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Are user fees in health care always evil? Evidence from family planning, maternal, and child health services

Amira El-Shal, *PhD*[1,*], Patricia Cubi-Molla, *PhD*[2,3], Mireia Jofre-Bonet, *PhD*[2,3]

[1] Department of Economics, Faculty of Economics and Political Science, Cairo University, Giza, 12613, Egypt
[2] Office of Health Economics, London, SW1E 6QT, UK
[3] Department of Economics, City, University of London, London, EC1V 0HB, UK
E-mail addresses: amira.elshal@feps.edu.eg (A. El-Shal), pcubi-molla@ohe.org (P. Cubi-Molla), mjofre-bonet@ohe.org (M. Jofre-Bonet)

Abstract

The effect of introducing or increasing user fees in low- and middle-income countries is controversial. While user fees are advocated as an effective means of generating revenue and enabling the quality improvement of health services, they are a financial barrier to access health services for the poorer. This paper contributes to the literature on the demand-side financing in health by providing evidence on the medium-term effects of introducing user fees on the utilization of family planning, antenatal and delivery care services, women's access to health care, and child health status in a middle-income country setting. Using difference-in-differences models with fixed effects, we find that the introduction of user fees in Egypt had no significant negative effect on the utilization of family planning and delivery care services; did not hinder women's access to care; and did not harm child health outcomes. Positive effects were even observed with respect to the utilization of antenatal care services. Our findings are compatible with the hypothesis that the potential decrease in demand due to the introduction of user fees might have been offset by an increased willingness to pay for a health care quality that could be, at least partly, just *perceived* as higher.

JEL classification: I11; I12; I18.
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[*]Corresponding author. Address: Department of Economics, Faculty of Economics and Political Science, Cairo University, Giza, 12613, Egypt. Telephone: (202)35732933. E-mail address: amira.elshal@feps.edu.eg.

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1. Introduction

In 1997, the Government of Egypt launched the health sector reform program (HSRP) to provide coverage of a basic benefit package (BBP) of health services to the population. The program had a service delivery component and a financing component. The former focused on quality improvement through facility accreditation (El-Shal *et al.*, 2021). The latter introduced two interventions, one on the supply side and one on the demand side. On the supply side, funds were re-channeled from direct to performance-based financing (PBF) of healthcare providers. On the demand side, user fees were introduced in public primary health care (PHC) facilities participating in the financing component of the HSRP. To join the scheme, previously uninsured beneficiaries were required to pay registration and renewal fees as well as copayment fees that include visit fees, drug copayments, and copayments for other interventions (World Bank, 2004).

The effect of introducing or increasing user fees in low- and middle- income countries (LMICs) is contentious. On the one hand, user fees can constitute a financial barrier for the poor who wish to use health services, thus decreasing the use of services (Bratt *et al.*, 2002; Cohen & Dupas, 2010; Issifou & Kremsner, 2004; Kipp *et al.*, 2001; Kremer & Miguel, 2007; Ridde, 2003). Supporting this hypothesis, positive effects of user-fee removal, reduction, or exemptions were reported on the overall use of health services and household health expenditure in Zambia (Hangoma *et al.*, 2018); the use of health care for all patients, for children under age five, and maternity consultations in Madagascar (Garchitorena *et al.*, 2017); maternal healthcare utilization in Nepal, Malawi, and Burkina Faso (Lamichhane *et al.*, 2017; Manthalu, 2019; Nguyen *et al.*, 2020; respectively), health care utilization among children in Jamaica and Vietnam (Li *et al.*, 2017; Nguyen & Lo Sasso, 2017; respectively) and their household health expenditure but only in Jamaica; and neonatal mortality in Nepal (Lamichhane *et al.*, 2017). An earlier cross-country study of 10 sub-Saharan African countries suggests that removing user fees increases maternal healthcare utilization, possibly leading to reducing neonatal mortality (McKinnon *et al.*, 2015). Some studies argue that there is no negative effect of user fee exemption on the quality of care (e.g., Philibert *et al.*, 2014).

On the other hand, studies advocate that user fees are an effective means of raising revenue and allowing improvements in health services quality (Audibert & Mathonnat, 2000; Mushi, 2014; Richard *et al.*, 2007). This hypothesis becomes more plausible if no negative effects are

associated with the introduction of or increase in user fees. In line of this, a recent systematic review of the literature on the impact of user fees on health outcomes in LMICs by Qin *et al.* (2019) concluded that reducing user fees is only modestly associated with improvements in health outcomes. Moreover, some studies found no effect of user-fee removal on health care utilization and catastrophic health expenditure in Zambia, even among the poorest groups (e.g., Lépine *et al.*, 2017; Masiye *et al.*, 2016). Another interesting study from Kenya shows that poorly implemented user-fee removal policies benefited richer women more than poorer ones (Obare *et al.*, 2018).

Despite the abundant evidence on the effects of alleviating user fees, few (non-recent) studies robustly examined the effect of introducing or increasing user fees in LMICs, and the observed effects were immediate and abrupt (Lagarde & Palmer, 2008). While it takes several years for health financing interventions to reach full impact, the existing studies do not investigate whether the effects were sustained over the longer term (Ensor *et al.*, 2017). Moreover, the quality of the evidence available in LMIC settings is poor (Lagarde & Palmer, 2008). The identified studies generally reported negative effects of user fees on patient outcomes and patient-*perceived* quality of care. These effects were typically with respect to utilization of services. We provide a systematic review of these studies in Appendix A.

This paper contributes to the literature on demand-side financing in health by providing high-quality evidence on the medium-term effects of introducing user fees in a middle-income country. Using difference-in-differences (DiD) models with fixed effects and data over the 1992-2014 period, we estimate the effect that the introduction of user fees in Egypt had on the utilization of family planning, antenatal care (ANC) and delivery care services, women's access to health care, and child health status between the years of 2008 and 2014. Financial incentives to contracted facilities participating in both components of the HSRP were discontinued at the end of 2008. Hence, the main difference between accredited-only facilities participating in the service delivery component and contracted facilities participating in both

components is that the latter became authorized to collect user fees from beneficiaries. This allows us to estimate the effect of introducing user fees by comparing the health outcomes of accredited-only facilities and contracted ones.

Interestingly, we find that user fees in the context of Egypt in the second half of the 2000s did not necessarily constitute a barrier to the utilization of family planning, maternal health, and child health services.

2. Background

2.1 Cost sharing under the HSRP

The HSRP came into operation in 2000, when an integrated package of service delivery and financing interventions were introduced to address the means by which PHC is financed, delivered, organized, and managed. The service delivery interventions aimed to ensure high quality of care, mainly through a facility accreditation program. Facilities that were subject to such interventions and succeeded in receiving accreditation are referred to as "accredited" or "accredited-only" facilities. Some of these facilities were subsequently subject to two financing interventions: PBF of facilities and instituting a non-linear price system for the uninsured. These facilities are referred to as "contracted" facilities as they enter into contractual agreements with the respective family health funds (FHF). Hence, a contracted facility was subject to both the service delivery and financing interventions. The PBF scheme was discontinued in 2008 and, since then, the main difference between accredited-only and contracted facilities became that the latter are authorized to collect user fees from beneficiaries.

Zooming in on user fees introduction, the Ministerial Decree 147 of the year 2003 was issued to increase the ability of FHFs to generate revenues by authorizing family health units (FHU) and family health centers (FHC) to collect user fees and drug copayments from beneficiaries. As determined by the Decree, uninsured beneficiaries are since then required to pay 10

Egyptian pounds (EGP) as registration fees for each enrolled person, up to a maximum of EGP30 per family. Uninsured beneficiaries are also required to pay EGP5 for annual renewal of registration for each enrolled person, up to a maximum of EGP15 per family. Besides registration and renewal fees, uninsured beneficiaries are required to pay copayment fees that include visit fees, drug copayment, and copayments for other interventions. The Decree

required uninsured beneficiaries to pay a copayment of EGP3 per examination and one third of the price of medical treatment (drugs and other therapy).[2]

These registration, renewal, and copayment fees are applicable in contracted PHC facilities in all governorates.[3] The Ministry of Health (MoH) transfers to the newly created FHF 100% of the registration fees, the renewal fees, and copayments for the uninsured poor beneficiaries, and 25% of those fees (including copayments) for the uninsured non-poor beneficiaries. Those insured by the Health Insurance Organization (HIO) can also use health services provided by contracted facilities. The facilities are subsequently reimbursed for treatment by HIO.

Prior to contracting, as it is the case for accredited-only and unreformed PHC facilities, uninsured beneficiaries are charged just EGP1 per examination and nothing for registration or treatment including drugs.[4] Beneficiaries who are insured by HIO pay in unreformed facilities according to the rules established for their coverage. Any fees that are collected go directly to MoH (for the uninsured) and HIO (for the insured).

Figure 1 illustrates the pathway of the HSRP. Out of 4,882 eligible PHC facilities across Egypt, a total of 2,549 facilities were successfully accredited by year 2014, 763 out of which

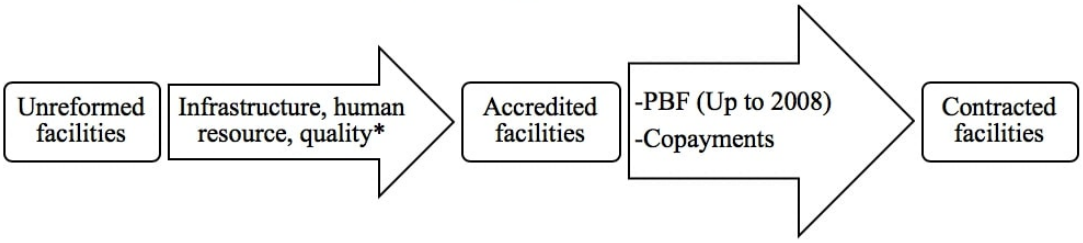
[2] Although the fee structure covers only a small share of the actual cost of providing a BBP of services, enrolled uninsured beneficiaries identified as poor are officially exempt from any user fees at the point of service in contracted facilities in all governorates. Some population categories are also exempt such as under-18 orphans without a supporter, divorced women, widows, and the unemployed. There are concerns, nevertheless, over the functioning of exemptions: the main concern is that the majority of individuals have never heard of the payment exemption of the poor (World Bank, 2010).

[3] The only exception is Menoufia. According to Ministerial Decree 231/2006, uninsured beneficiaries in Menoufia are required to pay EGP20 and EGP10 as registration and renewal fees, respectively, for each enrolled person, without maximum.

[4] Examination fees charged by many facilities are above the official fee scale, especially in the rural areas.

became contracted by 2014. It is important to note that facilities did not necessarily transfer from the first phase (accreditation) to the second phase (contracting) of the HSRP. A total of 1,786 PHC facilities remained "accredited only" by 2014 (Figure 2). These facilities were not subject to any of the financing interventions introduced under the HSRP.

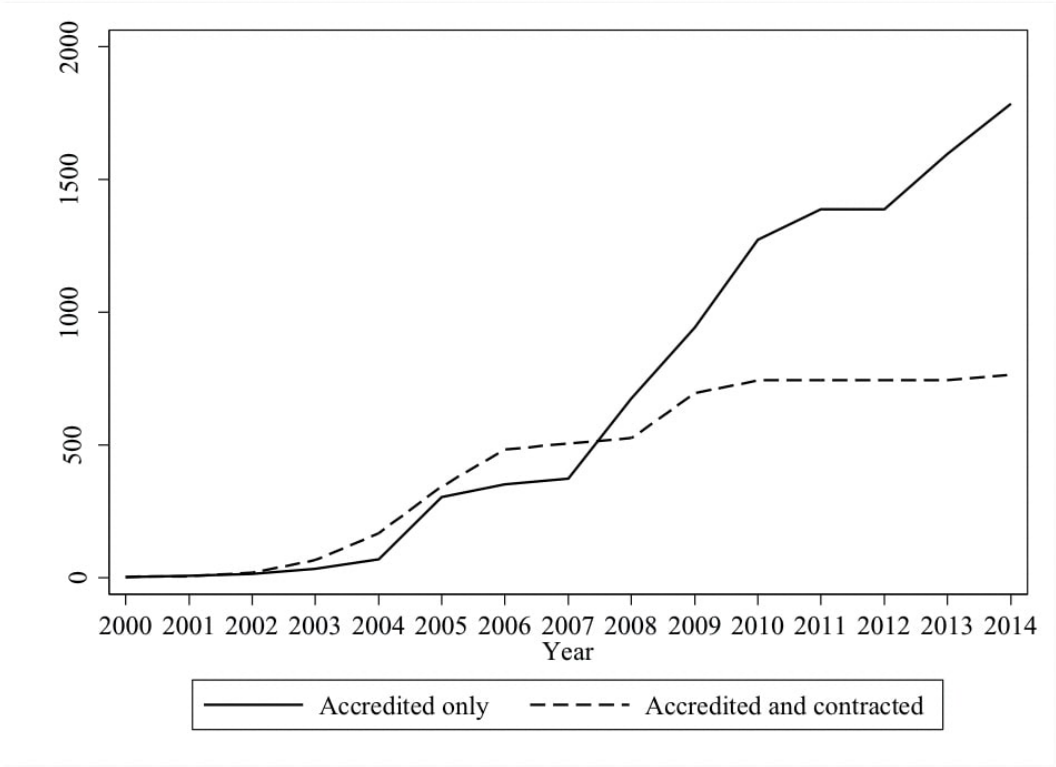
FIGURE 1
The pathway of the HSRP



* Renewal of PHC infrastructure, development of human resource, and quality assurance.

FIGURE 2

Progress of the HSRP's implementation



Source: Our own calculations based on data from Egypt's MOH

The targeting of the HSRP interventions was not random but rather followed a socio-economic vulnerability index[5] and targeted districts of the most vulnerable populations.[6]

2.2 Anticipated effect of introducing user fees

Economic theory suggests that introducing user fees is expected to drive demand for health services in two opposite directions. On the one hand, the negative price-elasticity of demand

[5] The index was constructed based on eight social and economic indicators (see Appendix B, Table B.2).
[6] Regional targeting took place at the district level rather than at the village or facility level. Additional targeting could have taken place within districts, at the facility level. However, within-district targeting lied within the discretion of the district health management and did not follow a set criterion.

implies that demand is expected to decrease as the price incurred by the consumer increases. On the other, if the services subject to fees are perceived to be of higher quality, there will be an increased willingness to pay for each unit of those services.

Utilization of health services. The conventional theory of consumer demand suggests that an increase in the price of a good/service is expected to decrease the demand for this good/service. Similarly, introducing user fees is expected to decrease the demand for health services by increasing the price incurred by the consumer at the time of consumption. The theory of demand for health and health care primarily stems from the Grossman human capital approach to health (Grossman, 1972; Grossman, 2000). Grossman extended the neoclassical approach to the consumer demand theory to the commodity of health care and drew from the human capital theory [Becker (1964, 1967); Ben-Porath, 1967; Mincer, 1974]. He constructed and estimated a model of demand for the commodity "good health," where the demand for health care is derived from the demand for "good health."

Quality of care. Introducing user fees can translate into better quality of the health services being charged for and thus one would expect an increase in their demand. This will be the case if revenues generated from user fees are invested in improving the quality of the services, i.e., in keeping up the maintenance or renewing the equipment, or training health workers. Often revenues generated can also be used to incentivize health workers through PBF schemes.

User fees, however, can lead to overprovision of services due to moral hazard on the part of the healthcare provider. However, it is not established in the literature whether health care services users can always judge the quality of services they receive.

Note that even if introducing user fees can enable quality improvements of the services, this may not necessarily translate into higher utilization of the services or better health outcomes of the population. Instituting user fees for health services can cause users to cut down their utilization of these services and/or to divert to alternative providers of lower quality and even turn to self-treatment. This type of change in utilization patterns will have a negative effect on health outcomes.

Another phenomenon that can result from introducing user fees is that, even if the quality of services remains unchanged, fees themselves may attach value to them (fee as *signal)*, hence increasing demand. In other words, there is a positive change in the *perception* of the quality of services that encourages higher utilization (Bagwell & Riordan, 1991; Riley, 2001).

Nonetheless, even in the latter case, it is unclear if the positive effect of improved quality, be it real or just perceived, can offset the negative effect suggested by the theory of consumer demand.

2.3 Evidence on the effect of user fees

Most studies reviewed in LMICs reported negative effects of introducing or increasing user fees on patient outcomes and/or patient-*perceived* quality of care. These negative effects were typically observed with respect to utilization of services. We provide a summary table of studies discussed in this subsection in Appendix A.

Introducing user fees. We identified 10 robust studies reporting on the effects of introducing user fees, four of which reported mixed effects (Benjamin *et al.*, 2001; Chawla & Ellis, 2000; Jacobs & Price, 2004; Matee & Simon, 2000), three reported negative effects (Kipp *et al.*, 2001; Kremer & Miguel, 2007; Ridde, 2003), two reported positive effects (Audibert & Mathonnat, 2000; Richard *et al.*, 2007), and one reported no effects (Mubyazi *et al.*, 2006).

In Papua New Guinea, Benjamin *et al.* (2001) found that introducing user fees for obstetric services in four urban clinics and a general hospital was associated with an immediate decrease in attendance to obstetric care, followed by an increase in and stabilization of the

frequency of attendances 12 months after introducing the fees. Despite quality improvements, introducing direct user fees and indirect insurance payments in government health facilities in Niger was associated with mixed effects on reporting an illness, no effects on seeking treatment, and mixed effects on seeking formal treatment (Chawla & Ellis, 2000). In Cambodia, introducing user fees at a district referral hospital was associated with a decrease in admissions for dengue but no change in admissions for malaria, diarrhea/dysentery, respiratory infections, deliveries, and other conditions (Jacobs & Price, 2004). Importantly, the study shows that user fees had negative effects on hospital mortality rates and ability to pay. However, both total admissions and pediatric admissions remained unaffected by user

fees. Matee and Simon (2000) reported that introducing user fees for dental health services provided by the government in Tanzania was associated with a decrease in dental attendance but no effect on either the demand for treatment or treatment pattern.

Three studies indicated a decrease in utilization levels for outpatient services, deworming drugs, and curative services in Uganda, Kenya, and Burkina Faso, respectively, after introducing user fees (Kipp *et al.*, 2001; Kremer & Miguel, 2007; Ridde, 2003). Mubyazi *et al.* (2006) found no effects of introducing user fees in public health facilities in Tanzania on quality of care or malaria health-seeking behavior measured by malaria patient attendances.

Only two studies reported positive effects of introducing user fees. In Mauritania, the results of Audibert and Mathonnat (2000) were largely positive with respect to improvement in quality of care and overall level of utilization of basic health facilities. Similarly, in Burkina Faso, introducing user fees for emergency obstetric care in an urban district hospital was associated with higher quality of care and higher emergency referrals from health centers; major obstetric interventions (MOI); MOI for absolute maternal indications; and, Cesarean section (C-section) rates. User fees were also associated with lower stillbirths and lower very early neonatal death among babies born by C-section (Richard *et al.*, 2007). The findings of

both studies suggest that users are willing to pay when the quality of health care improves. While Audibert and Mathonnat (2000) highlight the importance of the supply of essential drugs and motivation of staff, Richard *et al.* (2007) stress the importance of the availability of equipment and the standardization of protocols.

Increasing user fees. We identified five robust studies reporting on the effects of increasing user fees, three out of which reported negative effects on the majority of outcomes investigated

(Bratt *et al.*, 2002; Cohen & Dupas, 2010; Issifou & Kremsner, 2004), one reported mixed effects (Jacobs & Price, 2004), and one reported no effects (Benjamin *et al.*, 2001).

In Ecuador, higher user fees for obstetric services in urban clinics and a general hospital was associated with a decrease in the utilization of these services measured by gynecology visits, intra-uterine device (IUD) insertion visits, IUD revisits, and ANC visits. Effect on seeking formal treatment, however, was mixed (Bratt *et al.*, 2002). A randomized malaria prevention experiment in Kenya also found that a higher price of antimalarial insecticide-treated bed nets

(ITN) was associated with a decrease in demand (Cohen & Dupas, 2010). Similarly, Issifou and Kremsner (2004) found that an increase in consultation fees in a private hospital in Gabon had a negative effect on pediatric outpatient visits.

Jacobs and Price (2004) reported mixed effects of higher user fees at a district referral hospital in Cambodia. While negative effects were observed with respect to admissions for malaria and dengue, positive effects were observed with respect to admissions for other conditions. Admissions for diarrhea/dysentery, respiratory infections, and deliveries remained unaffected. Importantly, the study found that an increase in user fees had a negative impact on hospital mortality rates; but no effects were observed with respect to ability to pay and admissions. Finally, Benjamin *et al.* (2001) reported no effects of higher user fees on delivery and postnatal care services in Papua New Guinea on institutional delivery.

3. Methods

Using the 2008 and 2014 waves of the Egypt Demographic and Health Survey (DHS), we employ the DiD method to estimate the effects of introducing user fees on our health outcomes of interest by comparing the outcomes of facilities that do not charge user fees (just accredited) to those that do (both accredited and contracted). Treatment is defined as entering into a contractual agreement with the relevant FHF. We include facilities that are "accredited only" in 2008 and continue to be so in 2014 in our control group. Despite being accredited, these facilities did not contract with the FHF and thus are not authorized to collect user fees and drug copayments from beneficiaries. The treatment group includes facilities that are accredited in 2008 and are both accredited and contracted in 2014. According to Ministerial

Decree 147 of the year 2003, these facilities became authorized to collect user fees and drug copayments from beneficiaries.

For each health facility i at time t, the model specification we are interested in estimating is as follows:

$$y_{it} = \alpha + \beta\, copay_{it} + \gamma\, d_{post} + \delta\, copay_{it} * d_{post} + \zeta\, fac_i + \eta\, dist_i + \varepsilon_{it} \qquad (1)$$

The dependent variable y_{it} denotes the health outcome of interest, y, for facility i at time t, where *t*=2008 or 2014. The variable $copay_{it}$ equals 1 if a facility is authorized to collect user fees and drug copayments from beneficiaries (contracted facility) at time t and 0 if a facility is *not* authorized to do so (accredited-only facility). The coefficient β captures the differences between contracted and accredited-only facilities in 2008 prior to any contractual agreements with FHFs. The variable d_{post} takes value 1 for year 2014 and 0 for year 2008. The coefficient γ captures any time trends in health outcomes for all facilities and other factors that could affect outcomes. The parameter of interest is the DiD estimator, δ, which is the coefficient of the interaction term $(copay_{it} * d_{post})$ that equals 1 for contracted facilities only in 2014 and 0 otherwise. The coefficient δ captures the estimated change in the outcomes of contracted facilities relative to "accredited but not contracted" facilities as a result of contracting with the FHF and, consequently, becoming authorized to collect user fees.

The term fac_i is a vector of facility-level controls that reflect different characteristics of facility i, such as labor force, building condition, and population coverage of facilities. To ensure that the differential effect between contracted and accredited-only facilities are attributable to user fees introduction, we must control for observable facility characteristics that could explain part of this effect. The coefficient ζ captures the effect of these characteristics on health outcomes at the facility level. Coefficient η captures the effect of district-level social, economic, and demographic indicators, $dist_i$, on health outcomes at the facility level.

The use of DiD is suitable in our context as pre- and post-treatment health outcomes are observed for accredited and contracted facilities. A major concern, though, derives from the potential endogeneity in contracting. If the change in the status of a health facility is not

exogenous, the DiD estimator may be biased and inconsistent. The decision to contract does not depend on facility characteristics, those of the districts in which facilities are located, nor

on facility initial performance in terms of health outcomes. The means of the differences between the characteristics of accredited-only and contracted facilities are generally insignificant (see Tables 1 and 2 in section 5). Similarly, the differences in the baseline mean health outcomes between accredited and contracted facilities are generally insignificant except for ANC outcomes.

Complementarily, we estimate an alternative DiD fixed-effects model using only accredited and contracted facilities for all years from 1992 to 2014 (see below). We report the DiD fixed-effects estimates of the model using six waves of the DHS (1992, 1995, 2000, 2005, 2008, and 2014). The DiD estimator is robust against selectivity bias if any.

$$y_{it} = \theta + \lambda\, policy_{it} + \xi_t + \pi_i + \nu_{it} \qquad (2)$$

$policy_{it}$ is the key policy variable that equals 1 if facility i is authorized to collect user fees and drug copayments in year t; and ξ_t and π_i are the unobserved year and facility effects, respectively.

The sample of facilities used to estimate equation (2) includes only those facilities not having been reformed between 2000 and 2005, received accreditation by 2008, and remained accredited-only or became contracted by 2014.

4. Data

4.1 Dependent variables

We collapse the individual responses of 97,990 women over the period 1992-2014 at the facility level drawing from six DHS waves (1992, 1995, 2000, 2005, 2008, and 2014). The aim is to calculate our health outcomes of interest at the facility level instead of relying on

self-reported outcomes by health facilities that may be biased in either direction. The outcomes include indicators of utilization of family planning, ANC and delivery care services, and one indicator of women's access to health care. These are the outcomes that are expected

to be affected by introducing user fees. As the DHS data does not allow for the construction of indicators of utilization of child care services, we construct an indicator of child mortality as a comprehensive measure of the health status of children. The 1992, 1995, 2000, and 2005 waves are primarily used to validate the robustness of our main estimates of the 2008-2014 period.

To construct our health outcomes, we *spatially* link women interviewed in each of the Egypt DHS waves to their nearest mapped health facilities using the GPS coordinates of women and facilities.[7] All PHC facilities across Egypt are used during the joining process.[8] We then compute the health outcomes at the facility level and, finally, combine the waves of the survey in a panel.

We provide a summary table of the constructed dependent variables in Appendix B (see Table B.1).

Family planning. We include one indicator to reflect the current use of family planning methods: modern contraceptive prevalence (*mcp*),[9] which is a key proxy measure of access to reproductive health services. As part of the Egypt DHS ever-married women (EMW) questionnaire, each female respondent is asked if she is currently doing something or using any method to delay or avoid getting pregnant and which method(s) she is using. We calculate *mcp* as the percentage of currently married women between ages 15 and 49 years who say they use one of the modern contraceptive methods.[10]

[7] Quantum GIS 2.8.2 is used to perform the spatial join.
[8] There is no concern that a woman may bypass her closest PHC facility, which is now contracted and collects user fees, in favor of another facility, which is still accredited only or unreformed and does not collect user fees, because for a woman to use a MoH PHC facility, she is obliged by MoH to use only the facility in catchment.
[9] As a proxy measure of access to reproductive health services, higher *mcp* accelerates progress towards child mortality, HIV/AIDS, and gender equality.
[10] Female sterilization, male sterilization, the contraceptive pill, intrauterine contraceptive device, injectables, implants, female condom, male condom, diaphragm, contraceptive foam and contraceptive jelly, lactational amenorrhea method, country-specific modern methods, and other respondent-mentioned modern contraceptive methods.

ANC. The first dimension of ANC we consider is women's choice of the type ANC provision. We seek to assess whether introducing user fees encourages or discourages women to shift

from traditional birth attendants to doctors or trained nurses/midwives. We calculate the percentage of women with a birth in the last five years who received ANC by skilled health personnel (*ancprov*).

The most important ANC outcome we include in our analyses is ANC coverage of at least four visits (*anc4*), which is used as a global preferred indicator of access to and use of health care during pregnancy to track performance in maternal health programs.[11] As part of the Egypt DHS EMW questionnaire, each female respondent is asked how many times she received ANC during each of the pregnancies of her children born in the last five years. We calculate *anc4* as the percentage of women who received ANC for their last birth, according to grouped number of visits (four visits), in the last five years.

Despite the significance of *anc4*, the use of this sole indicator as a summary measure of access to and use of health care during pregnancy inappropriately emphasizes the number of visits at the expense of the content and process of care. Therefore, we include a third ANC outcome to reflect the utilization of nutrients during pregnancy: iron supplementation during pregnancy (*anciron*). We calculate *anciron* as the percentage of mothers who received iron supplements during pregnancy by dividing the number of women who received ANC for their last birth and who received iron supplements during pregnancy by the number of women with a birth in the last five years who received ANC for their last birth.

Delivery care. We include three indicators of utilization of delivery care services in our analyses: institutional delivery (*delplac*), skilled assistance during delivery (*delassist*), and C-section delivery rates (*delcaes*). The two former indicators are widely advocated for reducing maternal, perinatal, and neonatal mortality. Through the indicator *delplac*, we seek to

[11] The World Health Organization (WHO) recommends that a woman receives at least four antenatal visits during a normal pregnancy to ensure that antenatal complications are detected and controlled at the earliest stage. A pregnant woman is expected to receive health interventions during antenatal visits that could be vital to her health and the health of her infant as well.

investigate the effect of introducing user fees on access to childbirth facilities and interpret it also as a proxy measure of maternal and neonatal morbidity and mortality.[12] We calculate

delplac as the number of live births whose deliveries took place in a health facility in the last five years.

The second key measure of delivery care we include in our analyses is *delassist*. Empirical literature provides evidence that wider access to professional care during pregnancy and childbirth reduces maternal mortality.[13] As part of the Egypt DHS EMW questionnaire, each female respondent is asked either a health professional (doctor or nurse/midwife), other person (daya or other), or no one assisted with the delivery of each of her children. We calculate *delassist* as the percentage of live births assisted by medical provider (doctor or nurse/midwife) during delivery divided in the last five years.

Finally, we include the percentage of live births delivered by C-section in the last five years, *delcaes,* which is a key indicator of access to and use of health care during childbirth. We are cautious, however, while interpreting this indicator as we recognize that very high levels of C-sections are as dangerous as very low levels.

Access to care. We construct an indicator of women's access to health care as the percentage of women that declare that "getting money for treatment" is a problem in accessing health care for themselves (*accmon*). This indicator investigates whether introducing user fees deepens the role of money as an impediment to women to access health care.

Child health status. We finally calculate an indicator of child mortality in the last five years as a comprehensive measure of the health status of children: under-five mortality rate (*childmort*).

[12] Women who give birth at a health facility are more likely to receive proper medical attention and care during delivery and their infants more likely to receive proper care after delivery.
[13] Women assisted by skilled health personnel during delivery are less likely to die from any cause related to or aggravated by childbirth (Graham *et al.*, 2001).

4.2 Explanatory variables

We use information obtained from Egypt's MoH to capture interventions at the facility level and calculate facility-level controls. We use data obtained from the Central Agency for Public Mobilization and Statistics (CAPMAS) to calculate a set of district-level social and economic controls. We also include a set of regional dummies in our analyses whenever possible.

Treatment. The main explanatory variable in our model is the treatment variable, $copay_{it}$, indicating whether facility *i* is charging fees (contracted) at time *t* or not (accredited but not

contracted). The variable draws from information from Egypt's MoH identifying a facility as unreformed, accredited, or contracted. After PBF had been discontinued in 2008, the main difference between accredited and contracted facilities became that the latter are authorized to collect user fees and drug copayments from beneficiaries. We define treatment as having a contractual agreement with the relevant FHF by 2014 after being "accredited only" in 2008. A facility is considered to be control if it is accredited in 2008 and continues to be so in 2014. We remove unreformed facilities and facilities that are originally contracted in 2008 from the dataset.

Controls. We include facility-level characteristics, district-level social and economic characteristics, and regional dummies to control for potential heterogeneity at the facility, district, and regional levels, respectively. We use information obtained from Egypt's MoH on labor force, building condition, and population coverage to calculate a set of facility-level controls to account for potential selectivity at the facility level. To control for both the selection criteria of the HSRP regional targeting at the district level and the demographic variation across districts, we use data from Egypt's 2006 Population and Housing Census conducted by CAPMAS to construct a set of district-level social and economic indicators. This set was initially used by MoH to construct a socio-economic vulnerability index for the regional targeting of the HSRP interventions. We list all the control variables included in our analyses in Appendix B (see Table B.2).

5. Results

5.1 Descriptive statistics

Table 1 presents the differences in the facility-level characteristics between contracted and accredited-only health facilities. We use two-sample t-tests to check if the means of the two groups differ significantly. On average, we do not observe significant differences in the labor force characteristics, building condition, or population coverage between the two groups of facilities.

Similarly, we use two-sample t-tests to check if district-level characteristics of contracted and accredited-only facilities differ significantly (Table 2). We find that, on average, contracted facilities are not located in districts with more favorable socio-economic profiles compared to

districts where accredited facilities are located. Significant differences are only observed with respect to unemployment and HH overcrowding.

TABLE 1

Two-sample t-test of facility characteristics of accredited and contracted facilities

	Accredited	Contracted	Difference
Practitioners	5.126	6.320	-1.194
			(1.553)
Specialists	0.843	0.700	0.143
			(0.430)
Pharmacists	6.064	4.875	1.189
			(1.410)
Nurses	13.921	15.333	-1.412
			(2.180)
Lab technicians	1.210	0.833	0.376
			(0.280)
X-ray technicians	0.246	0.050	0.196
			(0.146)
Health observers	1.355	1.240	0.115
			(0.229)
Social workers	1.148	0.350	0.798**
			(0.353)
Building condition	1.536	1.773	-0.237
			(0.159)
Population coverage	39.297	34.560	4.737

	Accredited	Contracted	Difference
			(13.479)

Standard errors are reported in parentheses. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

TABLE 2

Two-sample t-test of district characteristics of accredited and contracted facilities

	Accredited	Contracted	Difference
Illiteracy	29.081	28.944	0.136
			(2.345)
Unemployment	10.139	7.826	2.313***
			(0.783)
Income dependency	4.418	0.556	3.863
			(2.625)
Inaccessibility to electricity	0.775	0.537	0.237
			(0.167)
Inaccessibility to potable water	2.682	2.132	0.550
			(0.988)
Family size	4.200	4.146	0.054
			(0.079)
HH overcrowding	1.157	1.110	0.047**
			(0.021)
Population size	31.818	37.579	-5.761
			(4.033)

Standard errors are reported in parentheses. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

5.2 Estimated effects of introducing user fees

For each health outcome, we report the results of estimating three specifications in Table 3. While the DiD model's specification (1) includes no controls; specification (2) includes facility-level controls only; and specification (3) includes both facility- and district-level controls. This latter most complete specification is our benchmark and on which we base our analysis. Standard errors are robust, clustered by facility. Appendix C presents the results of a battery of robustness checks.

TABLE 3

Estimated effects of introducing user fees, 2008-2014

	Outcome	DiD		
		(1)	(2)	(3)
Family planning	Modern contraceptive prevalence	-3.809	-0.810	-2.943
		(5.418)	(7.630)	(7.129)
ANC	ANC by skilled health personnel	16.112**	15.153*	17.929**

		(6.890)	(8.545)	(8.795)
	4+ visits	16.935**	13.154	17.776*
		(7.564)	(9.060)	(10.008)
	Iron supplementation	24.118***	22.408**	23.589**
		(7.959)	(9.894)	(8.978)
Delivery care	Institutional delivery	-5.409	1.763	8.847
		(6.302)	(8.583)	(8.701)
	Skilled-assisted delivery	-4.608	2.851	7.818
		(5.837)	(7.348)	(7.226)
	C-section delivery	6.101	14.296	16.104
		(8.140)	(10.704)	(11.902)
Access to care	Money barrier reported	9.534	6.966	8.947
		(10.074)	(12.426)	(12.687)
Child health status	Under-5 mortality	2.835**	2.890	1.602
		(1.374)	(1.980)	(1.946)
Obs.		166	107	107

Each row represents a separate regression. Robust standard errors across clusters are reported in parentheses. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Table 3 indicates that introducing user fees does not have a significant effect on modern contraceptive prevalence (*mcp*), a proxy measure of access to reproductive health services. A possible explanation is that even if a woman has access to a contracted facility, she would still have to pay a highly subsidized price to obtain a family planning method. This price is equal to the price incurred by a woman with access to an accredited-only facility. In this regard, it is imperative to highlight that Egypt's MoH offers family planning services to all women at nominal fees in an effort to slow down the rapid population growth.

Surprisingly, we find that having access to a facility that introduced user fees (contracted) is associated with a higher likelihood of receiving ANC by skilled health personnel (*ancprov*) and at least four ANC visits (*anc4*). As discussed earlier, *ancprov* and *anc4* reflect the access to and use of skilled care during pregnancy. Both *ancprov* and *anc4* increased significantly by 18 ppts between 2008 and 2014 for women with access to contracted facilities if compared to women with access to accredited-only facilities.

Moreover, having access to a contracted facility is associated with a higher likelihood of receiving iron supplements during pregnancy *(anciron)*: the proportion of women with access

to contracted facilities who receive iron supplements during pregnancy *(anciron)* increased significantly by 24 ppts between 2008 and 2014 compared to women with access to accredited-only facilities. Thus, while there could have been a general trend in Egypt towards increased use of ANC services, contracting possibly added to this trend.

With respect to delivery care, Table 3 shows that introducing user fees is associated with positive but insignificant effects on institutional delivery (*delplac*) and skilled assistance during delivery (*delassist*). While *delplac* reflects access to childbirth facilities, *delassist* reflects access to and use of professional care during pregnancy and childbirth.

Table 3 also reports on C-section delivery rates (*delcaes*) that is also a key indicator of access to and use of health care during childbirth. We find that introducing user fees does not have a significant effect on *delcaes*. Note that we initially expected that introducing user fees would be associated with a significant decrease in *delcaes* as Egypt's C-section delivery rate is far higher than the ideal rate set by the international healthcare community to be between 10-15% (World Health Organization, 2015). Our initial hypothesis is supported by empirical evidence that some countries attempt to reduce the demand for elective C-section by introducing a copayment when C-section is not medically indicated (Chen *et al.*, 2014).

In parallel, Table 3 shows that having access to a contracted facility that introduced user fees has no effect on the likelihood of reporting money as an impediment to access health care *(accmon)*. This finding suggests that introducing user fees did not appear to restrict women's access to care, although at the same time a pro-poor exemption policy was introduced.[14]

Finally, we find that introducing user fees has no effect on under-five mortality (*childmort*) during the 2008-2014 period (Table 3).

[14] The exemption policy was in place since 2003, when Ministerial Decree 147/2003 that institutionalized user fees also included an exemption clause for patients who cannot afford to pay.

5.3 Selectivity-robust estimations

We report the DiD fixed-effects estimates of equation (2), covering the 1992-2014 period, in Table 4. Based on the pooled sample, our results indicate that although contracting implies introducing user fees, it has not been associated with negative effects on any of the reported health outcomes of contracted compared to accredited-only facilities.

The results in Table 4 outline that while facility accreditation translated in a huge leap forward in terms of quality and use of the ANC services in all the facilities in this selected sample of either accredited or accredited and contracted facilities by 2014, contracting did not make a difference. It is important to see that the effects of contracting itself (*treat*) is insignificant on all indicators, and that since 2005, there were yearly improvements in quality for all variables.

6. Discussion

All in all, the results reported with respect to ANC outcomes are puzzling. Below, we discuss these results in the light of alternative but non-exclusive explanations.

First, if being contracted meant improved quality compared to the accredited-only facilities, then the demand curve would have shifted right and an increase in the use of services would have followed. But, by design, the introduction of fees meant a limited increase in quality with respect to the accreditation process.[15] The most substantial quality changes had been already

achieved by facilities during the process of accreditation that had warranted the adherence to certain guidelines and equipment. And, in fact, this point is strengthened by results in Table 4

[15] A facility should fulfill first the family medicine *accreditation* requirements to be eligible to contract. Additionally, the facility should possess a standard catalogue of equipment. This catalogue was originally developed to ensure that facilities have the equipment necessary to deliver the BBP of services defined under the HSRP. Further, contracted facilities are subject to additional supervision by the FHF. FHFs have an autonomous supervision system that focuses on the administrative and financial arrangements of contracted facilities. Besides periodic visits by supervisors from the Health District to all health facilities, contracted facilities receive tri-monthly visits from the FHF. Nevertheless, only 40% of the money supplied to the FHF is reallocated to improve the service in the contracted health facility.

showing that contracting itself did not affect directly the use of the variables of interest. Thus, although contracting might have meant limited amount of added quality, introducing fees made these changes obvious or *signaled* higher quality, while this would have not been apparent when the facility was accredited only.

TABLE 4

Estimated selectivity-robust effects of introducing user fees, 1992-2014

	Family planning	ANC			Delivery care			Access to care	Child health status
	Modern contraceptive prevalence	ANC by skilled health personnel	4+ visits	Iron supplementation	Institutional delivery	Skilled-assisted delivery	C-section delivery	Money barrier reported	Under-5 mortality
treat=1	-5.255	-1.746	-2.635	-15.033	13.304	1.798	0.259	-1.993	0.320
	(4.210)	(5.694)	(7.875)	(9.547)	(8.493)	(5.179)	(7.033)	(4.037)	(1.736)
Years (Ref: 1992)									
1995	-2.682	-16.101***	1.294		-3.209	-2.147	0.866		-0.040
	(3.943)	(4.992)	(5.547)		(4.448)	(4.492)	(3.206)		(1.877)
2000	4.958	-0.477	13.937**		17.959***	16.998***	19.518***		-2.825**
	(3.398)	(4.992)	(5.898)		(4.136)	(4.186)	(4.019)		(1.342)
2005	10.177***	6.747*	24.716***	17.398***	34.454***	28.059***	22.456***	13.250***	-4.577***
	(3.741)	(4.041)	(4.867)	(5.229)	(4.651)	(4.665)	(3.941)	(3.556)	(1.550)
2008	4.458	12.897***	35.283***	13.798**	33.206***	28.302***	33.622***	16.479***	-3.036*
	(3.560)	(3.712)	(4.468)	(5.877)	(4.230)	(4.064)	(4.685)	(3.060)	(1.759)
2014	4.202	22.602***	44.683***	27.635***	35.002***	30.166***	53.892***	-6.119	-3.808***
	(3.352)	(4.144)	(4.731)	(4.970)	(4.445)	(4.448)	(3.956)	(3.768)	(1.427)
Constant	48.668***	68.804***	42.501***	39.066***	48.906***	58.875***	4.026	19.462***	6.045***
	(2.722)	(3.125)	(3.702)	(3.522)	(3.301)	(3.338)	(2.693)	(2.108)	(1.223)
Obs.	368	366	366	272	366	366	366	274	366

Each *column* represents a separate regression. Clustered standard errors are reported in parentheses. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

We provide further empirical evidence to support this hypothesis. Re-estimating equation (1) using some indicators that reflect quality of ANC yield insignificant results for all indicators (see Table C.4 in Appendix C).

Alternatively, contracted facilities might have become relatively more appealing to the population on two grounds with respect to the accredited: The burden of out-of-pocket (OOP) expenditure on health is persistently high in Egypt, standing at 62% in 2000, 65% in 2005, 62% in 2008, and 59% in 2014 as a share of current health expenditure. In per capita terms, OOP expenditure increased from $189 in 2000 to $238, $260, and $289 in 2005, 2008, and 2014, respectively (Global Health Expenditure Database, 2020). Consequently, user fees incurred at public contracted facilities could have saved money to users, especially as compared to private providers. Simply put, the fees introduced by the Decree in fact might have regularized payments by households. Moreover, contracted facilities stand a better chance than accredited-only facilities of competing with private providers as contracted facilities offer a relatively higher quality of care.

Interestingly, accredited-only facilities were initially performing better compared to contracted facilities in 2008 - see Table C.1 in Appendix C. Therefore, non-random selection into contracting or facility unobserved heterogeneity could have only biased the estimated results in the direction of insignificance.

7. Conclusion

This paper contributes to the scant evidence on demand-side financing in health in LMIC settings by providing robust evidence on the medium-term effect of introducing user fees in Egypt on the utilization of family planning, ANC and delivery care services, women's access to health care, and child health status. We address a gap in the literature by investigating how improved *perceived* quality of health care can mitigate the negative effect of introducing user fees on the demand for and utilization of health services, as user fees appear to attach value to some health services provided.

We draw from data from six waves of the Egypt DHS, perform a *spatial* join of women interviewed and health facilities, and estimate the effect of becoming a contracted facility within a DiD framework.

Our results provide evidence that introducing user fees has no effect on the utilization of family planning and delivery care services, does not appear to hinder women's access to care, and has no effect on child health status. The lack of negative effects could be attributed to the fact that higher demand for and utilization of health care, probably due to *perceived* quality improvement, appears to offset the decline in the demand for and utilization of care associated with introducing user fees.

More importantly, we observe positive effects of introducing user fees on the utilization of ANC services: receiving ANC by skilled health personnel, receiving at least four ANC visits, and receiving iron supplements during pregnancy. These positive effects could partly be justified by the improved quality of ANC services provided by contracted facilities that have gone a process of both accreditation and contracting, but the effects could also be at least partially explained by a *perception* of an improved quality of health services provided by these facilities compared to the remaining ones. Other explanations for the positive counter-intuitive effects of fees on access and outcomes are that the fees introduced by the reform in fact regularize the OOP payments of households to fund health care or that, once there has been an initial monetary investment in health care, individuals stick to the follow-up consultations.

Our findings in the context of Egypt in the second half of the 2000s suggest that user fees do not necessarily constitute a barrier to the utilization of family planning, maternal health, and child health services in middle-income settings. On the contrary, introducing user fees can shift the demand for them and increase utilization. Caution needs to be exerted, nevertheless.

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Appendix A: Studies on the effectiveness of introducing/increasing user fees

Study	Intervention	Outcome measure	Reported effect on outcome
Audibert & Mathonnat (2000)	-Introduction of user fees in all health facilities from basic local units to some national hospitals	-Drug availability -Vaccinations for children less than a year old -Vaccinations for pregnant women -Curative consultations -Contacts per inhabitant	Mixed Positive Positive Positive Positive
Benjamin *et al.* (2001)	-Introduction of user fees for obstetric services in urban clinics and a general hospital -Higher user fees for obstetric services in urban clinics and a general hospital	-Attendance to antenatal clinics on first visits (immediate) -Attendance to antenatal clinics on first visits (12 months) -Institutional delivery	Negative Positive None
Bratt *et al.* (2002)	-Higher user fees in private non-profit clinics	-Gynecology visits -IUD* insertion visits -IUD revisits -ANC visits	Negative Negative Negative Negative
Chawla & Ellis (2000)	-Introduction of direct user charges and indirect insurance payments in government healthcare facilities, accompanied by quality improvements	-Reporting illness -Seeking treatment -Seeking formal treatment	Mixed None Mixed
Cohen & Dupas (2010)	-Higher price at which antenatal clinics sell long-lasting antimalarial insecticide-treated bed nets (ITNs) to pregnant women	-ITN sales -Pregnant women acquiring an ITN -Pregnant women not only acquiring the ITN but also reporting using it at follow-up	None Negative Negative
Issifou & Kremsner (2004)	-Higher consultation fees in a private hospital	-Pediatric outpatient visits -Malaria cases among outpatients	Negative Positive

Study	Intervention	Outcome measure	Reported effect on outcome
Jacobs & Price (2004)	-Introduction of user fees at a district referral hospital	-Care seeking from private practitioners	Positive
		-Patients admitted for malaria	None
		-Patients admitted for diarrhea/dysentery	None
		-Patients admitted for respiratory infections	None
		-Patients admitted for dengue	Negative
		-Patients admitted for deliveries	None
		-Patients admitted for other conditions	None
		-Total patients (non-TB**)	None
		-Mortality rate per admitted patients	Negative
		-Reporting inability to pay costs of hospitalization	Negative
		-Patients admitted	None
		-Pediatric patients admitted	None
	-Higher user fees at a district referral hospital	-Care seeking from private practitioners	Positive
		-Patients admitted for malaria	Negative
		-Patients admitted for diarrhea/dysentery	None
		-Patients admitted for respiratory infections	None
		-Patients admitted for dengue	Negative
		-Patients admitted for deliveries	None
		-Patients admitted for other conditions	Positive
		-Total patients (non-TB)	None
		-Mortality rate per admitted patients	Negative
		-Reporting inability to pay costs of hospitalization	None
		-Patients admitted	None
		-Pediatric patients admitted	None
Kipp *et al.* (2001)	-Introduction of user fees in 38 government health units	-Utilization by outpatients	Negative
		-Utilization by outpatients (urban/semi-urban)	Negative
		-Utilization by outpatients (rural)	Positive
		-Utilization by malaria patients (urban/semi-urban)	Negative
		-Utilization by malaria patients (rural)	Positive
Kremer & Miguel (2007)	-Introduction of user fees for preventive deworming drugs in primary schools	-Utilization of deworming drugs	Negative
Matee & Simon (2000)	-Introduction of user fees for dental health services provided by the government	-Attendance of dental patients	Negative
		-Dental treatment demands	None
		-Dental treatment pattern	None
Mubyazi *et al.* (2006)	-Introduction of user fees in public health facilities	-Quality of care	None
		-Malaria patient attendances	None
Richard *et al.* (2007)	-Introduction of user fees for emergency obstetric care in an urban district hospital	-Emergency referrals from health centers	Positive
		-Major obstetric interventions (MOI)	Positive
		-MOI for absolute maternal indications (AMI)	Positive
		-C-section*** rates	Positive

Study	Intervention	Outcome measure	Reported effect on outcome
		-Stillbirths among babies born by C-section	Positive
		-Very early neonatal death (<12 h) among babies born by C-section	Positive
		-Perception of the quality of care	Positive
Ridde (2003)	-Introduction of user fees in PHC facilities	-New curative consultations	Negative

*IUD: Intrauterine device. **TB: Tuberculosis. ***C-section: Cesarean section.

Appendix B: Description of data

TABLE B.1

Description of dependent variables

	Outcome	Description*	Units	Source	Year(s)
Family planning	*mcp*	Proportion of women currently using any modern contraceptive method	Percent	Our own calculations based on Egypt DHS	2008, 2014
ANC	*ancprov*	Proportion of women attended for ANC by skilled health personnel	Percent	Our own calculations based on Egypt DHS	2008, 2014
	anc4	Proportion of women who received four or more ANC visits	Percent	Our own calculations based on Egypt DHS	2008, 2014
	anciron	Proportion of women who received iron supplements as an ANC component	Percent	Our own calculations based on Egypt DHS	2008, 2014
Delivery care	*delplac*	Proportion of live births delivered in a health facility	Percent	Our own calculations based on Egypt DHS	2008, 2014
	delassist	Proportion of live births whose delivery was assisted by skilled health personnel	Percent	Our own calculations based on Egypt DHS	2008, 2014
	delcaes	Proportion of live births delivered by C-section	Percent	Our own calculations based on Egypt DHS	2008, 2014
Access to care	*accmon*	Proportion of women with a "getting money for treatment" problem in accessing health care	Percent	Our own calculations based on Egypt DHS	2008, 2014
Child health status	*childmort*	Proportion of deaths at age 0–5 years to live-born children	Percent	Our own calculations based on Egypt DHS	2008, 2014

*Definitions are obtained from WHO.

TABLE B.2

Description of control variables

Control	Description	Measure	Units	Source	Year(s)
Facility characteristics					
pract	Practitioners	Labor force	Number	MoH	2005
spec	Specialists	Labor force	Number	MoH	2005
pharm	Pharmacists	Labor force	Number	MoH	2005
nurs	Nurses	Labor force	Number	MoH	2005
labtech	Lab technicians	Labor force	Number	MoH	2005
xraytech	X-ray technicians	Labor force	Number	MoH	2005
obs	Health observers	Labor force	Number	MoH	2005
socwork	Social workers	Labor force	Number	MoH	2005
inf	Building condition of a facility defined as bad, average or good	Infrastructure	Dummy	MoH	2005
cov	Size of the population in catchment served by a facility	Coverage	Number	MoH	2005
District socio-economic indicators*					
illit	Percentage of population (aged 10 years and above) who are illiterate	Illiteracy	Ratio	CAPMAS	2006
unemp	Percentage of population (aged 15 years and above) who are unemployed	Unemployment	Ratio	CAPMAS	2006
incdep	Ratio of the dependent population (aged below 15 years and over 65 years) to the working population (aged 15-64 years)	Income dependency	Ratio	Our own calculations based on CAPMAS's census	2006
elect	Share of the population with no access to electricity	Accessibility to electricity	Ratio	Our own calculations based on CAPMAS's census	2006
wat	Share of the population with no access to potable water	Accessibility to potable water	Ratio	Our own calculations based on CAPMAS's census	2006
famsiz	The number of individuals divided by the number of families	Family size	Ratio	CAPMAS	2006
crowd	Average number of individuals per room	HH overcrowding	Ratio	CAPMAS	2006
pop	Size of population resident in a particular district	Population size	Number	CAPMAS	2006
Regional dummies					
urb	Urban	Regional variation	Dummy	CAPMAS	2006-2019
lowurb	Lower urban	Regional variation	Dummy	CAPMAS	2006-2019
lowrur	Lower rural	Regional variation	Dummy	CAPMAS	2006-2019

Control	Description	Measure	Units	Source	Year(s)
uppurb	Upper urban	Regional variation	Dummy	CAPMAS	2006-2019
upprur	Upper rural	Regional variation	Dummy	CAPMAS	2006-2019
front	Frontier	Regional variation	Dummy	CAPMAS	2006-2019

*Definitions of district socio-economic indicators are obtained from CAPMAS.

Appendix C: Robustness checks

Pre-treatment parallel trends. The key assumption of DiD is parallel trends in the health outcomes of treated and control health facilities in the absence of treatment. Table C.1 shows that accredited-only facilities were initially performing better compared to contracted facilities in 2008. But we must verify that the differences in health outcomes between contracted and accredited-only facilities would have remained the same in the absence of user fees.

TABLE C.1

Two-sample t-test of baseline mean health outcomes of accredited and contracted facilities, 2008

	Outcome	Accredited	Contracted	Difference
Family planning	Modern contraceptive prevalence	52.053	59.276	-7.222
				(6.354)
ANC	ANC by skilled health personnel	79.329	58.673	20.655***
				(7.138)
	4+ visits	74.145	53.223	20.922***
				(7.807)
	Iron supplementation	52.698	34.311	18.387**
				(8.265)
Delivery care	Institutional delivery	77.441	83.294	-5.854
				(8.047)
	Skilled-assisted delivery	83.813	87.706	-3.893
				(7.343)
	C-section delivery	32.775	31.449	1.326
				(8.589)
Access to care	Money barrier reported	39.404	30.647	8.757
				(8.751)
Child health status	Under-5 mortality	3.270	0.000	3.270*
				(1.874)

Standard errors are reported in parentheses. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

We test for the validity of parallel trends for our main results reported in Table 3. We use information from five DHS survey waves (1992, 1995, 2000, 2005, and 2008) to assess the validity of parallel trends prior to our study period 2008-2014. We base the analysis on

observations of facilities that are unreformed in both 2000 and 2005, accredited-only in 2008, and are later observed in 2014 as either accredited only or contracted. For the period 1992-2008, we define facilities that are observed as contracted in 2014 as treated and facilities that remain accredited only in 2014 as control.

To obtain pre-treatment slopes, we follow Mason *et al.* (2017) and regress the change in health outcomes in the period 1992-2008 on a dummy variable for becoming contracted "treatment" and facility- and district-level controls.[16] Table C.2 reports the estimated mean changes in health outcomes between the 1992 and 2008 DHS survey waves for facilities that are contracted versus accredited only as of the 2014 wave. We find that the treatment dummy is not statistically significant for all the reported health outcomes except institutional delivery (*delplac*). The latter is statistically significant at the 10% level only and is not initially reported as being affected by user fees introduction (see Table 3). Thus, Table C.2 provides evidence of the absence of an existing trend that could invalidate the DiD assumption made to estimate the effects of contracting, further alluding to the absence of selectivity bias.

TABLE C.2

Estimated mean difference in health outcomes between the 1992 and 2008 DHS survey waves

	Outcome	Treatment dummy
Family planning	Modern contraceptive prevalence	7.286
		(9.755)
ANC	ANC by skilled health personnel	7.835
		(13.030)
	4+ visits	7.396
		(14.134)
	Iron supplementation	-0.878
		(20.565)
Delivery care	Institutional delivery	20.225*
		(11.248)
	Skilled-assisted delivery	14.040
		(9.952)
	C-section delivery	-3.678
		(12.591)
Access to care	Money barrier reported	6.925
		(14.043)
Child health status	Under-5 mortality	-0.893
		(4.254)

[16] In general, parallel trends is satisfied if unobserved confounding is time-invariant and additive, and becomes more plausible with pre-treatment covariates.

Each row represents a separate regression. The covariates are the facility characteristics, district socio-economic indicators and regional dummies. Bootstrapped standard errors are reported in parentheses. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Placebo treatment. We follow the placebo test performed by Bertrand *et al.* (2004) to confirm the robustness of the results reported in Table 3. We define a "false" lagged contracting intervention to inspect our health outcomes before user fees introduction. The pre-treatment estimations should yield null results if our DiD model is correctly specified. We draw information from the 2005 and 2008 DHS waves to verify the results of our study period 2008-2014. Again, all controls are included in the estimations of the placebo tests.

The results of the placebo test of contracting are reported in Table C.3. The estimates of the majority of outcomes are insignificant except that of three outcomes, which are significant but negative. That is, the differences between the outcomes of contracted and accredited-only facilities reported in Table 3 only emerged after contracting. This finding provides further evidence of pre-treatment parallel trends, i.e., our treatment causes the effects observed rather than the other way around.

TABLE C.3

Estimated effects of placebo contracting, 2005-2008

	Outcome	DiD (Lagged treatment)
Family planning	Modern contraceptive prevalence	6.401
		(7.308)
ANC	ANC by skilled health personnel	-12.514*
		(7.489)
	4+ visits	-15.171*
		(8.528)
	Iron supplementation	-11.385
		(9.455)
Delivery care	Institutional delivery	-5.744
		(11.084)
	Skilled-assisted delivery	-16.972*
		(8.960)
	C-section delivery	-15.473
		(12.009)
Access to care	Money barrier reported	-19.047
		(13.578)
Child health status	Under-5 mortality	-3.398
		(2.590)

Each row represents a separate regression. Robust standard errors across clusters are reported in parentheses. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Placebo outcomes. Finally, we identify a set of health outcomes that, based on economic theory, are not supposed to be - at least directly - affected by the introduction of user fees.

For family planning, we identify one indicator of informed choice of contraceptive methods: knowledge of side effects of contraceptive method used. We calculate this indicator as the percentage of current users of selected contraceptive methods who were informed of the side effect or problems of the method used.

With respect to ANC, we identify several indicators that cover the content of ANC services and prenatal tetanus toxoid injections, thus reflecting the quality of ANC. We calculate the percentages of women who received the following components of ANC: being informed of signs of pregnancy complications, weight measurement, blood pressure measurement, and urine sample collection. We also calculate the percentage of women who received the adequate number of tetanus toxoid injections during pregnancy.

As for access to care, we identify two indicators that we do not expect to be - even indirectly - affected by user fees: distance to health facility reported as a barrier to access health care and having to take transportation reported as a barrier to access health care.

We also identify three indicators of child morbidity prevalence: prevalence of childhood acute respiratory infection (ARI), childhood fever, and childhood diarrhea, calculated as the percentages of children, under five years, who were ill with a cough accompanied by short and rapid breathing (for ARI), or ill with a fever, or ill with diarrhea at any time during the two weeks preceding the DHS interview.

A valid DiD design implies that introducing user fees should not have any effect on the identified placebo health outcomes. We re-estimated the three DiD specifications of equation (1) using the placebo outcomes and found that none of these outcomes are statistically significant, which supports the validity of our DiD models (see Table C.4).

TABLE C.4

Estimated effects of placebo outcomes, 2008-2014

	Outcome	DiD		
		(1)	(2)	(3)
Family planning	Knowledge of side effects	-12.301	-9.708	-11.220
		(9.670)	(12.274)	(10.734)
ANC		-15.435	-15.911	-14.575

	Informed of signs of pregnancy complications	(10.495)	(14.972)	(16.727)
	Weight measurement	-8.472	-6.231	-6.071
		(6.646)	(9.358)	(10.235)
	Blood pressure measurement	-4.685	-1.861	-1.312
		(6.219)	(7.382)	(8.049)
	Urine sample collection	12.750	6.791	11.127
		(10.499)	(13.917)	(13.222)
	Tetanus immunization during pregnancy	9.357	2.786	1.488
		(6.736)	(7.246)	(7.878)
Access to care	Distance barrier reported	3.479	0.722	2.130
		(6.948)	(8.873)	(9.503)
	Transportation barrier reported	3.398	8.550	9.313
		(7.385)	(8.716)	(9.579)
Child morbidity prevalence	ARI	-3.130	-2.056	-0.151
		(8.169)	(10.528)	(9.758)
	Fever	-2.110	-3.399	-3.186
		(6.435)	(8.262)	(8.860)
	Diarrhea	-6.220	-4.580	-4.354
		(6.547)	(8.556)	(9.227)

Each row represents a separate regression. Robust standard errors across clusters are reported in parentheses. *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.