Money for Nothing? The Effect of Financial Incentives on Efforts and Performances in the Health Sector *

Elise Huillery† and Juliette Seban‡

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Abstract

Financial incentives for service providers are increasingly used in developing countries as a tool to maximize the effort and output of public good providers. Using a field experiment in the Democratic Republic of Congo, we evaluate the impact of a fee-for-service mechanism aimed to increase health service utilization by the population. We find that, relative to fixed payments, the fee-for-service mechanism did *not* increase service utilization (the performance criteria), but on the contrary slightly decrease curative and postnatal service utilization as well as newborn health outcomes. We show that these detrimental effects of incentives do not result from a diminution in workers' efforts, fraud, or switching away from non-incentivized actions. On the contrary, the workers provided more efforts to attract patients as they offered lower service prices and intensified service publicity. But these efforts were evidently misplaced, showing that incentivized workers are not always more productive because they may not understand how to perform. We also show evidence that the incentive scheme increased the weight of external motives relative to intrinsic motives in worker motivation.

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†University of Paris-Dauphine and J-PAL (elise.huillery@dauphine.fr)

‡Sciences Po, LIEPP (juliette.seban@sciencespo.fr)

1 Introduction

Whether governments should incentivize service providers to improve service delivery is a crucial question in both developing and developed countries. Incentives are beneficial under two conditions: first, they should encourage greater effort from the workers, and second, greater effort should translate into higher performances. This paper shows that financial incentives introduced in the health sector in the Democratic Republic of Congo (hereafter, DRC) decreased performances despite greater effort from the health workers. These findings provides first evidence in the field of previous observations in the lab that people who are offered a reward for performing at some tasks may perform worse at difficult tasks (Glucksberg, 1962) and that large stakes can cause big mistakes (Ariely et al. 2009).

In the DRC, the government is primarily concerned about substantial proportions of the population not using health services like immunization, prenatal services, attended delivery, or curative services. The government thus aimed at improving health outcomes by increasing service utilization. To do so, the government designed a payment scheme providing heath workers with incentives to increase service utilization: instead of a fixed payment to each health facility, which represents on average half of facilities' revenue, the government allocates the same total budget to facilities based on levels of service utilization. Therefore, payments to each health facility is linked to a simple performance criterion, namely the volume of patients in this facility relative to other facilities for a number of pre-determined services. This incentive scheme, similar to fee-for-service payments within a constrained budget, introduces competition among health facilities in access to public funds, with the hope that competition would encourage health workers to develop appropriate strategies to increase supplier-induced demand. As governmental payments represent half of facilities' budget, this new incentive scheme represents a large stake for the worker teams. Different obstacles can hinder the demand for health services: lack of affordability, lack of information, poor service quality, or behavioral issues. Since local health workers are in a better position than the central government to identify the relevant obstacles in a specific area, the fee-for-service scheme decentralizes the task of finding the appropriate strategies to increase service uptake at the local level. This paper compares the efficiency of this incentive scheme to fixed payments, which only depends on the number of health workers irrespectively of their activity. As the two payment schemes are based on equal total budget, ressource effect is neutralized and we evaluate the pure incentive

effect.

Our empirical strategy relies on a field experiment conducted in the Haut-Katanga district between 2010 and 2013. The 96 health areas of the Haut-Katanga district were randomly assigned to either fee-for-service payments or fixed payments. All of the 152 public, private, or religious health facilities in Haut-Katanga, except the four biggest hospitals, participated in the experiment. After two years, unannounced visits to the facilities were performed to measure worker attendance, and an independent survey was administered to collect data on the supply and price of health services, health worker efforts to attract patients, service utilization, and population health. The analysis distinguishes targeted and non-targeted health services in order to test the potential disruptive effect of incentives on non-targeted services.

We find that the incentive scheme led to an overall smaller utilization of health services by the population, driven by smaller utilization of curative and prenatal care services. Incentivized health workers thus failed at achieving on the performance criterion. We also find a slight deterioration in newborn health outcomes, while our baseline data show no pre-existing differences in service utilization and newborn health outcomes. In incentivized facilities, revenue was found 42% lower (even though they received the same average amount from the government), and worker income 34% lower, than in the fixed payment facilities. The loss in revenue translated in lower quantity and quality of equipment and infrastructure.

The lower performances in incentivized health areas do not result from lower worker efforts. On the contrary, fee-for-service spurred health workers into greater effort to attract patients: (1) they were more present in facilities; (2) they organized more preventive health sessions at facilities; (3) they conducted more outreach activities to inform the population about the services offered at the facility; (4) they offered significantly lower user fees for targeted services (which, together with lower utilization, explains the large negative impact on facility revenue). Equally important, their effort to attract patients was focused on *targeted* services with no substitution away from *non-targeted* services. We also find that the reward did not induce significant score manipulation, nor significant free-riding among health workers. The only advserse behavioral effect that can be observed is a change in workers' structure of motivation: we elicited worker motives and find that the incentive scheme increased the weight of external motives relative to intrinsic motives. Finally, we observe that incentivized workers are less satisfied with their job than non-incentivized workers.

The important question emerging from these results is to understand why the set of strategies

implemented by the health workers to increase service utilization led to no or opposite effects. We explore this question by examining self-reported reasons why non-users do not use health services. In incentivized health areas, we find a higher proportion of individuals who declare that they do not use health services because they don't see the benefit, and because service provider is too far away (although there is evidence that distance is similar in incentivized and non-incentivized health areas). Very few individuals declare that the service is too expensive, both in incentivized and non-incentivized health areas. These results indicate that the population perceive a lower benefit from using heath services in incentivized areas than in non-incentivized areas. The combination of intense direct selling through preventive sessions and outreach activities, and reduced user fees, may have signaled lower quality of the health services. There is a vast theoretical literature on the signaling value of prices and advertising (see Bagwell, 2007, for an overview), as well as empirical evidence that when consumers cannot pin down the value of a product, higher prices are associated with higher perceived-value (Mastrobuoni et al., 2014). Alternatively, lower quantity and quality of equipment and infrastructure resulting from the loss in facilities' revenue due to lower service prices may have created (or amplified) the negative signal on service quality. The population may primarily need a better understanding of health service benefits, but this need was not addressed by incentivized health workers. Presumably workers were not trained on how to increase demand for health services, which points to the potential mismatch between incentive approaches and workers skills. Finally, the change in worker attitude (more extrinsically motivated, less satisfied with their job) may have been perceptible and amplified the negative impact on service utilization.

The empirical literature on incentives in for-profit organizations shows that incentives reinforce agents' efforts to achieve the rewarded action and increase the output (Lazear, 2000; Bandiera et al. 2007; Bandiera et al. 2013). In heath service delivery, several studies advocate that performance-based financing improves service delivery (see Eichler and Levine, 2009, for an overview). However, the presence of confounding factors[1] makes the question of the impact of performance-based financing largely unanswered (Christianson et al. 2008; Eldridge and Palmer 2009). Two studies provide evidence that rewards contingent on a specific input (respectively attendance and service quality)

[1]Until recently, this literature was not using credible identification strategies: some papers compare very small groups (generally 2-3 districts) which were not randomly assigned to the different treatments (Soeters et al., 2011; Rusa et al., 2009; Eicher et al., 2007); others compare the situation before and after the introduction of performance-based financing (Sondorp et al., 2008; Meessen et al., 2007). Besides, performance-based financing has commonly been a part of a package that may include increased funding, technical support, training, changes in management, and new information systems. In most studies, the level of resources and supervision allocated to the health facilities in different treatments is not similar.

do motivate health workers to provide more of this input (at least in the short run), but did not lead to any increase in service utilization (Banerjee and Duflo, 2008; Peabody et al., 2011). Olken et al. (2014) report on a pay-for-performance mechanism applied to village committees in Indonesia, which primarily speeded up impacts on the targeted indicators but did not change ultimate long-run outcomes. Finally, a bunch of papers document the effects of a performance-based financing scheme in Rwanda using a difference-in-difference strategy[2]: they find that the incentive scheme was efficient at increasing utilization of some targeted services as well as worker productivity, and at improving some targeted health outcomes (Basinga et al. 2011; De Walque et al. 2013; Gertler and Vermeesch 2013). The literature on the effect of incentives for health providers using clean identification is thus limited, and the lack of evidence on precise workers' responses and strategies still needs to be addressed[3].

This paper makes several contributions to the literature on the use of incentives to improve worker effort and performance. First, this paper constitutes one of the few studies using the random assignment of a large number of health areas to estimate the effects of a performance-based mechanism as a way to allocate governmental resources to health facilities. Second, this paper provides first empirical evidence that a fee-for-service scheme may lead to disappointing results in terms of public health. Third, this paper explores in detail worker responses and test the potential adverse effects of financial incentives mentionned in the theoretical and behavioral literatures: (i) incentives may be negative motivational reinforcers (Lepper et al. 1973, Deci 1975, Deci and Ryan 1985, Benabou and Tirole 2003, Benabou and Tirole 2006, Gneezy et al. 2011, Ashraf et al. 2014); (ii) agents may concentrate their effort on the incentivized actions at the expense of the non-incentivized actions (Holmström and Milgrom 1991, Rasul and Rogger 2014); (iii) financial incentives may induce free-riding problems whenever rewards are collective (Bandiera et al. 2013); (iv) and incentivized agents may manipulate performance measures to obtain more of the reward.

[2] 166 facilities were grouped into 8 pairs and one side of each pair was randomly assigned to pay-for-performance funding, while the other side continued with the traditional input-based funding until 23 months after study baseline. The paper uses a difference-in-difference strategy in order to control for potential selection effects since the number of units of randomization was very small and some post-randomization reassignment of some districts happened because of administrative boundaries' reorganization.

[3] In the context of high income countries, identification issues also limit the scope of many studies. Hickson et al. (1987) uses the randomization of physicians into salary and fee-for-service groups in the UK, and find that physicians paid by fee-for-services scheduled more visits per patient than did salaried physicians (4 visits v 3 visits during the 9-month study), missed fewer recommended visits, but also scheduled visits in excess of those recommendations. One recent study on the effect of pay-for-performance mechanism is Mullen, Franck and Rosenthal (2010), which uses a difference-in-difference strategy on US data and show that pay-for-performance targeted on service quality did not lead to any major improvement in quality of targeted services, nor notable effect on the quality of non-targeted services. Note that pay-for-performance in high income countries tends to reward quality measures instead of service volume, because the policy concern is more about service quality than about service utilization in rich countries relative to poor countries. See Stabile and Thomson (2014) for a review.

We show that in the context of the health sector in the DRC, none of these adverse behavioral effects realized except a shift away from intrinsic to extrinsic motivation. However, this paper shows that financial incentives generated misplaced effort and that incentivized workers are not always more productive. The key policy implication is that financial incentives to service providers should be used with caution whenever the rewarded task requires complex strategies and workers do not know well the production function for the outcomes that matter. Financial incentives may be more appropriate where the rewarded task is easy and in connection with worker skills.

The remainder of the paper is organized as follows. Section 2 presents the context in which the experiment was set up and the experimental design. Section 3 examines the data and econometric approach. Section 4 presents the effects of the fee-for-service scheme compared to fixed payments, and Section 5 concludes.

2 Experimental Set-Up

2.1 Background on Health in DRC and Haut-Katanga

The DRC is the second largest country in Africa by area, with the fourth largest population at 66 million (World Bank, 2012). Impoverished by decades of war, instability and bad governance, it counts also among the poorest countries in the world: DRC is ranked second from the bottom of the Human Development Index (186 out of 187 in 2012) (UNDP, 2012), with an estimated per capita income of USD 220 (current) in 2012 (World Bank, 2012). Since the democratic elections in 2006, the country has started a slow reconstruction phase. The fee-for-service mechanism is a strategy for spurring health workers into a greater effort to attract patients which has been developed to promote effective service utilization and improve health outcomes among the population.

The district of Haut-Katanga entails 1.26 million people in the province of Katanga in the south-eastern corner of the DRC. From September to November 2009, a survey was conducted to better understand the health situation in Haut-Katanga by providing a description of the functioning of the health facilities as well as the characteristics and behavior of the health workers, patients and households in the district. The survey sample entailed 152 health facilities[4], among which 129 health facilities were still operating and have been part of the experiment thereafter. For these 129 health facilities, we consider the 2009 survey as a baseline survey that provides both descriptive

[4] 161 health facilities were recognized as part of the government health system in the district, among which 5 hospitals were excluded from the study and 4 health centers could not be reached.

statistics and balance checks (Appendix Tables 3.A and 3.B).

In regards to health facilities, Appendix Table 3.A shows that facilities' infrastructure is very poor: only 20% facilities has running water, and 28% has electricity. A third do not have any examining table nor a delivery box, which are very basic equipment. 14% do not even have a scale, which is quite essential for young children' health assessment. Exit interviews show that patients report quite short consultation time (15.85 minutes on average), and twice as much waiting time before the consultation (27.76 minutes on average)[5]. The vast majority of patients (88%) is satisfied or very satisfied with the consultation. The average consultation fee is quite small: FC 526 (USD 0.58) for a curative visit, FC 1,522 (USD 1.67) for child delivery, and less than FC 400 (USD 0.44) for an immunization, prenatal, or postnatal visit. On top of consultation fees, patients have to pay for prescripted drugs which cost on average another FC 1,430 (USD 1.57).

The average health worker is 40 year-old, about 11 years of professional experience as a health worker, and attained secondary education levels. The average income from the health facility is FC 65,500 per month (USD 72), but 30% have also another job out of the health facility. They spend on average 52 hours per week working in the health facility and received 35 patients the week before the survey, equating approximately 7 patients per working day per health worker. Health workers are thus far from overworked.

In 2009, health service utilization by the population was found to be below adequate levels (Appendix Table 3.B): 29% of births in the last 12 months were not attended in a formal health facility, 24% of mothers did not visit for prenatal care during their last pregnancy, and 72% of mothers did not visit the health facility after child birth. Despite frequent immunization campaigns, only 12% of children under 5 years-old were able to present an immunization card (although, based on mothers' declaration, a majority of children received at least one immunization shot). Overall, the picture that emerges from the 2009 survey is that health service utilization is insufficient.

2.2 Experimental Design

Payment Calculation

In the Haut-Katanga district, all the 96 health areas (totalizing 152 health facilities) were randomly assigned to either the fixed payment system, or to the fee-for-service system. In the fixed-payment system, the amount allocated to each facility was calculated based on facility staff. Each worker was

[5]The 2009 survey does not allow for assessing the technical quality of medical procedures.

entitled to a given amount of governmental payment depending on his/her grade and experience. In the fee-for-service system, payments were based on service volumes declared by facilities. Both groups were treated exactly the same way in all other respects, such as the training provided to health workers, the quantity of drugs and equipment provided by the government, the level of supervision etc. All facilities had autonomy in the allocation of the payment across expenditure categories and staff.

Seven services were targeted at the primary care level: first curative visit, prenatal visit, child delivery, obstetric referral, child full immunization, tetanus toxoid immunization, and family planning visit. Three additional services were taregted at the secondary care level: C-section, blood transfusion, and obstetric referrals to hospitals. Relative prices for each service are presented in Appendix Table 1. Formally, payments to health facilities were written as:

$$P_{i,m} = \alpha_i + \beta_m Q_{i,m}$$

where $P_{i,m}$ is the payment to facility i in month m, α_i represents a fixed component, $Q_{i,m}$ is the vector of targeted service quantities provided by facility i in month m, and β_m is the vector of prices that the government attach to each targeted service in month m. The fee-for-service group was characterized by a pure performance-based mechanism ($\alpha_i = 0$ and $\beta_m > 0$), whereas the comparison payment group had a pure fixed payment ($\alpha_i > 0$ and $\beta_m = 0$). In order to ensure neutrality in the level of funds received by both groups and to isolate the incentive effect from the resource effect, the total budget allocated to health facilities in the fee-for-service group was the same as the total budget allocated to health facilities in the fixed payment group. Hence, noting $\overline{Q_m}$ the average service provision in the fee-for-service group in month m and $\overline{\alpha}$ the average payment in the fixed payment group:

$$\overline{\alpha} = \beta_m \overline{Q_m}$$

In practice, $\overline{\alpha}$ was fixed and β_m was adjusted accordingly at $\frac{\overline{\alpha}}{\overline{Q_m}}$[6]. Although relative prices attached to the targeted services were constant , absolute prices and facility payments were thus determined by the quantity of services provided by the facility *relative to* the quantity of services provided by the other incentivized health facilities[7].

[6] The other way to equalize the two total budgets is to fix $\beta_m = \beta$ and adjust $\overline{\alpha}$ accordingly at $\beta\overline{Q_m}$. This technique was used in the Rwanda experiment where the governmental budget could increase according to the average service provision in the incentivized group.

[7] As discussed in Bandiera et al. (2005), relative incentives might yield lower effort from the health workers than piece rates because effort imposes a negative externality on others, in particular when others are friends. In the

The budget used in this experiment estimated at \$0.43 per capita per year (average monthly facility payments were \$550 and the average catchment area population was 12,900)[8]. The average monthly payment by facility from June 2010 and September 2012 did not differ in the fixed-payment group and in the fee-for-service group. This confirms that the experimental design was respected and that the study isolates the incentive effect from any resource effect.

Score Manipulation

Service volumes were measured using monthly reports submitted by facilities, in which the number of patients for each targeted service was reported. These numbers were verified by public agents at the beginning of the following month by comparing reported volumes with those found in health facility registers[9]. Payments were calculated and paid as soon as the register verification was done, generally during the following month. The same payment lag applied to the fixed payment group since all payments happened at the same time. Subsequent verification of the information noted in the registers was also conducted: a random sample of 30 patients[10] from the registers were selected and visited by independent associations to check the accuracy of the registers[11]. A system of retroactive financial sanctions was integrated in order to reduce providers' incentives to submit fraudulent reports and register phantom patients.

In reality, the community verification system proved weak: fee-for-service facilities only received 3 community verifications on average throughout the experiment and there was no effective financial sanction associated with being caught for fraudulent over-reporting. Specifically, the reductions in payments were proportionally equal to the percentage of patients not being identified through community verification. For example, if 18% of patients were not found through community verification, the facility would only receive a reduction of 18% in their corresponding payment and

context of this fee-for-service program, we do not have measures of interpersonnal connections between workers of different health facilities. However, health facilities are generally distant one from another and it seems unlikely that health workers from different health facilities live in the same neighborhood and are close friends.

[8] This is lower than in other contexts where output budgets range between \$2 and \$3 per capita per year.

[9] Register verification was also meant to take place in health facilities under the fixed-payment system since the government wanted to improve the accountability of health facilities in general, not only as an element of fee-for-service. At endline, the average number of register verifications in the last 12 months is 7 in both the fee-for-service group and the fixed-payment group (p-value of the test of equality of means in the two group = 0.48).

[10] The 30 patients were chosen such that each targeted service is present in the sample, but none of the non-targeted services.

[11] Community verifications were meant to take place only in the fee-for-service group as part of the performance-based financing mechanism. However, we conducted community verifications in the fixed-payment health facilities for impact evaluation purposes (1 community verification by facility in the comparison group). The fixed-payment health facilities had no incentive to cheat on service volumes so the comparison of discrepancy rates between the fee-for-service group and the fixed-payment group allow for differentiating cheating from natural -unavoidable- discrepancies due to the fact that some patients moved or were absent at the time of the verification.

no additional sanctions were enforced. Despite the weak verification process, we did not find any significant difference in the propensity to report phantom patients in the registers[12]: the average proportion of missing patients was found to be 17% in the fixed-payment group and 21% in the fee-for-service group, this difference being non significant.

Pay-for-Performance and the Structure of Worker Motivation

In the context of this specific incentive scheme, the task workers have to perform is attracting more patients. Given that worker remuneration is provided by the facility, the treatment changes the structure of worker motivation by adding a financial benefit of attracting patients in a context where workers already have a financial benefit of attracting patients: in the fixed payment group, worker utility of attracting patients entails not only the intrinsic value they attribute to this task, but also user fees. Table 3 shows that user fees account for about half of control facilities' revenue (on average FC 562,507 per month, Line 2), with the other half being provided by the government payments (on average FC 500,647 per month, Line 1) (other resources from private donors and NGOs are minimal as shown in Line 3). It means that workers' incentive to attract patients is already large in the control group as half of the total budget comes from user fees. Importantly, as long as worker utility is not too concave in worker income, the utility of attracting patients is unchanged by the presence or absence of the governmental fixed payments.

In the fee-for-service group, the introduction of a new contingent reward from the government adds a financial benefit of engaging into attracting patients. In the fee-for-service group, the entire budget depends on service utilization: half comes from user fees, and the other half comes the government through the fee-for-service mechanism. This is likely to increase worker utility of attracting patients as long as the potential decrease in intrinsic motives and signalling effects are not too large (Benabou and Tirole 2003, 2006). After government payments are withdrawn, worker utility of attracting patients is unambiguously reduced in the fee-for-service group compared to their past situation with incentives. Whether it ends up below, equal or above worker utility of attracting more patients in the ex-fixed payment group depends on how incentives affected the intrinsic value they attribute to the task, as well as on the resulting level of user fees.

[12]However, the health workers in the fee-for-service group were significantly more likely to fill out consultation reports for their patients than in the fixed payment group, so service utilization in registers was under-reported in the fixed-payment group. For that reason, it is crucial to rely on an independent source of information about service utilization, like we do in this paper, since registers not give an accurate measure service utilization in the fixed-payment group.

3 Data and Empirical Strategy

3.1 Data Sources

Baseline Survey A survey was administered between September and November 2009. 85% of health facilities involved in the experiment (129 out of 152) were interviewed in this survey. As a result, we perform the balance checks on this subsample of our experimental sample (Appendix Tables 3.A and 3.B). Note that the baseline questionnaire was not designed by the research team so baseline indicators do not generally match endline indicators. In particular, questions on child and maternal health outcomes concern mothers' last pregnancy and child, an episode that can be a long time ago, while at endline they concern only pregnancies and children born in the last 12 months.

Administrative Data Administrative data are available every month from January 2010 to December 2012 for all 152 health facilities. This data includes the number of targeted services provided, the payment due to the health facility, the actual payment made to the health facility, whether a performance verification occurred and related indicators (e.g., % missing patients and consequent financial sanctions). We use this data to examine payments received by the facilities but we do not rely on it to measure service provision and utilization since it can be both manipulated and not evenly reported in the fee-for-service group and fixed-payment group as a consequence of differential incentives to report service utilization.

Qualitative Data In April and June 2012, qualitative interviews were conducted in 31 health facilities randomly selected in 4 out of the 8 health zones (Kafubu, Kipushi, Kasenga and Lukafu). In each facility, one interview was done with the facility head and another one with a health worker (on a voluntary basis). In total, 29 facility heads and 31 health workers were interviewed, all by the same person. They were equally distributed between the fee-for-service group and the fixed-payment group. Questions were all open and dealt with the perception of the payment (transparency, fairness, understanding of the calculation), the general functioning of the health facility, recent changes that might have occurred in the facility, and obstacles to improve the number of patients and the quality of services.

Attendance Spot Checks Unannounced spotchecks were performed in July, August and September 2012 to collect data on worker attendance in the health facilities that is impervious to gaming.

Endline Survey A final survey was administered between December 2012 and February 2013, four months after the fee-for-service mechanism was withdrawn. The endline survey was administered in 87 out of the 96 health areas involved in the experiment. The rainy season and the insecurity created by the Maï Maï insurgency made it impossible to reach the other 9 health areas. Attrition occurred at the same rate in both groups, with 44 health areas in the fee-for-service group and 43 in the fixed-payment group included.

The endline survey included four different questionnaires for facility heads, health workers, patients straight out of consultation, and households living in the catchment area. Appendix Table 2 reports the endline sample size by questionnaire and treatment status. All facilities in the 87 health areas that could be reached were interviewed, totalizing 123 health facilities. All the technical staff in each health facility was interviewed up to 10 persons[13], totalizing 332 health workers. A sample of 10 patients per facility was randomly selected for exit interviews, or the maximum available if fewer are present, totalizing 1,014 patients. Finally, the household questionnaire was administered to 1,708 households: 20 households were interviewed in each of the 87 health areas, among which 10 households randomly chosen in the population and 10 randomly chosen among the households with a pregnancy in the last 12 months. The selection of the 20 households was done as follows: four axes in the locality were randomly drawn from a central point, then one household was visited every five houses on each axis. - On two axes, all households were eligible and took the survey if it consented to (otherwise the next household was visited), while on the two other axes, only households where a woman had been pregnant in the last 12 months were eligible (otherwise the next household was visited). After each interview, the interviewer went five houses further and continued the selection 5 households took the questionnaire on each axis.

3.2 Outcomes of Interest

Service Utilization First, we measure overall health service utilization by asking each household member whether s/he visited a health facility in the last 12 months. Second, we disentangle

[13] In the facilities staffing more than 10 health workers, 10 were randomly chosen from the list of all health workers during the facility head interview. The health workers who were present the day when the interviewer visited the health facility were interviewed on-site, whereas the others were visited at home. Only those health workers who were out of the neighborhood at the time of the survey (because they were on vacation or because they temporarily migrated) could not be interviewed.

utilization of different services: curative services, child immunization, maternal health services and family planning. Regarding 0-5 child immunization, we asked the mother whether her child had at least one immunization shot, and we also observed whether we could see a scar from TB immunization on the child's shoulder (which is a more objective measure). For maternal health services, we asked women who have been pregnant (gave birth) in the last 12 months whether she used prenatal (postnatal) services, the number of prenatal (postnatal) visits, whether delivery was attended, and whether delivery was done with a c-section[14]. Finally, for family planning we asked each woman aged 15-49 whether she was using a modern contraceptive method (IUD, daily pill or implant), and we also examine whether each woman aged 15-49 has had a pregnancy in the last 12 months as a direct measure of family planning utilization. Pregnancy rate was calculated on the representative sample only since, by construction, all women in the other sample have been pregnant in the last 12 months.

We check that the results at endline (4 months after the governmental payments stopped) appeared *before* the payments stopped by focusing whenever possible on service utilization before September 2012. Therefore, we present the same outcomes for children aged at least 15 months at endline (at least one year-old in September 2012) and women who gave birth before September 2012.

Population Health Status We assess health status using mortality rates (number of persons/women/children who died in the last 12 months in the household), the proportion of newborn in the last 12 months that are still alive, as well as standard under-five weight-for-age and height-for-age z-scores. We check that the results at endline appeared *before* the payments stopped by focusing on children born before September 2012.

Health Facility Revenue Health facility revenue is three-fold: governmental payments, revenue from users (consultation fees and drug sales), and resources from private donors and NGOs. Monthly governmental payments are collected from administrative data during the whole period of the experiment Jun. 2010-Sept. 2012. We collect data on facility revenue from user fees, drug sales, and private donors for the last month in the facility endline questionnaire. Worker payment are

[14]We also examined utilization of traditional healers and den mothers services in order to take into account potential substitution effects between modern and traditional maternal health services. However, utilization of traditional maternal services was found very low and not affected by fee-for-service so we do not report these results in the paper for the sake of space (they are available upon request).

also reported for the last month in both the facility and worker endline questionnaires.

The enumerators also observed the quantity and quality of equipment and infrastructure at endline, which reflect both facility revenue and managerial decisions. We constructed three indices, each index being the first component of a principal component analysis: (1) the *quality index*, which is based on the observed quality of twelve items[15]; (2) the *infrastructure index*, based on the observed presence of six items[16]; (3) the *equipment index*, based on the number of items for fifteen types of medical equipment[17].

Worker Effort Worker attendance (proportion of health workers present at the facility) was collected from unannounced spotchecks by independent research assistant. The research assistant reported the number of workers present at facility without telling the facility head and the workers in order to avoid any interference with worker behavior at a later point. Observational data on worker attendance was collected in an anonymous and aggregated way, at the facility level.

Preventive sessions at the facility are organized to offer the population the opportunity to access preventive services. In the facility endline questionnaire, we asked the facility head the number of preventive sessions organized at the facility in the last 12 months. Besides, outreach activities in communities are performed by the health workers to inform the population about the preventive sessions (topic, day, hour). In the worker questionnaire, we asked each worker the number of outreach activities she performed in the last 12 months. We asked these questions for five types of service, three targeted (prenatal care, immunization and family planing) and two non-targeted (postnatal care and HIV prevention).

Since free-riding is a concern when incentives are collective, we present evidence on the distribution of effort within the facility by using the number of outreach activities per agent. We show the proportion of agents who did not do any outreach activities (extensive margin), and the 25th, 50th, and 75th percentiles among agents who did some outreach activities (intensive margin). For facilities with at least two agents, we also present the facility level standard deviation of the number of outreach activities per agent (dispersion of effort within the facilities).

[15] Building quality, waiting room, consultation room, lavabo, soap, clean towels, bathrooms, sterilization material, permanent display of user fees and drugs' costs, examination table, and ordinogram.

[16] Phone, motorized transportation mean, water tap, toilet, electricity, and hard roof.

[17] Generator, sterilizer, tensiometer, stethoscope, baby-scales, weighing scale, height gauge, microscope, gynecological examination table, fridge, delivery boxes, fuel, kerosene, bed, and solar panel.

The Structure of Worker Motivation In the worker endline survey, we elicited workers' motives in order to assess the effect of the incentives on the nature of motivation. We posit that financial incentives may draw worker attention on financial motives at the expense of non-financial motives. To test this hypothesis, workers were asked about the main advantage and disadvantage they see in their job. These questions were open to not induce any type of response and capture the most salient motives. We classified the responses into six categories of advantages (social recognition, remuneration, material comfort, others' health and life, responsibility, intellectual interest in medecine) and six categories of disadvantages (lack of social recognition, low remuneration, low material comfort, loosing others' life, too much responsibility, risk of getting infected/sick). We calculate the proportion of workers who mention either remuneration or material comfort as the main advantage or as the main disadvantage (we also separate advantage and disadvantage), and use this proportion as a measure of the relative importance of extrinsic versus intrinsic motives in workers' total motivation.

Staff attendance provides a measure of workers' motivation (intrinsic and extrinsic). At endline, workers were no longer incentivized so the incentive structure did no longer differ between the two groups. Any difference in worker behavior therefore reflects persistent effects of fee-for-service on motivation. The endline survey was done in an unannounced visit to avoid manipulation of staff attendance, so we can use staff attendance at endline to analyze worker motivation after the incentive was withdrawn and compare to worker motivation before the incentive was withdrawn.

Finally, we measure worker satisfation with a self-assessment job satisfaction scale from 0 to 10, 0 being the minimum level of satisfaction and 10 the maximum level of satisfaction.

Service Prices A strategy to increase service utilization may be to reduce service prices, while the opposite may happen to non-targeted services to discourage its utilization. We collected information on user fees from three sources: facility heads, patient exit interviews, and individuals who used the service in the last 12 months. Due to sample size concerns, we focus on the most commonly offered services: curative consultation, child delivery, prenatal visit, postnatal visit, and school entry visit. To improve statistical power to detect effects that go in the same direction within a domain, we also present findings for a Fee Summary Index that aggregates information over all user fees, targeted service user fees (curative and prenatal visits, and child delivery), and non-targeted service user fees (postnatal and school entry visit). To check that the effects appeared before government payments

stopped, we focus on visits that happened before September 2012 whenever possible.

Service Quality Service quality is primarily measured by technical quality. Consultation time is considered here, along with compliance with standard medical procedures (which is a better indicator). Compliance was assessed from patient exit interviews. Those who consulted for illness were asked about three basic procedures: being weighted, being examined, and tension check, as well as whether they were prescribed drugs without being examined. Women who gave birth were asked about the number of days they attended the facility after giving birth, as well as standard procedures: weighing, stomach palpation, tension check, stomach measure, HIV test, tetanus shot, blood test, urine analysis, and information on immunization schedule, during prenatal visits, and stomach palpation, child weighing, child examination, child immunization, and child immunization during postnatal visits. Finally, we examine the proportion of patients who understood the diagnosis and prescriptions, as well as the proportion of patients and household members who were satisfied with the visit.

Reasons for not using health services Reasons for not using health services are captured by asking individuals who did not use specific health services the main reason why they did so: why didn't individuals who have been sick use curative services? Why didn't women use family planning? Why didn't pregnant women use prenatal services? Why didn't mothers use attended delivery, postnatal services and immunization? These questions were left open and the interviewer classified the response within one of five pre-determined categories: (1) it is too expensive, (2) the waiting time is too long, (3) it takes too much time to go to the health facility, (4) I don't see the benefit, and (5) the service is poor quality. We examine the proportion of the total population in each category (individuals who use the service receive a zero), instead of the proportion of non-users in each category.

3.3 Empirical Strategy

Validation of the Experimental Protocol The internal validity of the impact evaluation relies on the comparability of the fixed-payment group and the fee-for-service group as observed at endline. With a large number of units of randomization, the law of large numbers insures that the characteristics in both groups are balanced. Here randomization was done on 96 health areas randomly allocated to two groups, and it is preferable to check whether the pre-program

characteristics of the fixed-payment group and the fee-for-service group are similar.

This comparison is done using the 2009 survey administered to health facilities, health workers, and randomly chosen households in the catchment area. As explained earlier, 85% of health facilities involved in the experiment took the 2009 survey. As a result, 129 out of the 152 pilot health facilities can be observed to check how characteristics were initially balanced between the fixed-payment group and the fee-for-service group. The households who are surveyed in the 2009 survey are not the same households as the households surveyed at endline, because it would have been too difficult to find the same households three years later. Both household samples are two representative samples of the households living in the health area but do not constitute a panel.

Most initial characteristics are balanced, although the urban health facilities (17% of the sample) were not equally distributed in the fee-for-service group and fixed-payment group: they represent 12% of the PBF health facilities while 23% of the fixed-payments ones. Appendix Tables 3.A and 3.B present the means of observables collected in 2009 in the fee-for-service and fixed payment groups, as well as t-tests for the following null hypothesis: the difference is zero controlling for a dummy indicating whether the unit of observation is located in a urban area. 2 differences in means are statistically significant out of 85 tests, which is consistent with what would be expected with random sampling variations. It is particularly important to note that our main outcomes - utilization and health ouctomes - are balanced at baseline. We are therefore confident that differences in outcomes at endline between the two groups are not driven by initial conditions as long as we control for urban location.

Another threat to the internal validity of the impact evaluation is contamination between the treatment and the control group. The randomization was done at the health area level to limit this concern. In fact, health facilities in the same health area are closer and have more contacts than health facilities in different health areas. As distances are quite large between health areas, households are unlikely to visit a health facility in another health area. As shown in Appendix Table 3.B, the average distance to the closest health facility in the health area is 4.21 kilometers, whereas the average distance to the closest health facility in another health area is 15.67 kilometers. Among individuals for whom we have data on the facility they visited (if they visited a facility in the last 12 months), 87% visited a facility in the health area, and this proportion is similar in the control and the fee-for-service groups (Appendix Table 3.B). Therefore, the payment mechanism did not affect the decision of the households to visit a facility in another health area, and compliance to treatment

assignment among households is high. In this context, contamination between the control and the treatment groups seems very unlikely to affect the internal validity of the experiment.

Estimation Strategy For each outcome of interest, we show the estimation results of an equation of the form:

$$Y_i = \alpha + \beta FFS_i + X_i^{'}\gamma + \varepsilon_i$$

where FFS is a dummy for being in the fee-for-service group. Because the treatment was randomly assigned, it is in expectation uncorrelated with the error term and can therefore be estimated through OLS. Coefficient β estimates the average effect of fee-for-service and is presented in the third column of our result tables after the unit and number of observations. We show the p-value for a test that this coefficient is equal to zero in the fourth column of the result tables.

The unit of observation i varies: it stands either for a health area, a health facility, a health worker, a patient straight out of consultation, a household, or a household member. Following the results of the balance checks discussed above, we control for a dummy indicating whether the facility is urban. To improve the precision of the estimation of the average treatment effect, we also use a small set of controls X_i which includes dummies for the health zone (the Haut-Katanga province entails eight health zones), for whether the health facility is religious, private, or public, and for whether the heath facility is a health post (smaller facility) or a health center (larger facility). At the *health worker level* it also includes dummies indicating that the health worker is a female, a doctor, a nurse, as well as the age and number of years of experience of the health worker. At the *patient level* it includes a dummy indicating that the patient is a female, the age of the patient, and the reason for the visit. At the *household level*, it includes the sex and age of the household member, and for adults a dummy indicating that the person is literate. We favor the results controlling for these characteristics since it improves the precision of the estimates. Finally, we clustered error terms at the health area level to take into account potential correlation between units in the same assignment unit.

4 Results

In this section we present the impact of fee-for-service on facilities' performances, then on worker effort and motivation, and then on worker strategies to meet the performance criterion.

4.1 Performances

In this section we present the effect of fee-for-service on facilities' performances in terms of service utilization (the scheme's performance criterion), health outcomes, and providers' revenue.

Utilization

Table 1 presents the effects of fee-for-service on service utilization. In the control group, 50% of people visited a health facility in the last 12 months, and fee-for-service reduced this proportion to 44% (the difference is significant at the 1% level). The detailed analysis by type of service shows that this overall decrease in utilization comes mostly from curative and prenatal services. In the control group, 41% of household members used curative services at the facility in the last 12 months, while 35% in the fee-for-service group (the difference is significant at the 1% level). Although self-declaration of sickness is generally not reliable because it is endogenous to consultation (see Akin et al. 1998), we check that the decrease in utilization is not due to a decrease in needs by focusing on people who say that they have been sick in the last 12 months: the proportion of sick people who visited a facility was reduced from 62% in the fixed payment group to 57% in the fee-for-service group (significant at the 5% level, result available upon request). Also, take-up for prenatal visits was found to be 79% in the control group and 69% in the fee-for-service group, resulting in a decrease of 0.41 prenatal visit per pregnant woman off a basis of 3.23 visits[18] (these differences are both significant at the 1% level). The reduction in utilization of prenatal services is similar when we restrict the sample to women who gave birth before fee-for-service stopped, showing that the impact appeared during the exposure to fee-for-service. We thus find a clear reduction in prenatal service take-up due to fee-for-service, whereas at baseline there was no significant difference in utilization of this service (Appendix Table 3.B).

We do not find other significant effect of fee-for-service on utilization of the other services (immunization, attended delivery, postnatal services, and family planning). 85% of children aged 0-5 received at least one immunization shot based on mother declaration, and the enumerators could see the TB immunization scar on the shoulder of 60% of children. 82% of births were attended in a health facility over the last 12 months, and 47% of mothers used postnatal services for an average of one postnatal consultation per mother. Only 5% of women aged 15-49 were using a modern

[18] We don't find any substitution of modern medicine for traditional medicine: the same reduction in the number of prenatal visits is found when we include visits to healers and den mothers. Note that women report a very small utilization of traditional medicine for prenatal care.

contraceptive method[19] and the fertility rate[20] is very high: 35% of women aged 15-49 had been pregnant in the last 12 months in both the control and fee-for-service groups. This result indicates that the differential utilization of prenatal care services is not a composition effect due to differential fertility. Fertility is indeed exactly similar in both groups.

It should also be noted that health service utilization seems to have been increasing a lot between the baseline 2009 survey and the endline 2012 survey, as shown by comparing the levels of utilization in the control group in Table 1 and Appendix Table 3.B. For instance, the proportion of pregnant women who used prenatal services was 74% in 2009 and 79% in 2012, the proportion of attended delivery was 71% in 2009 an 82% in 2012, and the proportion of mothers who used postnatal services was 27% in 2009 and 47% in 2012[21]. The negative impact of fee-for-service on prenatal service utilization should thus be placed in a context where the natural trend in prenatal service utilization was increasing (we don't have accurate information on curative visits in the 2009 survey).

Population Health Status

Table 2 presents the effect of fee-for-service on health outcomes. We find a small deterioration in weight-for-age z-scores in fee-for-service health areas: weight-for-age mean of children 0-5 in fee-for-service health areas is 0.16 standard deviation below the mean in the fixed payment health areas, while weight-at-birth means were identical at baseline (Appendix Table 3). Height-for-age and the proportion of children born in the last 12 months who are still alive are not statistically different in both groups[22]. The estimates are less precise when we focus on children born before September 2012, when fee-for-service was in place, but the point estimates are of similar magnitudes. We don't find that fee-for-service affected the overall mortality rate in the households, nor mortality of women who gave birth in the last 12 months and children aged 0-5. If anything, the negative impact of fee-for-service on health outcomes is thus concentrated on children born in the last 12

[19] Modern contraceptive methods are pill, shot, condom, IUD, spermicidal, implant and sterilization.

[20] Fertility rate is calculated on women from the representative sample only, since all women in the other sample have been pregnant in the last 12 months by construction.

[21] We should be cautious with the 2009 and 2012 comparison since the household samples are not the same in the two surveys. Both have been randomly selected within each health area but the selection procedure was not the same (the authors were not involved in the 2009 survey) so there may be sampling variations. We thus do not want to put much weight

[22] Child survival rate in control health areas is found 93% at baseline and 99% at endline, but this important difference is largely due to the fact that they are not calculated on comparable age groups. Children at endline are all below 1 since their mother was pregnant in the last 12 months, while at baseline they can be of any age since they have been the last child of their mother. The average age of the corresponding children is 0.5 years at endline but 2.5 years at baseline.

months. It may be related to the negative impact of fee-for-service on prenatal care utilization.

Health Facility Revenue

Table 3 presents the effects of fee-for-service on facility revenues, worker's payment, and the overall quality of facility infrastructure and equipment.

Facility Revenue and Worker Payment As per the first line of Table 3, we find that the average governmental payments over the course of the experiment were identical in the fee-for-service and fixed payment groups (about FC 500,000, being USD 550 per month). However, facilities' revenue from users is half as big in fee-for-service facilities as in fixed payment facilities (the difference is significant at the 10% level). We don't observe any difference in revenue from private donors and NGOs, which anyway represent a very tiny proportion of facility revenue (about 1%). This result is consistent with our previous findings that fee-for-service led to lower service utilization than fixed payments, along with a decrease in user fees and price of drugs (see below Section 4.3). As a consequence, salary to health workers was significantly lower in fee-for-service health facilities than in fixed payment ones. We find a 34% reduction in last month worker payment as reported by the facility head, and a 28% decrease as reported by the health workers (significant at the 10% and 5% level respectively). The decrease in service utilization and in prices (see Section 4.3) thus led to concrete deterioration of facilities' revenue and worker income.

Quality of the Facility Infrastructure and Equipment We find a significant negative impact of fee-for-service on the quantity and quality of equipment. The mean *quality index* in the fee-for-service group is -0.52, while 0.20 in the fixed payment group. Most of the twelve items included in this index indicate a lower quality of equipment in the fee-for-service facilities, and four differences are significant: sink, clean towels, sterilization material and the availability of an examination table. Furthermore, the mean *equipment index* is -0.64 in the fee-for-service group, while 0.05 in the fixed payment group. The components of this index show that fee-for-service facilities have consistently less equipment than the comparison ones, with four significant differences: microscope, gynecological examination table, fridge and fuel. The *infrastructure index* is statistically identical in the two groups. The negative effects of fee-for-service on the quality and equipment indices are likely to be related to the reduced revenue in the fee-for-service group. Because of the lack of resources, fee-for-service health facilities had difficulties in investing in new equipment and repairing

existing equipment.

4.2 Effort and Motivation

In this section, we examine whether the reduced performances are due to a reduction in worker effort. Facilities count on average seven workers, among which two-thirds are technical workers (doctors –only 3% of staff – nurses and birth-assistants) and one third is non-technical workers (pharmacists, managers, secretaries, receptionists and maintenance workers). It is important to notice first that contrary to the result of Bandiera et al. (2013), here the team incentive did change team composition: the number of workers, the levels of qualification, and the turnover are identical in the fee-for-service group and in the fixed-payment group (results available upon request). The finding that staff composition remained stable suggests that worker mobility was low and that financial incentives were not able to spur health workers into assortative matching by ability. Knowing that, we present here the differences in worker effort and motivation in the fee-for-service and fixed payment groups.

Worker Effort

Table 4 presents the impact of fee-for-service on worker effort.

Attendance We find higher staff attendance under fee-for-service than under fixed-payment in the unannounced visits in July, August and September 2012: 58% in the fixed-payment group versus 65% in the fee-for-service group, a 14% increase, significant at the 10% level (Figure 9 in the Online Appendix shows the distribution of staff attendance at facilities by treatment status). The higher attendance due to fee-for-service echoes workers' statements in the qualitative interviews: "If we work a lot, we will have more money", or "We need to work many days and hours in order to have more patients." Even if the fee-for-service mechanism reduced worker payment, workers were thus more present at facility in the fee-for-service group than in the fixed-payment group[23].

Preventive Sessions at Facilities Incentivized workers organized more preventive sessions at facilities in the last 12 months than non-incentivized workers (120 instead of 100), although the difference is not significant. The increase is actually driven by targeted services (immunization, pre-

[23]Note that health facilities are open on average 30 days per month and 139 hours per week, suggesting that the margin of improvement in the extensive margin of service supply is almost non-existent. There is no statistical difference in facility opening between fee-for-service and fixed payment facilities (results available upon request).

natal care, and family planning) for which 74 preventive sessions were offered in the fixed payment group versus 106 in the fee-for-service group (a 43% increase marginally significant at the 10% level). For non-targeted services (postnatal care and VIH prevention), the number of preventive sessions is also higher in the fee-for-service group (32 instead of 27) but the difference is not significant[24] (see Figure 5 and 6 in the Online Appendix for the change in distributions). As a result, access to targeted health services is easier in the fee-for-service group since a larger number of preventive sessions gives more opportunities to use the service, while access to non-targeted services remained equivalent in both groups.

Number of Outreach Activities in the Community The number of outreach activities by health workers in the community is higher in the fee-for-service group: health workers performed an average of 22 visits to the community in the last 12 months, versus 15 in the fixed payment group, but this difference is not significant (p-value=0.171). In fact, the increase in outreach activities is driven by targeted services: health workers made 16 visits to communities for these services in the fee-for-service group, versus 10 in the fixed payment group (a 60% significant increase significant at the 10% level). In contrast, the increase in outreach activities for non-targeted services is small (7 versus 5) and not significant (see Figure 7 and 8 in the Online Appendix for the change in distributions). The population in the catchement area of fee-for-service facilities should thus be better informed about time and day of the preventive sessions organized at facility for targeted services than the population in the catchement area in fixed payment facilities.

Free-riding We don't find evidence that the collective nature of the incentive led to free-riding. First, the proportion of agents who did not do any outreach activities remained equal in both groups (48%). Second, the 25th, 50th and 75th percentiles of the number of outreach activities per health worker all increased in the incentivized group, which means that effort increased over the whole counterfactual distribution. Finally, the standard deviation of the number of outreach activities per agent at the facility level is larger in the fee-for-service group, but not statistically different from the fixed payment group. We cannot reject the hypothesis that the effect of fee-for-service on worker effort is a pure upward translation for all workers. Altogether, these findings suggest that workers did not free-ride on others' effort.

[24] The supply for preventive sessions is already higher for targeted services than for non-targeted services. The incentive scheme thus widened this gap.

The Structure of Worker Motivation

Table 5 presents the impact of fee-for-service on the structure of worker motivation in terms of intrinsic versus extrinsic motives.

Attention Paid to Material versus Non-Material Benefits In the fixed payment group, 38% of workers mention spontaneously material benefits (e.g. remuneration, standard of living) as the main advantage or disadvantage of their position, as opposed to non-material benefits (e.g. social recognition or health benefits to the population). This proportion increases dramatically to 50% in the fee-for-service group (a 32% increase significant at the 5% level). Importantly, this change is also unlikely to be driven by the decrease in worker salary since we observe an increase from 11% to 19% (significant at the 10% level) in the proportion of workers who mention material benefits as the main *advantage*, while a smaller and insignificant increase in the proportion of workers who mention material benefits as the main *disadvantage* (from 29% to 34%, p-value=0.22). This finding gives evidence of a shift in attention from the intrinsic value that the worker attributes to her job to its extrinsic benefits. We interpret this effect as evidence that introducing competition in access to public funds increases the salience of financial stakes for health workers, and the weight of external motives relative to intrinsic motives in worker utility.

Staff Attendance After the Incentives were Removed The positive effect of the fee-for-service scheme on staff attendance when incentives were in place reversed after incentives were withdrawn. The attendance rate in the fixed payment group was 57% at endline, similar to before the governmental payment was withdrawn, which confirms that the termination of fixed payments did not affect staff effort and left worker motivation intact. In contrast, a striking reversal happened in the fee-for-service group: the attendance rate was at 65% before the incentive was withdrawn while only 45% after. This represents a substantial and statistically significant difference in the number of present workers between the ex-incentivized and ex-non-incentivized facilities: 3.8 in the fixed payment group while only 2.5 in the fee-for-service group[25] (see Figure 10 in the Online Appendix for the change in distribution). The incentive thus induced higher worker motivation compared to fixed payments as long as the incentives were in place, but lower motivation after the incentives were withdrawn. It is important to keep in mind that payments from the government

[25]This result is consistent with declarative data from the workers: self-declared worker attendance rate in the last seven days is found 78% in the fixed payment group while 71% in the fee-for-service group (p-value of the test of equality 0.04).

stopped in both the fee-for-service group and the fixed-payment group at the same time, which represents the same average reduction in health facilities' revenue by design. Payment termination equalizes back worker incentives of attracting patients in the ex-incentivized group and in the ex-fixed payment group, which should lead to a convergence of worker motivation. The fact that attendance is found lower in the ex-incentivized group (rather than equal) may result from the combination of the loss in intrinsic motivation and the reduced wages resulting from worker past strategies.

Job Satisfaction Finally, we find that the fee-for-service scheme led to a decrease in worker satisfaction. Incentivized facility heads report an average job satisfaction of 5.24 instead of 6.21 in the fixed payment group (p-value=0.055). Other health workers have a lower job satisfaction in general, 5.53 in the fixed payment group, reduced to 4.89 in the fee-for-service group, although this difference is not significant (p-value=0.169). Overall, if anything, incentivized health workers seem less satisfied with their job than non-incentivized health workers, which may also result from the combination of reduced intrinsic motivation and reduced wages resulting from worker past strategies.

4.3 Misplaced Strategies

Reduced performances did thus not result from reduced effort, although there seems to be a shift in the nature of worker motivation. In this section, we review the strategies used by the health workers to better understand how the incentive scheme could have resulted in counterproductive effort.

Prices of Health Services

Table 6 presents the effects of fee-for-service on user fees and drug prices. We find evidence that fee-for-service induced lower user fees for targeted services than fixed payment. The mean Summary Fee Index for all services is not statistically different between both groups, but the mean Summary Fee Index for *targeted* services it is 0.79 standard deviations below the mean in the fixed payment group (significant at the 10% level). The mean Summary Fee Index for *non-targeted services* of the fee-for-service group is 0.38 standard deviations below the mean of the fixed payment group, a difference which is not statistically significant. The detailed analysis of fees by service shows that the average fee is lower for all services in fee-for-service facilities, although the estimates are

generally imprecise.

We find significant differences in user fees for prenatal visits. Fee-for-service facility heads report an average first prenatal visit fee of FC 442 instead of FC 850 in fixed payment facilities (a 48% decrease), and an average second prenatal visit fee of FC 51 instead of FC 132 in fixed payment facilities (a 61% decrease), both difference being significant at the 10% level. Lower user fees for prenatal visits is confirmed by users themselves: women who used a prenatal visit in the last 12 months report an average user fee of FC 458 in fee-for-service health areas, instead of FC 583 in fixed payment health areas, a 21% decrease significant at the 5% level. Note that the difference in prenatal visit fees is visible before september 2012 when governmental payments stopped, as women who used a prenatal visit before September 2012 report a 33% difference (significant at the 1% level).

We also find lower fees for curative visits in fee-for-service facilities than fixed payment facilities. Based on facility heads, the difference is sizeable (-55% for the first curative visit), but imprecisely estimated. Based on patient exit interviews, the difference is smaller but still sizeable (-26%) and significant at the 5% level. Patient exit interviews show also a 49% smaller price for drugs in fee-for-service facilities than in fixed payment facilities, the difference being significant at the 1% level.

Overall, our data consistently suggest that fee-for-service encouraged health facilities to set lower prices, especially for targeted services, probably a strategy to attract more patients. Importantly, the lower prices in fee-for-service facilities relative to fixed payment facilities at endline have to be placed in a context where prices have been increasing a lot since 2009. As per Appendix Table 3.A, patient exit interviews provide user fees for curative visits, pre- and postnatal visits, child immunization, and child delivery, at baseline which are all much smaller than what is reported by facility heads and patient exit interviews at endline. Hence, the incentive mechanism did not induce a price reduction but a *smaller price increase* than fixed payments.

Service Quality Table 7 presents the impact of fee-for-service on service quality. On average, patients straight out of consultation report 16-minute consultations in both groups, while household members who visited in the last 12 months report a consultation time slightly longer in the fee-for-service group (19 minutes) than in the fixed payment group (16 minutes) (the difference is significant at the 1% level). This finding dispels the fear that incentives based on the quantity

of health services would imply maximizing the number of patients at the expense of time spent with each of them. Beside this, there is no other observable change in service quality. The average compliance rates with standard medical procedures are low in both groups: 32% for curative visits, 67% for prenatal visits, and 62% for postnatal visits. 49% of patients straight out of consultation report that drugs were prescribed without them having been examined. On average, women stay 2.3 days in the health facility after giving birth. These measures of technical quality were not affected by fee-for-service. Our data thus show that technical quality is quite poor and that the incentive scheme had no impact on it.

Both users' understanding of diagnosis and medication and users' satisfaction are high: 82% of patients straight out of consultation and 94% of household members who visited in the last 12 months understand the diagnosis, and 90% of patients are aware of what drugs they are supposed to take; 94% among patients straight out of consultation and 91% among household members who visited in the last 12 months are satisfied with their visit. The main reason for being satisfied or dissatisfied of the visit is care quality, way above the second reason which is welcome quality - all other factors being negligeable[26]. Patients' satisfaction was not affected by the incentive scheme. Together, these results suggest that incentivized workers did not reduce quality in response to the volume-based incentive, nor improved quality to attract more patients.

Why not using health services?

Table 8 presents the impact of fee-for-service on the proportion of total population who do not use health services per reason category (financial cost, waiting time, distance, lack of interest in the service, and poor quality of the service). The sum of proportions per category totalizes the proportion of the population who do not use the service (those who used the service have a zero in all reasons). Among individuals who have been sick, 38% did not visit for a curative consultation in the fixed payment health areas, among which 16% because it is too expensive, 1% because it is too far away, and 21% because they think it is not useful. In the fee-for-service health areas, we see larger proportions of individuals who did not use curative visits because it is too expensive, too far away, and not interesting, but the difference is significant only for the proportion who do not use because it is too far away. However, Appendix Table 3.B shows that the average distance to the closest health facility is identical in both groups. Therefore, we interpret the difference in the

[26] Table 6 reports only reasons related to service quality. Other reasons for being satisfied or disatisfied by the visit were price and distance, which both account for very small proportions of satisfaction, and even smaller proportions of dissatisfaction.

proportion of individuals complaining about distance as a change in motivation to get the service.

We find a similar change for prenatal services. Indeed, we find large increases in the proportions of women who do not use prenatal services because of distance (from 3% to 8%), and because of lack of interest (from 6% to 9%). We also find a small increase in the proportion who do not use because of poor service quality from 0% to 1%. In contrast, there is no change in the proportions of women who do not use the service because it is too expensive and because health workers are not available (waiting time). All in all, we interpret these findings as evidence that fee-for-service reduced the value that women attribute to prenatal services.

For the other services (family planning, child delivery, postnatal visits, and child immunization), there is no change in the overall proportion of individuals who do not use these services. We see some changes in the reasons why people do not use, but it is less clear that these changes express a change in interest. For family planning, a smaller proportion report that it is of little interest to them and a higher proportion reports that they are opposed to it. For postnatal services, a smaller proportion reports that it is of little interest to them and a higher proportion that it is too far away, a sign of lower motivation. For child immunization and postnatal services, there are only very small changes. Prenatal and curative services are thus the only ones that suffered from a clear loss in perceived benefit.

Misunderstanding of Users' Behavior

In our data, prices do not appear as an important parameter neither in the decision to visit, nor in the decision not to visit. Only 3% of patients in exit interviews declared that they chose the facility because prices were attractive, while 59% mentioned proximity and 34% service quality. Similarly, 6% of individuals who visited a facility in the last 12 months declared that they chose the facility because prices were attractive, 60% because of proximity, and 26% because of service quality. Finally, 5% of women who gave birth in a facility declared that they chose the facility because prices were attractive, while 61% mentioned proximity and 32% service quality[27] (these statistics are available upon request).

Regarding non-users, Table 8 shows that the main reason why people do not use health services is never prices, but rather the lack of interest in the service and distance, suggesting that there is a higher need to better understand the benefits of using health services than to reduce prices.

[27] These numbers do not sum at exactly 100% because a handful of responses did not enter into these three categories. The question "why did you choose this facility?" was an open question, and we coded the answer into the categories "prices", "proximity", "quality" and "others".

In this context, selling hard and decreasing prices does not seem to be the most adequate strategy to increase service utilization, at least until the lack of perceived benefit is not addressed. The positive effects of price reduction may not realize as long as perceived benefit is fragile. In the health sector, marketing and price reduction may have to come with an effort to increase awareness of health service benefit, otherwise prices may work as a signal for quality. Future research should examine the informational effects of marketing and prices in sectors like health, especially in contexts where the population is not fully aware of the benefit of using health services. Dupas (2014) provides an interesting example where lower prices of bednets led to higher adoption in a context where households were offered a voucher indicating both the subsidized price *and* the market value of the bednet. Thanks to the indication of the bednet market value on the voucher, the households received positive information on the quality of the bednet.

In the end, it is surprising that the health workers did not invest in awareness campaigns or other action to improve awareness of health service benefits. This finding echoes Ariely et al. (2009) who find that large stakes may lead to "big mistakes". In our context, governmental funds represent half of facilities' budget in the control group so the stake is very large. One explanation is that rewards generate negative stress limiting one's creative thinking (Baumeister, 1984; Kamenica, 2012). McGraw and McCullers (1979) explain that rewards lead to underachievement when the task requires open-minded thinking because the focus of attention limits one's capacity to draw unusual connections between elements. To illustrate this explanation, qualitative interviews of incentivized health workers reveal that they did not want to increase prices as they thought the population would complain against price increase and they were fearful of reducing demand to even lower levels. Another reason why health workers did not invest in awareness campaigns may be related to the change in job satisfaction and structure of motivation, which shifted away from intrinsic motives. The important lesson from this paper is that the combination of low worker capacity and a delicate demand for health is not an appropriate context for an incentive scheme which requires to understand users' behavior and use creative thinking. Finally, new health workers informed about the payment system who would have self-selected in the health sector might be more able to develop appropriate strategies, as suggested by the results of Ashraf, Bandiera and Lee (2014) on the effects of carreer incentives on selection in the public health sector.

5 Conclusion

This study compares a fee-for-service payment mechanism for health providers to fixed payments in the district of Haut-Katanga, DRC. In the fee-for-service scheme, governmental payments to health facilities depend on the volume of patients for some pre-determined services, which aimed to promote health service utilization. The findings show that fee-for-service payments led to more efforts by health workers to attract patients for the services included in the performance measure, without crowding out non-targeted services or service quality, nor generating score manipulation or free-riding within the facilities. However, the increased efforts from the health workers were associated with an overall smaller utilization of health services, a substantial reduction in facility revenue and worker income, as well as a slight deterioration in newborn health outcomes. The strategies implemented by incentivized workers to increase service utilization, which focused on service affordability and publicity, were thus counterproductive as the population show less interest in health services. These findings suggest that existing health workers cannot be treated as entrepreneurs as they were not always able to identify the successful strategies to increase demand for health services. We also find that fee-for-service led to a decrease in worker job satisfaction and a decrease in worker intrinsic motivation.

In terms of policy lessons, these findings suggest that financial incentives should be used only in situations where the task is simple so that workers have the capacity to carry out the rewarded output without difficulty. This may be a challenge in the health sector as demand for health is complex. Specific interventions to stimulate demand for health may be combined with incentive schemes for providers so that provider effort to increase service utilization can be more productive, in particular interventions to improve awareness about the benefit of health services.

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Table 1: Impact on Service Utilization

	Unit of Observation	Number of Observations	Average Treatment Effect (ATE)	p-value (ATE=0)	Mean of dep. variable in the control group	St.dev. of dep. variable in the control group
Overall Utilization						
Visited a health facility in the last 12 months	Household Member	9113	-.06	0.001***	.50	.50
Curative Services						
Used curative care services at a health facility in the last 12 months	Household Member	9124	-.06	0.004***	.41	.49
Family Planning						
Uses a modern contraceptive method	Women 15-49	1873	.00	0.762	.05	.22
Has been pregnant in the last 12 months (representative sample only)	Women 15-49	902	-.01	0.733	.35	.48
Prenatal Services						
Used prenatal care services at a health facility	Pregnant Women	1121	-.1	0.004***	.79	.41
Number of prenatal visits at a health facility	Pregnant Women	1098	-.41	0.006***	3.23	1.9
If gave birth before Sept. 2012 , used prenatal services at a health facility	Pregnant Women	624	-.08	0.002***	.94	.24
If gave birth before Sept. 2012 , number of prenatal visits at a health facility	Pregnant Women	603	-.35	0.062*	3.47	1.75
Delivery						
The mother delivered in a health facility	Mother	961	-.03	0.459	.82	.38
If delivery attended, had a C-section	Mother	773	.02	0.15	.02	.13
If gave birth before Sept. 2012 , delivered at a health facility	Mother	624	-.03	0.473	.83	.38
If gave birth before Sept. 2012 and delivery attended , had a C-section	Mother	500	.03	0.097*	.01	.11
Postnatal Services						
Used postnatal care services at a health facility	Mother	960	.00	0.907	.47	.50
Number of postnatal visits at a health facility	Mother	945	-.02	0.797	.78	1.19
If gave birth before Sept. 2012 , used postnatal services at a health facility	Mother	623	-.04	0.509	.49	.50
If gave birth before Sept. 2012 , number of postnatal visits at a health facility	Mother	623	-.08	0.513	.88	1.28
Child Immunization						
Ever had an immunization shot	Children 0-5	2448	-.01	0.726	.85	.36
Has a scar from tuberculosis immunization	Children 0-5	2441	.01	0.880	.60	.49
If aged 15 months or older , ever had an immunization shot	Children 0-5	1415	.01	0.428	.93	.26
If aged 15 months or older , has a scar from tuberculosis immunization	Children 0-5	1411	.04	0.337	.65	.48

Data Source: Endline survey. ***, **, * indicate significance at 1, 5, and 10%. Error terms are clustered at the health area level. In all regressions we control for the health zone, and for whether the health facility is rural or urban, religious or non-religious, private or public, health post or health center. At the individual level, we add controls for the sex and age of the individual, grade and experience if the respondant is a health worker, reason for visiting if the respondant is a patient, and whether the individual is literate if the respondant is an adult household member.

Unit of Observation: Pregnant Women = Women 15-49 who were pregnant in the last 12 months ; Mother = Women who gave birth in the last 12 months.

Table 2: Impact on Health Outcomes

	Unit of Observation	Number of Observations	Average Treatment Effect (ATE)	p-value (ATE=0)	Mean of dep. variable in the control group	St.dev. of dep. variable in the control group
Newborn and Child Health						
Weight-for-age z-score	Children 0-5	2402	-.16	0.066*	-1.09	1.63
Height-for-age z-score	Children 0-5	2376	-.11	0.245	-1.67	1.72
If gave birth in the last 12 months, her child is still alive	Mother	961	-.01	0.144	.99	.10
If born before September 2012 , weight-for-age z-score	Children 0-5	2090	-.13	0.179	-1.31	1.51
If born before September 2012 , height-for-age z-score	Children 0-5	2066	-.12	0.277	-1.84	1.66
If gave birth before Sept. 2012 , her child is still alive	Mother	624	-.01	0.241	.99	.08
Mortality						
Number of persons in the household who died in the last 12 months	Household	1708	.00	0.832	.14	.40
Number of women in the household who died for perinatal reasons in the last 12 months	Household	1707	.00	0.381	.01	.10
Number of children under 5 in the household who died in the last 12 month	Household	1707	.01	0.529	.09	.32

Data Source: Endline survey. ***, **, * indicate significance at 1, 5, and 10%. Error terms are clustered at the health area level. Same controls as in Table 1.
Unit of Observation: Mother = Women who gave birth in the last 12 months.

Table 3: Impact on Facility Ressources

	Unit of Observation	Number of Observations	Average Treatment Effect (ATE)	p-value (ATE=0)	Mean of dep. variable in the control group	St.dev. of dep. variable in the control group
Governmental Payments (from administrative data)						
Average governmental payment to facility over Jun. 2010 - Dec. 2012 (FC)	Health Facility	149	-17489.36	0.768	500646.9	422386.6
Facility Revenue at endline						
Revenue from users in the last month (FC)	Health Facility	118	-288458.1	0.093*	562506.9	1216083
Other revenue from private donors and NGOs in the last month (FC)	Health Facility	118	-18039.43	0.256	11434.43	85860.71
Workers' Payment at endline						
Reported by the Facility Head						
Average total payment per worker in the last month (FC)	Health Facility	118	-19252.79	0.079*	56168.16	71476.75
Reported by the Health Workers						
Total payment in the last month (FC)	Health Worker	282	-35885.75	0.031**	127139.5	174494.9
Quality of the Facility Infrastructure and Equipment at endline						
Quality index^ based on interviewers' observation (Principal Component Analysis)	Health Facility	116	-.52	0.014**	.20	1.51
Infrastructure index^^ (Principal Component Analysis)	Health Facility	110	.18	0.372	-.17	1.43
Equipment index^^^ (Principal Component Analysis)	Health Facility	116	-.64	0.026**	.05	2.23

Data Source: Endline survey. ***, **, * indicate significance at 1, 5, and 10%. Error terms are clustered at the health area level. Same controls as in Table 1.

^The quality index includes observation on building quality, waiting room, consultation room, lavabo, soap, clean towels, bathrooms, sterilization material, permanent display of user fees and drugs' costs, use of an examination table and ordinogram.

^^The infrastructure index includes six items: phone ownership, motorized transportation mean ownership, access to clean water, toilet and electricity, and hard roof.

^^^The equipment index includes the quantity of fifteen types of medical equipment owned by the health facility: generator, sterilizer, tensiometer, stethoscope, baby-scales, weighing scale, height gauge, microscope, gynecological examination table, fridge, delivery boxes, fuel, kerosene, bed and solar panel.

Table 4: Impact on Worker Effort

	Unit of Observation	Number of Observations	Average Treatment Effect (ATE)	p-value (ATE=0)	Mean of dep. variable in the control group	St.dev. of dep. variable in the control group
Attendance						
% workers present in the facility (average across unnanounced visits Jul., Aug. and Sept. 2012)	Health Facility	138	.07	0.067*	.58	.29
Preventive Sessions* Organized at the Facility in the Last 12 Months						
Number of preventive sessions organized at the facility	Health Facility	118	20.08	0.291	100.44	82.88
Number of preventive sessions organized at the facility for targeted services	Health Facility	119	21.9	0.104	73.92	57.1
Number of preventive sessions organized at the facility for non-targeted services	Health Facility	120	5.5	0.422	26.87	31.89
Outreach Activities by Health Workers in the Last 12 Months**						
Number of outreach activities	Health Worker	326	7.18	0.171	15.23	44.48
Number of outreach activities for targeted services	Health Worker	326	5.98	0.096*	9.83	26.42
Number of outreach activities for non-targeted services	Health Worker	326	1.21	0.523	5.4	19.54
Free-riding						
Did not do any outreach activity for targeted services in the last 12 months	Health Worker	326	-.00	0.947	0.48	0.50
Among agents who did at least one outreach activity for targeted services:						
25th percentile of the number of outreach activities	Health Worker	172	3	0.006***	2	na
50th percentile of the number of outreach activities	Health Worker	172	6	0.092*	6	na
75th percentile of the number of outreach activities	Health Worker	172	9	0.077*	24	na
Facility stand. dev. of the nb of outreach activities for targeted services per agent (if > 1 agent)	Health Facility	87	2.17	0.522	8.34	16.07

Data Source: Endline survey. ***, **, * indicate significance at 1, 5, and 10%. Error terms are clustered at the health area level. Same controls as in Table 1.

*Preventive sessions include: immunization, prenatal care and family planning (targeted services), postnatal care and HIV prevention (non-targeted services).

**Outreach activities include: immunization, prenatal care and family planning (targeted services), postnatal care and HIV prevention (non-targeted services).

Table 5: Impact on Staff Intrinsic Motivation

	Unit of Observation	Number of Observations	Average Treatment Effect (ATE)	p-value (ATE=0)	Mean of dep. variable in the control group	St.dev. of dep. variable in the control group
Importance Attached to Job Remuneration						
Facility staff elicits financial benefits as the main advantage or disadvantage of his position	Facility Staff	454	.12	0.026**	.38	.49
Facility staff elicits financial benefits as the main advantage of his job	Facility Staff	452	.08	0.069*	.11	.31
Facility staff elicits financial benefits as the main disadvantage of his job	Facility Staff	454	.05	0.220	.29	.46
Staff Attendance after fee-for-service was withdrawn						
Number of workers in the facility on unnanounced visit 4 (enline survey)	Health Facility	123	-1.35	0.032**	3.84	3.42
% workers present in the facility on unannounced visit 4 (endline survey)	Health Facility	123	-.12	0.099*	.57	.31
Attendance rate in the facility in the last 7 days	Health Worker	331	-.07	0.042**	.78	.14
Job Satisfaction						
Level of satisfaction of the facility head for his job (from 0 to 10)	Facility Head	123	-.97	0.055*	6.21	2.51
Level of statisfaction of the health worker for his job (from 0 to 10)	Health Worker	331	-.64	0.169	5.53	2.86

Data Source: Endline survey. ***, **, * indicate significance at 1, 5, and 10%. Error terms are clustered at the health area level. Same controls as in Table 1.

Table 6: Impact on User Fees

	Unit of Observation	Number of Observations	Average Treatment Effect (ATE)	p-value (ATE=0)	Mean of dep. variable in the control group	St.dev. of dep. variable in the control group
User fees as reported by facility heads at endline						
Fee Summary Index *	Health Facility	93	-1.02	0.142	.00	4.01
Fee Summary Index, targeted services only **	Health Facility	109	-.79	0.061*	.00	2.80
Fee Summary Index, non-targeted services only ***	Health Facility	95	-.38	0.344	.00	1.94
Targeted Services						
User fee for first curative visit (FC)	Health Facility	123	-692.45	0.281	1263.49	4557.32
User fee for attended delivery (FC)	Health Facility	113	-224.18	0.655	2747.41	2423.25
User fee for first prenatal visit (FC)	Health Facility	118	-407.87	0.095*	850	1741.42
User fee for second prenatal visit (FC)	Health Facility	115	-80.8	0.053*	132.2	264.86
Non-Targeted Services						
User fee for second curative visit (FC)	Health Facility	112	-178.08	0.180	459.48	799.04
User fee for postnatal visit (FC)	Health Facility	111	-57.43	0.386	105.36	430.82
User fee for school entry visit (FC)	Health Facility	112	-6.72	0.838	86.67	154.83
User fees in the last 12 months as reported by users at endline						
If at least one visit in the last 12 months:						
Fee for the last postnatal visit (FC)	Mother	388	-38.33	0.533	349.27	585.98
Fee for the last attended delivery (FC)	Mother	762	-144.22	0.844	8768.17	6910.28
Fee for the last prenatal visit (FC)	Pregnant Women	918	-125	0.019**	583.44	721.46
Fee for the last immunization visit (FC)	Children 0-5	2014	-12.82	0.257	55.14	187.39
If the reason for the present visit is illness:						
Fee for the present curative visit (FC)	Patient	718	-1897.28	0.034**	7311.32	16030.53
Cost of drugs for the present curative visit (FC)	Patient	549	-1581.25	0.002***	3628.32	6160.66
User fees *before September 2012* as reported by users at endline						
If at least one visit in the last 12 months before September 2012:						
Fee for the last postnatal visit (FC)	Mother	227	-25.56	0.672	315.72	539.36
Fee for the last attended delivery (FC)	Mother	493	521.19	0.528	8726.83	6926.56
Fee for the last prenatal visit (FC)	Pregnant Women	581	-194.81	0.001***	598.05	706.02
Fee for the last immunization visit (FC)	Children 0-5	508	19.44	0.459	73.16	211.38

Data Source: Endline survey. ***, **, * indicate significance at 1, 5, and 10%. Error terms are clustered at the health area level. Same controls as in Table 1.

Unit of Observation: Pregnant Women = Women 15-49 who were pregnant in the last 12 months ; Mother = Women who gave birth in the last 12 months.

*Fee Summary Index is the equally weighted average of z-scores of its components. The z-scores are calculated by subtracting the control group mean and dividing by the control group standard deviation. The components of the index are fees paid for first and second curative consultations, delivery, prenatal and postnatal visits, and preschool consultation.

**Targeted services are: first curative consultation, delivery, and prenatal visits.

***Non-targeted services are: second curative consultation, postnatal visit, and preschool consultation.

Table 7: Impact on Service Quality

	Unit of Observation	Number of Observations	Average Treatment Effect (ATE)	p-value (ATE=0)	Mean of dep. variable in the control group	St.dev. of dep. variable in the control group
Technical Quality						
Consultation time (minutes)	Patient	974	1.03	0.422	16.09	15.52
If visited a health facility, consultation time (minutes)	Household Member	4309	2.55	0.000***	16.99	15.74
If visited for illness, compliance rate with medical procedure for the present curative consultati	Patient	713	-.01	0.805	.32	.30
If visited for illness, drugs were prescribed to the patient and the patient was not examined	Patient	719	-.04	0.495	.49	.50
If delivery attended, number of days in the health facility after the delivery	Mother	746	.05	0.734	2.12	1.17
If any postnatal visit, compliance rate with medical procedures for the last postnatal consultati	Mother	389	.04	0.173	.62	.26
If any prenatal visit, compliance rate with medical procedures for the last prenatal consultation	Pregnant Women	923	.00	0.908	.67	.17
Users' Understanding						
If visited for illness, patient understands diagnosis and next steps	Patient	720	.00	0.971	.82	.38
If visited for illness, patient knows what drugs to be taken	Patient	718	-.05	0.187	.90	.30
If visited a facility, household member understands diagnosis	Household Member	4258	.02	0.223	.94	.24
Users' Satisfaction						
The Patient reports that s/he was…						
satisfied	Patient	994	.01	0.359	.94	.23
satisfied thanks to health service quality	Patient	990	.00	0.937	.57	.50
satisfied thanks to welcome quality	Patient	990	-.03	0.442	.28	.45
satisfied thanks to equipment quality	Patient	990	.00	0.997	.03	.18
not satisfied because of health service quality	Patient	993	-.01	0.671	.03	.18
not satisfied because of welcome quality	Patient	993	.00	0.946	.01	.09
not satisfied because of equipment quality	Patient	993	-.01	0.359	.01	.10
If visited a health facility, the Household Member reports that s/he was…						
dissatisfied because of equipment quality	Household Member	4326	.00	0.744	.91	.28
satisfied thanks to health service quality	Household Member	4318	.00	0.976	.74	.44
satisfied thanks to welcome quality	Household Member	4318	-.01	0.484	.08	.28
satisfied thanks to equipment quality	Household Member	4318	.00	0.916	.02	.14
not satisfied because of health service quality	Household Member	4312	.00	0.809	.05	.22
not satisfied because of welcome quality	Household Member	4312	.00	0.966	.01	.10
not satisfied because of equipment quality	Household Member	4312	.00	0.864	.01	.09

Data Source: Endline survey. ***, **, * indicate significance at 1, 5, and 10%. Error terms are clustered at the health area level. Same controls as in Table 1.

Unit of Observation: Household Member = any person in the sampled households; Pregnant Women = Women 15-49 who were pregnant in the last 12 months; Mother = Women who gave

Table 8: Impact on Reasons for not Using Health Services

Did not use the service in the last 12 months because…	Unit of Observation	Number of Observations	Average Treatment Effect (ATE)	p-value (ATE=0)	Mean of dep. variable in the control group	St.dev. of dep. variable in the control group
Curative Services (individuals who have been sick in the last 12 months)						
… It is too expensive	Household Member	5920	.03	0.141	.16	.36
… Waiting time for consultation is too long	Household Member	5920	.00	0.199	.00	.04
… It is too far away	Household Member	5920	.01	0.008***	.01	.07
… It is of little interest to me / I don't know what it is / how it works	Household Member	5920	.01	0.704	.21	.41
… The service is poor quality	Household Member	5920	.00	0.886	.00	.04
Family Planning						
… It is too expensive	Women 15-49	1876	.00	0.304	.01	.07
… It is too far away	Women 15-49	1876	-.01	0.380	.03	.18
… It is of little interest to me / I don't know what it is / how it works	Women 15-49	1876	-.07	0.041**	.48	.50
… I am opposed to it	Women 15-49	1876	.12	0.002***	.21	.41
… I want to get pregnant	Women 15-49	1876	.00	0.984	.06	.23
Prenatal Services						
… It is too expensive	Pregnant Women	1119	.00	0.686	.03	.16
… Waiting time for consultation is too long	Pregnant Women	1119	.00	0.765	.00	.04
… It is too far away	Pregnant Women	1119	.05	0.004***	.03	.16
… It is of little interest to me / I don't know what it is / how it works	Pregnant Women	1119	.03	0.044**	.06	.23
… The service is poor quality	Pregnant Women	1119	.01	0.075*	.00	.00
Attended Delivery						
… It is too expensive	Mother	960	.01	0.146	.02	.13
… Waiting time for consultation is too long	Mother	960	.00	0.000	.00	.00
… It is too far away	Mother	960	.00	0.947	.13	.34
… It is of little interest to me / I don't know what it is / how it works	Mother	960	.01	0.395	.02	.15
… The service is poor quality	Mother	960	.00	0.242	.00	.00
Postnatal Services						
… It is too expensive	Mother	954	-.01	0.631	.03	.18
… Waiting time for consultation is too long	Mother	954	.00	0.379	.01	.10
… It is too far away	Mother	954	.09	0.048**	.18	.38
… It is of little interest to me / I don't know what it is / how it works	Mother	954	-.08	0.008***	.30	.46
… The service is poor quality	Mother	954	-.01	0.568	.01	.12
Child Immunization						
… It is too expensive	Children 0-5	2446	-.01	0.170	.01	.10
… Waiting time for consultation is too long	Children 0-5	2446	-.01	0.077*	.02	.15
… It is too far away	Children 0-5	2446	.01	0.395	.02	.15
… It is of little interest to me / I don't know what it is / how it works	Children 0-5	2446	.02	0.363	.10	.29
… The service is poor quality	Children 0-5	2446	.00	0.290	.00	.00

Data Source: Endline survey. ***, **, * indicate significance at 1, 5, and 10%. Error terms are clustered at the health area level. Same controls as in Table 1.
Unit of Observation: Pregnant Women = Women 15-49 who were pregnant in the last 12 months ; Mother = Women who gave birth in the last 12 months.

Appendix Table 1: Relative Prices of Targeted Health Services

Service	Indicator	Relative Price (USD)
Services targeted at health centers and referral health centers		
Curative care	Per new curative consultation	$0.6
Institutional delivery	Per delivery at the health center	$5
Obstetric referral	Per pregnant woman referred to the referral center/hospital	$5
Full childhood immunization	Per fully immunized child	$3.5
Prenatal care	Per prenatal care consultation	$1.2
Tetanus toxoid vaccination	Per 5th dose of tetanus toxoid vaccination	$2
Family planning	Per woman that uses a modern method of family planning	$4.5
Additional services targeted only at referral health centers:		
Caesarean section	Per caesarean section delivery (and decision-tree has been followed)	$30
Blood transfusion, when appropriate	Per transfusion episode	$5
Obstetric referral	Per delivery referred to the referral center/ hospital"	$5

Appendix Table 2: Endline Sample

Endline Sample, by Payment Status

	PBF Group	Comparison Group	Total
Health areas	44	43	87
Health Facilities	60	63	123
Facility Staff	154	178	332
Patients	470	544	1,014
Households	859	849	1,708
Household members	4,578	4,656	9,234
Women 15-49	939	957	1,896
Pregnant Women*	571	560	1,131
Mothers**	479	489	968
Children 0-5	1,228	1,285	2,513

*Pregnant Women = Women who have been pregnant in the last 12 months
**Mothers = Women who gave birth in the last 12 months

Appendix Table 3.A: Balance Checks on Health Facilities

	Unit of Observation	Nb of Obs.	Mean in the control group	Standard Deviation in the control group	Difference in mean in the treatment group	p-value (difference=0)
Health Facilities at baseline						
Health Center (versus Health Post)	Health Facility	129	.78	.42	-.04	0.623
Public	Health Facility	129	.59	.50	-.03	0.734
Private	Health Facility	129	.28	.45	-.09	0.276
Religious	Health Facility	129	.13	.33	.11	0.119
Number of years of activity	Health Facility	122	20.18	22.43	.27	0.948
Catchement population	Health Facility	122	11129.3	15802.48	1255.16	0.669
Catchement area (km2)	Health Facility	109	368.96	826.58	-19.96	0.892
Number of beds	Health Facility	129	8.95	13.43	1.23	0.536
Number of workers	Health Facility	129	6.36	5.52	-.16	0.866
Has running water	Health Facility	129	.20	.41	-.02	0.782
Has electricity	Health Facility	129	.28	.45	-.04	0.52
Has an examining table	Health Facility	129	.67	.47	-.12	0.152
Has a scale	Health Facility	129	.86	.35	-.02	0.728
Has a gauge	Health Facility	129	.41	.50	-.03	0.680
Has a delivery box	Health Facility	129	.63	.49	-.01	0.922
Infrastructure Index^	Health Facility	129	.00	.56	.06	0.525
Equipment Index^	Health Facility	128	.00	.52	.12	0.352
Medical Material Index^	Health Facility	129	.00	.48	-.16	0.147
Stock of Vaccines Index^	Health Facility	125	.00	.87	-.17	0.144
Waiting time before consultation (minutes)	Patient exit interview	783	27.76	81.12	-.69	0.919
Time in consultation (minutes)	Patient exit interview	662	15.85	14.59	.87	0.626
Patient is satisfied or very satisfied of the consultation	Patient exit interview	783	.88	.32	-.03	0.399
Consultation fee for this consultation:						
Curative visit	Patient exit interview	379	525.63	1080.72	-63.67	0.677
Delivery	Patient exit interview	68	1521.88	2387.84	-464.17	0.5
Child immunization visit	Patient exit interview	201	387.96	676.54	-61.76	0.705
Pre- and postnatal visit	Patient exit interview	51	369.23	278.24	206.83	0.54
Cost of drugs for this consultation	Patient exit interview	783	1430.25	3435.05	235.3	0.585
If curative visit, cost of drugs for this consultation	Patient exit interview	379	1803.37	4283.39	553.37	0.498
Health Workers at baseline						
Female	Health Worker	457	.48	.50	-.1	0.042**
Age (years)	Health Worker	456	40.31	10.95	-.1	0.932
Doctor	Health Worker	457	.04	.20	.02	0.290
Qualified Nurse	Health Worker	457	.24	.43	-.01	0.708
Non-qualified Nurse	Health Worker	457	.31	.46	-.01	0.801
Midwife	Health Worker	457	.16	.36	.01	0.849
Adjunct	Health Worker	457	.17	.38	.00	0.952
No education	Health Worker	457	.08	.27	-.01	0.747
Primary Education	Health Worker	457	.08	.27	-.02	0.612
Academic Secondary Education	Health Worker	457	.31	.46	.06	0.262
Vocational Secondary Education	Health Worker	457	.30	.46	-.04	0.307
Higher Education	Health Worker	457	.23	.42	.01	0.822
Experience (years)	Health Worker	455	10.64	10.17	-1.49	0.137
Income (Francs Congolais)	Health Worker	304	69508.57	69909.81	2084.83	0.837
Satisfied in the current position	Health Worker	457	.48	.50	.06	0.262
Monthly income (FC)	Health Worker	457	41176.58	208923.5	-11561.5	0.218
Has another job outside the health facility	Health Worker	457	.30	.46	-.06	0.32
Number of working hours per week	Health Worker	421	52.1	24.46	-.36	0.92
Number of patient consultations per week	Health Worker	392	35.46	38.51	-2.74	0.616

Data Source: Baseline survey. ***, **, * indicate significance at 1, 5, and 10%. Error terms are clustered at the health area level. We control for the urban/rural location of the health facility.
^Each Summary Index is the equally weighted average of z-scores of its components. The z-scores are calculated by subtracting the control group mean and dividing by the control group standard deviation. The components of the Infrastructure Index are dummies of whether the health facility has a water tap, electricity, a waste disposal, a sewage disposal, and a pharmacy. The components of the Equipment Index are dummies for whether the health facility has a phone, a radio, the number of electricity generators, the number of examination tables, the number of refrigerators, the number of fuel liters, and the number of kerosene liters. The components for the Medical Material Index are dummies for whether the health facility has autoclaves, tensiometers, sthetoscopes, scales, gauges, microscope, and a delivery kit. The Stock of Vaccines Index components are the number of BCG vaccines, DTC vaccines, Polio vaccines, measles vaccines and anti-amariale vaccines in the facility. The Housing Index components are dummies for whether the household housing has a water tap, sanitation, garbage collection, and some energy (fuel or electricity).

Appendix Table 3.B: Balance Checks on Households

	Unit of Observation	Nb of Obs.	Mean in the control group	Standard Deviation in the control group	Difference in mean in the treatment group	p-value (difference=0)
Households, Baseline sample						
Muslim	Household	1059	.03	.17	.00	0.931
Christian	Household	1059	.91	.29	-.04	0.065*
Animist	Household	1059	.02	.14	.00	0.668
Housing Index^	Household	1059	.00	.65	-.08	0.349
Number of persons in the household who died in the last 12 months	Household	1059	.14	.38	-.03	0.169
Female	Household Member	6816	.49	.50	-.01	0.593
Maried	Adult 15+	3845	.52	.50	.03	0.154
Single person	Adult 15+	3845	.41	.49	-.02	0.445
Attended some school	Adult 15+	5431	.73	.44	-.03	0.266
Completed primary school	Adult 15+	2091	.48	.50	-.03	0.349
If was ever pregnant, visited a health facility during the last pregnancy	Pregnant Women	1017	.74	.44	-.01	0.691
If was ever pregnant, number of visits to a health facility during the last pregnancy	Pregnant Women	989	2.84	2.24	-.12	0.529
If ever had a child, the last delivery was attended	Mother	862	.71	.45	-.05	0.379
If ever had a child, visited a health facility after the last delivery	Mother	846	.28	.45	.01	0.785
If ever had a child, the last child is still alive	Mother	859	.93	.26	-.01	0.777
If ever had a child, weight of the last child at birth (grams)	Mother	521	3262.89	623.82	10.78	0.862
Age in months	Children 0-10	2654	57.74	36.12	-.76	0.537
Immunization card seen by the interviewer	Children 0-5	1351	.12	.33	.02	0.409
If immunization card seen, had BCG	Children 0-5	177	.8	.40	-.03	0.653
If immunization card seen, had Polio	Children 0-5	172	.54	.50	.02	0.859
If immunization card seen, had DTC	Children 0-5	177	.73	.45	.08	0.348
If immunization card seen, had Measles	Children 0-5	175	.49	.50	-.02	0.878
If immunization card seen, had Vitamins	Children 0-5	178	.27	.45	-.05	0.489
Households, Endline sample						
Ethnicity = Bemba	Household	1707	.45	.50	.02	0.755
Ethnicity = Baluba	Household	1707	.10	.30	.00	0.914
Ethnicity = Lamba	Household	1707	.09	.28	.03	0.414
Ethnicity = Other	Household	1707	.36	.48	-.05	0.407
Religion = Christian	Household	1707	.93	.25	-.02	0.284
Religion = Other (muslim, animist, no religion)	Household	1707	.05	.22	.01	0.417
Distance to the closest health facility in the health area (in km)	Household	1609	4.21	7.15	.8	0.521
Distance to the closest health facility in another health area (in km)	Household	1638	15.67	14.5	-1.08	0.666
If any visit in the last 12 months, visited a facility in the health area	Household Member	2454	.87	.33	.03	0.533
Female	Household Member	9225	.51	.50	-.01	0.199
Age (years)	Household Member	9135	17.09	16.10	.15	0.601
Literate	Household Member	9234	.31	.46	-.01	0.572
Number of years of education	Household Member	9207	2.62	3.60	-.08	0.664
Female aged 15-49	Household Member	9234	.21	.40	.00	0.942
Child under 5	Household Member	9234	.28	.45	-.01	0.304

Data Source: Baseline survey. ***, **, * indicate significance at 1, 5, and 10%. Error terms are clustered at the health area level. We control for the urban/rural location of the health facility.
^Each Summary Index is the equally weighted average of z-scores of its components. The z-scores are calculated by subtracting the control group mean and dividing by the control group standard deviation. The components of the Infrastructure Index are dummies of whether the health facility has a water tap, electricity, a waste disposal, a sewage disposal, and a pharmacy. The components of the Equipment Index are dummies for whether the health facility has a phone, a radio, the number of electricity generators, the number of examination tables, the number of refrigerators, the number of fuel liters, and the number of kerosene liters. The components for the Medical Material Index are dummies for whether the health facility has autoclaves, tensiometers, sthetoscopes, scales, gauges, microscope, and a delivery kit. The Stock of Vaccines Index components are the number of BCG vaccines, DTC vaccines, Polio vaccines, measles vaccines and anti-amariale vaccines in the facility. The Housing Index components are dummies for whether the household housing has a water tap, sanitation, garbage collection, and some energy (fuel or electricity).