borrowed money to pay their health care. It suggests that the HEF intervention did reduce long-term welfare risks related to coping strategies such as borrowing, but instead resulted in a shift from paying to receiving free care for those that could already afford their health expenditure (Figure 9). We have however to acknowledge that as we don't have data on the level of debt, we cannot check whether the amounts borrowed diminished or not with HEF.

Figure 9. Source of financing of outpatient services users with survey data

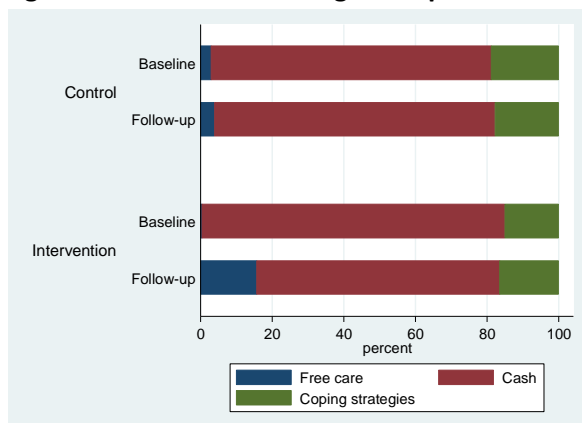


Table 6. Direct effects of HEF on out-of-pocket health payments

Data Column	Survey data		Diary data	
	(1)	(2)	(3)	(4)
Dependent variable	Prob OOP>0 if seeking care	Level OOP if OOP>0	Prob OOP>0 if seeking care	Level of OOP if OOP>0
HEF at health centre	-0.088*** (0.031)	5,604.441 (7,277.478)	-0.052*** (0.018)	1,462.113 (2,700.408)
Age: 6-17	-0.049** (0.024)	-13,093.797*** (4,864.001)	0.013** (0.006)	1,026.942 (1,069.667)
Age: 18-50	-0.058*** (0.020)	-6,958.387 (6,075.195)	0.010 (0.006)	5,822.747*** (1,686.307)
Age: +51	-0.051 (0.031)	-4,485.822 (6,443.090)	0.009 (0.008)	5,691.368*** (2,042.393)
Gender: male	-0.001 (0.014)	-5,495.493** (2,612.913)	0.004 (0.005)	556.232 (641.943)
Migration status: away	0.030* (0.016)	-6,306.657 (5,446.154)	-0.004 (0.011)	984.532 (1,239.324)
Chronic illness	-0.015 (0.017)	29,037.032*** (5,606.234)	-0.027** (0.010)	3,641.235*** (862.155)
Illness severity: moderate	0.070*** (0.019)	32,727.526*** (4,136.401)	-0.005 (0.008)	21,858.281*** (922.560)
Illness severity: slight	0.047*** (0.018)	135,833.207*** (18,030.783)	-0.023 (0.017)	185,339.204*** (14,979.809)
Literacy status: reads	0.007 (0.011)	-1,666.637 (3,160.724)	-0.010 (0.007)	-589.947 (793.402)
Farm work	0.042** (0.020)	4,743.825 (10,141.537)	-0.012 (0.010)	-1,355.446 (1,272.889)
Casual worker	0.006 (0.016)	12,670.725** (6,393.631)	-0.024** (0.010)	-2,884.209*** (911.970)
Poorest median	-0.024* (0.014)	-4,342.280 (4,478.902)	-0.010 (0.009)	-849.942 (610.596)
Household head age: 18-50	-0.061** (0.026)	4,457.554 (6,008.986)	0.029 (0.061)	13,427.897*** (4,670.832)
Household head gender: male	-0.011 (0.016)	2,350.242 (3,837.369)	-0.003 (0.006)	-5.294 (1,164.187)
Household head literacy status: reads	-0.010 (0.014)	7,362.158* (4,220.350)	-0.015** (0.007)	1,213.830* (694.790)
Household head work: farmer	-0.013 (0.025)	-8,075.386 (6,594.904)	0.017** (0.007)	1,973.746 (1,553.098)
Household head work: casual worker	-0.010 (0.021)	-8,180.131 (5,869.358)	0.016 (0.011)	1,144.293 (1,304.599)
Number of hh members below 5y	0.008 (0.009)	-5,830.740*** (2,097.763)	0.010* (0.005)	668.504 (539.498)
Number of hh members above 50y	0.022 (0.015)	-4,683.058* (2,756.258)	0.013** (0.006)	-600.526 (878.468)
Distance to the health centre: 5-10km	-0.031 (0.024)	-5,247.221 (5,395.897)	0.034*** (0.007)	-8,309.208*** (2,004.904)
Distance to the health centre: +10km	0.005 (0.021)	-277.019 (7,370.546)	0.040*** (0.009)	-2,005.778 (2,026.491)
Period: follow-up survey	0.051*** (0.015)	11,015.056* (6,456.369)		
Period: Jan-Dec 2012			-0.025** (0.010)	-419.916 (2,691.101)
District: intervention	-0.001 (0.043)	1,441.838 (10,914.566)	0.051*** (0.014)	-16,285.556*** (1,954.749)
Observations	3436	2952	17551	17129
Pseudo R2	0.0477	n.a.	0.118	n.a.

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Models with probability as a dependent variable use the Logit estimator; those with a level of expenditure use the GLM specified with a Gamma distribution and link-log. All estimates control for health centre fixed effects; estimates with the diary data control for month fixed effects. Marginal effects are reported.

Table 7. Conditional effects of HEF on out-of-pocket health payments

Dependent variable	Prob OOP>0 if seeking care									
Data	Survey data					Diary data				
Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Conditioning variable	Poorest median	Sickness rate	Chronic disease	Male	Distance to HC	Poorest median	Sickness rate	Chronic disease	Male	Distance to HC
HEF at HC	-0.112*** (0.040)	-0.027 (0.049)	-0.093*** (0.034)	-0.126*** (0.030)	-0.148*** (0.053)	-0.051** (0.025)	-0.072*** (0.026)	-0.063*** (0.018)	-0.055*** (0.021)	-0.086*** (0.028)
HEF at HC x cond variable 1	0.034 (0.021)	-0.144** (0.059)	0.025 (0.028)	0.059** (0.023)	0.041 (0.028)	-0.003 (0.023)	0.016 (0.014)	0.019** (0.008)	0.003 (0.010)	0.029*** (0.010)
HEF at HC x cond variable 2		-0.011 (0.059)			0.087*** (0.020)		0.009 (0.016)			0.033*** (0.013)
cond variable 1	-0.035* (0.018)	0.102*** (0.018)	-0.022 (0.021)	-0.020 (0.015)	-0.041* (0.024)	-0.008 (0.019)	-0.015 (0.014)	-0.043*** (0.015)	0.003 (0.009)	0.014 (0.012)
cond variable 2		0.047** (0.019)			-0.032 (0.021)		-0.032* (0.017)			0.023* (0.013)
Observations	3436	3436	3436	3436	3436	17552	17552	17552	17552	17552
Pseudo R2	0.0484	0.0542	0.0479	0.0503	0.0517	0.118	0.119	0.119	0.118	0.123

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

All regressions use the Logit estimator. All estimates control for health centre fixed effects; estimates with the diary data control for month fixed effects. Marginal effects are reported.

For illness severity, there are two binary conditional variables: variable 1 refers to a moderate rate and variable 2 to a serious rate (both compared to a slight rate). For distance to health centre, there are two binary variables: variable 1 refers to a distance to HC of 5-10km while variable 2 to more than 10km (both compared to a distance less than 5km).

Table 8. Effects of HEF on total household health expenditure expressed per capita

Data Column	Survey data					Diary data	
	(1) Prob HE>0	(2) Level HE if HE>	(3) Prob HE>0	(4) Prob HE>0	(5) Prob HE>0	(6) Prob HE>0	(7) Level HE if HE>
HEF at health centre	-0.017 (0.031)	1,891.838 (7,726.124)	-0.029 (0.036)	0.010 (0.036)	-0.036 (0.061)	0.036 (0.050)	701.609 (2,800.633)
Poorest median	-0.035** (0.015)	-3,972.135 (3,355.085)	-0.040** (0.020)	-0.034** (0.015)	-0.035** (0.015)	0.005 (0.013)	1,092.469 (857.566)
Household head age: 18-50	-0.040 (0.026)	-3,002.406 (6,270.502)	-0.040 (0.026)	-0.039 (0.026)	-0.039 (0.026)	0.011 (0.034)	4,146.933** (1,681.008)
Household head gender: male	0.011 (0.020)	1,520.312 (3,635.743)	0.012 (0.020)	0.023 (0.027)	0.011 (0.020)	-0.007 (0.018)	-538.631 (1,163.832)
Household head literacy status: reads	0.033** (0.015)	5,904.892 (3,823.214)	0.033** (0.015)	0.034** (0.015)	0.033** (0.015)	-0.001 (0.017)	1,732.112* (907.346)
Household head work: farmer	-0.013 (0.021)	-8,385.839 (6,279.771)	-0.013 (0.021)	-0.014 (0.021)	-0.014 (0.020)	0.005 (0.033)	-887.490 (1,196.558)
Household head work: casual worker	-0.021 (0.014)	-10,033.055** (4,671.153)	-0.001 (0.014)	-0.002 (0.014)	-0.000 (0.013)	-0.024 (0.023)	-1,384.893 (1,334.090)
Number of hh members below 5y	0.012 (0.010)	-7,861.543*** (2,164.492)	0.013 (0.010)	0.012 (0.010)	0.012 (0.009)	0.023* (0.012)	-1,543.252** (670.182)
Number of hh members above 50y	0.025 (0.018)	1,692.835 (3,456.116)	0.025 (0.018)	0.024 (0.018)	0.025 (0.018)	0.033* (0.020)	-1,269.839 (1,076.666)
Distance to the health centre: 5-10km	-0.018 (0.027)	-9,327.012** (4,257.273)	-0.018 (0.027)	-0.019 (0.027)	-0.016 (0.024)	-0.037 (0.043)	-1,554.846 (1,484.513)
Distance to the health centre: +10km	-0.000 (0.021)	-1,989.860 (5,823.583)	-0.001 (0.022)	-0.000 (0.021)	-0.019 (0.024)	-0.040 (0.055)	700.562 (1,611.529)
Period: follow-up survey	0.001 (0.013)	3,099.417 (6,228.315)	0.001 (0.013)	0.001 (0.013)	0.001 (0.013)		
Period: Jan-Dec 2012						-0.207*** (0.031)	-8,631.136*** (2,860.111)
District: intervention	0.030 (0.040)	3,001.140 (13,571.601)	0.030 (0.040)	0.029 (0.040)	0.035 (0.041)	-0.262*** (0.037)	-8,240.915*** (2,228.293)
HEF at health centre x Poor			0.017 (0.030)				
HEF at health centre x hh head gender: male				-0.047 (0.041)			
HEF at health centre x Distance to the health centre: 5-10km					0.003 (0.048)		
HEF at health centre x Distance to the health centre: +10km					0.044 (0.030)		
Observations	1313	1235	1313	1313	1313	13039	10539
Pseudo R2	0.0559	n.a.	0.0563	0.0575	0.0581	0.0703	n.a.

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Models with probability as a dependent variable use the Logit estimator; those with a level of expenditure use the GLM specified with a Gamma distribution and link-log. All estimates control for health centre fixed effects; estimates with the diary data control for month fixed effects. Marginal effects are reported.

5 - DISCUSSION

The main finding of this study is quite straightforward: the extension of the HEF scheme to health centre services in Sampov Luon has failed to achieve its expected effect. Despite their new entitlement to free services at health centre level, poor households continue to disregard public health centres as a place to get curative services. Their utilisation of the health centres for treatment was low before the intervention, it remained low afterwards.

This study provides clear evidence that this is not due to poor implementation that the intervention failed: the population surveyed reported a good understanding of the scheme and those using the health centres in the intervention district were indeed waived from payment during the whole intervention. This suggests that the program did not work because one of its main assumptions was probably wrong: price was not the main barrier preventing the poor to use the health centres. The fees were already low and probably attractive enough.

To explain the low utilization by poor households of the local health centre, we have to turn to other explanations than a financial barrier. One is that distance to health centre is on average larger in Sampov Luon district, and the estimates suggest that the distance to health centre may indeed impede HEF impact on utilisation and the probability of incurring OOP payments. A more probable explanation is that public health centre is not seen as the best option for outpatient curative services. For slight and moderate diseases, poor people self-medicate. For more serious ones, they go to the private providers - who may be the health centre staff outside opening hours. The pattern of behaviours observed in Sampov Luon district is very consistent with behaviours observed elsewhere in Cambodia, also for households from other socio-economic groups (7).

Policy lessons

These results are disappointing for actors who committed efforts to the development of the HEF at health centre level; they also question the value of extending the HEF at health centre level nationwide or at least indicate that the public health benefits of this policy need to be reassessed. More fundamentally, they question the strategy adopted so far by the Ministry of Health and its financial and technical partners to increase utilization of public services.

Over the last 15 years, a lot of creativity and efforts have been put into innovative health care financing schemes addressing specific health and social protection needs to vulnerable groups. It happened that many of these schemes have managed to get households using public services (9,10,12). The HEF was an important component of this policy and there is today a sound body of evidence that the HEF has secured access to hospital services for tens of thousands of poor households in the country. This has indirectly proven that user fees (as well as transport costs and lack of information) were barriers affecting hospital utilization by the poor.

But there were also some disappointing results, the most remarkable being probably the very low subscription of rural households to a micro-insurance scheme in Takeo Province (13). The main cause explaining the lack of effectiveness of the HEF at health centre level is probably the same than the one behind the failure of the micro-insurance experiment: Cambodian households are selective in their use of health facilities: whereas households use public health centres for preventive services, they largely rely on very various forms of private provision for their curative services, with a few remarkable exception (e.g. HIV/AIDS treatment). The Takeo experiment proved that they were not ready to buy a health insurance for non-specialized curative services; this experiment shows that even if they receive this insurance for free, they do not use it.

This inspires two reflections. First, as far as utilization of health centres is concerned, the main barrier is not the (already low) price of services. If securing a well availed public first line is an objective of the Ministry of Health of Cambodia, other strategies must be thought of. Testing a few of them (e.g. appoint medical doctors, performance based financing, regulate the dual practice of health staff, etc.) could make sense. Second, this result indicates that Cambodia is maybe progressively reaching the limit of a model consisting in adding different (demand-side) health care financing schemes to increase utilization of its public health services: while it has been key to strengthen its public sector and has been one of the most effective strategies, this approach is reaching its limits, at least it reached them in Sampov Luon. Next reforms will have to address problems at their roots.

Strengths and limits of our study

It is important to keep in mind that our study took place in two districts only. Our findings should therefore be used with caution and not be generalized for the whole country. Another limit is the loss of households during the course of the study. Moreover, difference-in-difference estimates rest on the parallel trends hypothesis which has not been addressed here (yet). Further analyses could be performed to ensure the robustness of findings. For instance, survey data econometric estimates could be performed with individual and household fixed effects, since a balanced panel dataset is used. Other techniques might also be used to take more advantage of the use of diary data.

When analysing our data, we found useful to develop the program theory supporting the intervention. We believe that this theoretical effort is a good practice which could enhance the scrutiny of other health care financing interventions elsewhere.

6 - CONCLUSION

In this paper, we assessed the impact of a HEF on the utilization of health centre services by poor households. The findings were not conclusive. We do not think that they question the HEF strategy, they rather qualify it: the fact that HEF worked very well for hospital services does not mean that it would be as effective with health centre services. Caution is required. In Cambodia, as in many low-income countries, the future is probably for more holistic interventions combining the lever of financing mechanisms with greater efforts on the supply side, including in terms of harnessing a private sector sometimes insufficiently regulated.

This study has relevance beyond Cambodia. “User fees or not” has been one of the most passionate debates over the last twenty years in international health (14). Some have argued that even a low fee can constitute a major barrier for the poorest (15). This is possibly true for preventive services or for some specific contexts (16), but it may also be wrong in some situations, and may not be the only explanation for low utilisation, as the one documented in this paper.

This study reminds that ‘low utilization’ does not equate to ‘low access’. In a situation where households do not use health centres and massively go to other types of providers, the priority is probably to try to understand the reasons behind these behaviours and to focus on the related bottlenecks (if increasing the utilization of the public health centres is a goal *per se*). Scratching the fee or entitling households to an insurance is not enough.

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8 - ANNEX

Table 9. Mean tests for outpatient care variables – baseline survey data

	Total Sample			Intervention Group			Control Group			Diff.I-C	T-test
	Obs	Mean	SD	Obs	Mean	SD	Obs	Mean	SD		
Outpatient care history											
Sick or injured last month	3977	0.62	0.01	2016	0.63	0.02	1961	0.60	0.02	0.03	1.28
# of times sick or injured	2463	2.43	0.10	1279	2.47	0.16	1184	2.39	0.13	0.08	0.41
Serious problem	2463	0.14	0.01	1279	0.15	0.01	1184	0.13	0.01	0.02	1.27
Moderate problem	2463	0.51	0.01	1279	0.48	0.02	1184	0.53	0.02	-0.04	-1.72
Slight problem	2463	0.14	0.01	1279	0.15	0.01	1184	0.13	0.01	0.02	1.27
Still has the problem	2463	0.47	0.01	1279	0.47	0.02	1184	0.47	0.02	0.00	-0.13
Type of care received											
Self-medication	2463	0.29	0.02	1279	0.27	0.03	1184	0.31	0.03	-0.05	-1.26
Outpatient consultation	2463	0.67	0.01	1279	0.69	0.02	1184	0.65	0.01	0.04	1.74
Inpatient care	2463	0.01	0.00	1279	0.01	0.00	1184	0.01	0.00	0.00	0.10
No care at all	2463	0.10	0.01	1279	0.10	0.01	1184	0.11	0.01	-0.01	-0.64
Initiation of treatment											
# of days before care seeking	1657	2.06	0.09	885	2.02	0.11	772	2.11	0.14	-0.09	0.50
First outpatient consultation											
At hospital	1657	0.02	0.00	885	0.02	0.01	772	0.02	0.01	0.00	-0.14
At health centre	1657	0.13	0.01	885	0.15	0.02	772	0.11	0.02	0.05	1.98
At private provider	1657	0.28	0.02	885	0.28	0.03	772	0.29	0.03	-0.01	-0.19
At pharmacy	1657	0.56	0.02	885	0.55	0.03	772	0.57	0.03	-0.02	-0.49
At traditional healer	1657	0.01	0.00	885	0.00	0.00	772	0.02	0.00	-0.01	-2.97
Health expenditures											
Cost of treatment (% of total)	1611	0.85	0.01	877	0.83	0.01	734	0.88	0.01	-0.04	-2.45
Cost of transport (% of total)	1623	0.12	0.01	882	0.16	0.01	741	0.08	0.01	0.07	4.36
Paid in Cash	1657	0.81	0.02	885	0.84	0.02	772	0.79	0.02	0.05	1.68
Borrowed money	1657	0.15	0.01	885	0.14	0.02	772	0.16	0.02	-0.02	-0.88
Total cost (in 10,000 riels)	1652	3.44	0.28	885	3.32	0.27	767	3.58	0.52	-1.20	-0.44
Days lost											
Number of days lost	1657	3.18	0.16	885	3.47	0.20	772	2.84	0.23	0.63	2.06
Patient's satisfaction											
Satisfied with waiting time	1657	0.91	0.01	885	0.91	0.01	772	0.91	0.01	0.00	0.09
Satisfied with staff attitude	1657	0.99	0.00	885	0.99	0.00	772	0.99	0.00	0.00	-0.38
Satisfied with quality of care	1657	0.99	0.00	885	0.99	0.00	772	0.98	0.01	0.02	2.73

Source: Baseline report (11).

Table 10. Expenditure at the health center, private provider and for self-medication

	Control		Intervention	
	Baseline	Endline	Baseline	Endline
Outpatient at health centre, total				
Mean	17,060	9,296	11,894	5,473
p25	1,000	500	3,000	2,000
p50	3,000	1,500	5,000	5,000
p75	6,250	5,000	10,000	6,000
obs	60	49	111	106
Outpatient at health centre, user fees				
Mean	13,028	6,663	6,053	896
p25	500	0	2,000	0
p50	1,000	500	2,000	0
p75	3,000	1,500	2,000	0
obs	60	49	111	106
Private provider, total				
Mean	75,687	90,777	67,390	101,907
p25	12,500	15,000	16,000	28,000
p50	31,000	50,000	31,000	55,000
p75	100,000	120,000	65,000	120,000
obs	164	161	203	155
Private provider, user fees				
Mean	69,053	82,548	61,668	91,477
p25	10,000	15,000	13,000	20,000
p50	30,000	45,000	28,000	50,000
p75	90,000	100,000	60,000	100,000
obs	164	161	203	155
Self-medication or drug retailer, total				
Mean	16,252	17,735	16,356	20,026
p25	700	2,000	1,000	3,000
p50	4,000	6,000	5,000	7,500
p75	12,000	20,000	15,000	20,000
obs	574	618	665	592

Source: Authors. Notes: P25 stands for 25th percentile, p50 for median, p75 for 75th percentile.

Data source: baseline and endline survey data.