Free Delivery: The effect of a delivery fee exemption policy on the utilization of maternal health services in Ghana

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Abstract

User fees are believed to reduce demand for health services but are an important source of revenue and provide incentives to health care providers in developing countries. The elimination of user fees has been advocated as a strategy to increase the utilization of maternity services but the effectiveness of such policies is not well understood. In late 2003, Ghana introduced a delivery fee exemption policy, initially rolling the policy out to 4 of its 10 regions, creating a natural experiment to evaluate the effect of user fees using a differences-in-differences study design. My findings suggest that this policy was effective at increasing the proportion of births supervised by trained medical personnel and the proportion of births delivered in facilities but may have had an adverse effect on the quality of services delivered.

1 Introduction

User fees are believed to represent important barriers to access to essential health services in developing countries. Although other factors are also believed to reduce the demand

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for health services, cost-sharing at the point of service ("user fees") are common in many developing countries and are believed to dramatically reduce demand for health services, lead to catastrophic health expenditures, and have an adverse effect on equity.[1] Advocates for user fees argue that user fees can generate important financial resources, can improve the allocative efficiency of a health system, and can provide incentives for health service providers. Health system planners trade-off concerns for sustainability and efficiency with concerns for access and equity.

User fees are common in sub-Saharan Africa [5], with the majority of African health systems implementing some sort of cost recovery system. A review of experimental studies that have investigated the effect of user fees on the demand for health products in developing countries finds a large impact of cost-sharing on take up [10], however none of the studies reviewed investigate the effect of user fees on the demand for health services per se, all were conducted in highly controlled experimental settings, and none investigated the effect of user fees on supply side responses. Cross-sectional household demand studies have provided a mixed view of the effect of user fees with some studies finding large reductions in demand while others have actually found increased demand with cost-sharing [6]. The authors of these studies argue that increased demand may be due to an offsetting quality response induced by user fees, but many of these studies suffer from methodological and data quality issues. Evaluations of real world user fee policy changes also present a mixed view, however, most of these studies evaluate policies implemented at the national level with no valid comparison group to account for general trends which may also affect outcomes. The impact of user fees on health services, in particular maternal health services, in developing countries remains poorly understood.

While there is a growing consensus that user fees represent an imperfect policy option to promote health service delivery, policy makers struggle to find alternative solutions that can easily be implemented, can replace lost revenues, and can target services to the poor or other vulnerable groups. The realization that significantly higher coverage of health services will be needed to achieve the Millennium Development Goals has refocused attention on the role of user fees in limiting demand for health services [11] and has led a number of countries to experiment with eliminating user fees altogether or to introduce exemptions for particular services or for particular populations. Although interest in such policies is high, the effectiveness of these policies on the utilization of health services or health outcomes has not received a great deal of attention from researchers.

[1] Other factors that are also believed to reduce the demand for essential health services include poor quality services, poor availability of facilities, lack of knowledge of the effectiveness of health services, and cultural preferences.

In the early 2000s, health service coverage rates in Ghana were unsatisfactory and user fees were seen as an important barrier to higher health service coverage in the country. In particular, the maternal mortality rate was high and not improving, and the low proportion of births supervised by trained medical professionals was seen as a major contributor to this problem [17]. The elimination of cost-sharing became an important political issue. In September 2003, the Government of Ghana implemented a delivery fee exemption policy (DFEP) with the goal of improving the proportion of births supervised by trained medical personnel [14]. The DFEP was initially rolled out to 4 of the poorest regions and then rolled out to the rest of the country in April 2005, however, competing priorities and implementation challenges limited the subsequent national rollout [16].

An evaluation of the DFEP was launched in 2005 to retrospectively evaluate the impact of the policy. The evaluation suggested that the policy likely lead to increased utilization of maternity services and reduced cost-sharing, however, the evaluation was not nationally representative, lacked a valid comparison group, and did not distinguish between the early and late implementation phases of the policy [15]. Given that increasing the proportion of births supervised by trained medical professionals is seen as key to reducing maternal mortality and the increased interest in user fee exemption policies internationally, the effectiveness of this policy warrants further evaluation.

The goal of the following analysis is to conduct a nationally representative evaluation of the early implementation phase of the DFEP on the utilization of maternal services in Ghana using household survey data. The empirical strategy is to use a difference-in-differences study design comparing early to late implementation regions. This evaluation finds that the policy was effective at increasing the proportion of births supervised by trained medical professionals, the proportion of births supervised by public providers, and the proportion of births delivered in facilities. However, the policy may have also had an adverse effect on the quality of maternal health services delivered.

This paper is organized into five sections. The first section introduces the research question and provides a rationale for the evaluation. The second section provides background on the role of skilled delivery in reducing maternal mortality, heath service delivery in Ghana, and the DFEP. The third section presents the empirical strategy and data used in this evaluation. The fourth section presents the main findings of the evaluation. The fifth section discusses these findings and concludes.

2 Background

2.1 The theory and practice of user fees

2.1.1 Rationale for user fees

Economic theory suggests that positive prices for health services, in particular services with large private benefits and low public benefits, can improve the efficiency of health service delivery in a number of ways. First, positive prices can improve the allocative efficiency of health service delivery by ensuring that only those people with a marginal utility exceeding the purchase price of the service will benefit from the service. Second, user fees can raise much needed revenues, which can free up public resources to pay for other services with a greater social benefit [6]. Third, user fees are believed to provide important incentives to health care providers where other incentive structures are weak which could increase the quantity and quality of services delivered.

On the other hand, economic theory would also predict that if the willingness to pay or if the financial liquidity of wealthier patients exceeds that of lower income patients and if the government charges the average willingness to pay for health services, mainly the wealthy will benefit and the poor may be unable to access health services. In particular in the case of socially desirable services, such as ensuring safe childbirth, opponents to user fees argue that such policies make public health systems inequitable. It is for this reason that most user fees policies, in theory, include exemptions for the poor, however, challenges in targeting these exemptions to the most poor in a developing country setting have limited the effectiveness of such policies. In most countries, such exemptions are non-functional in practice [5, 13].

While studies that have evaluated the amount of revenues raised through user fees generally conclude that user fees contribute only a small share of the total revenues of the health system, user fees can represent a significant share of all revenues raised at particular facilities, in particular rural facilities [5]. User fees are seen as a practical solution in countries where it is difficult to ensure limited public funds reach peripheral facilities in a sufficient and timely manner. In addition, it means that in the absence of compensatory arrangements, the elimination of user fees may face opposition from health care providers, or reduce the quality of services delivered, limiting the effectiveness of such policies where enforcement mechanisms are weak.

2.1.2 Empirical evidence of the effect of user fees

The empirical literature has evaluated the effect of user fees on a number of outcomes, including the demand for medical services, health expenditures, health equity, and health

outcomes. The results of such studies have provided a mixed view of such policies and as a result significant debate remains about the actual effect of user fees in practice.

Alaka Holla and Michael Kremer recently reviewed experimental studies that have investigated the effect of user fees on the demand for health products in developing countries. They conclude that cost sharing has a large and significant negative impact on the take up of insecticide treated bed nets, deworming drugs, and water disinfectants [10]. However, none of the reviewed studies investigated the impact of user fees on health services per se. In addition, all of the studies reviewed were conducted in experimental settings where the supply side was controlled by the investigators ignoring the potential impact of user fees on supply side responses which may also affect overall take up rates.

In the early 1990s, as data from some of the earliest household surveys in developing countries became available, a number of studies attempted to estimate the effect of user fees on the demand for health services using cross-sectional household survey data [6]. Most of these studies found relatively inelastic demand for health services, suggesting that user fees could raise revenues without a complete reduction in health services, although much more elastic demand was observed for certain groups including children and the poor. Some of these studies even found increased demand for health services with increased cost-sharing. The authors of such studies have argued that user fees can increase the quality of services provided, justifying the existence of user fees. However, most of these studies were cross-sectional and observational in nature and relied upon geographic variation in the placement or reported prices paid for health services, which are not necessarily exogenous, limiting the strength of such findings.

During the past decade, a number of countries have eliminated user fees or have implemented exemption policies for particular services or particular groups. In 2001, Uganda eliminated all user fees for all health services delivered in public facilities. One evaluation of this policy change found significant increases in the utilization of services [19]. Another evaluation of the same policy using a longer time series of data also found increased utilization, but actually found larger increases in utilization in the time period immediately preceding the elimination of user fees [18]. Neither of these evaluations include a valid comparison group to control for broader system level trends which may have simultaneously affected utilization over the time period. Zambia recently eliminated user fees for patients in rural facilities but the evaluation of this policy has yet to be completed.

A number of countries, including Ghana, Senegal, and Burkina Faso have experimented with policies to exempt pregnant women from cost-sharing associated with assisted or institutional deliveries. Aside from the limited evaluations of the Ghanaian experience, described below, none of these policies have been rigorously evaluated and as such very little is known

about how user fees specifically affect the utilization of maternity services.

2.2 Maternal mortality and skilled delivery

Maternal mortality has received increased attention from the international community following the inclusion of a reduction in maternal mortality among the Millennium Development Goals. The general set of strategies advocated by the World Health Organization (WHO) and other health organizations to improve health outcomes during pregnancy is known as the Safe Motherhood (SM) Initiative, which grew out of a major international conference on maternal health organized by the World Bank, the WHO and the United Nations Population Fund (UNFPA) during the late 1980s. The four main components of the SM strategy are family planning, antenatal care, skilled assistance at delivery, and access to emergency obstetric care.[2] The SM strategy has been adopted and implemented to a various degree by most countries in the developing world over the past 20 years.

The empirical evidence on the role of skilled delivery on improving maternal outcomes is actually quite weak largely due to the measurement challenges associated with measuring maternal mortality. The importance of ensuring skilled delivery has been advocated largely due to an intuitive belief of its effectiveness based on a number of pieces of evidence. First, the bulk of maternal deaths, up to two thirds, occur during the labor, delivery, and immediate postpartum periods [8]. Therefore it is believed that ensuring that deliveries are supervised by trained medical personnel, who are able to deal with the main complications of the delivery process and to refer the most complicated cases to emergency obstetric care, should reduce maternal deaths. Second, the reduction in maternal mortality that occurred in developed countries occurred during a time period where there were large increases in the professionalization of delivery, however, this time period also corresponded to a period when many other major changes to the practice of medicine were ongoing [9]. Finally, cross country correlations between coverage of skilled delivery and maternal mortality suggests a relationship exists between higher proportion of births supervised by trained personnel and lower maternal mortality [8].

2.3 Health service delivery in Ghana

Since the 1980s, the health system in Ghana has been undergoing significant reform with the goal of making health service delivery better coordinated and more effective. User fees

[2]Basic emergency obstetric care includes access to antibiotics, oxytocic drugs, drugs for eclampsia, services to remove the placenta or retained products, assisted vaginal delivery services and referral services to comprehensive emergency obstetric care, which includes all of the above as well as facilities capable of conducting surgery, providing anesthesia and blood transfusion services.

were introduced in 1985 to increase financing and to improve the quality of health services. Most health services were associated with user fees under this policy, however, there were *de jure* exemptions for particular services and for particular groups. In theory, the poor were exempt from user fees, however, challenges in identifying the most poor and limited financial resources available at peripheral facilities limited implementation of this policy. In practice, the exemptions for the poor were non-functional [13].

The decentralization of health services has also been a guiding principle of recent health system reforms in Ghana. In 1997, the Ghana Health Service (GHS) was established as the agency of the government responsible for implementing health service delivery. The Ministry of Health remained responsible for the stewardship of the health system, including policy formulation, resource mobilization, and overall monitoring and evaluation of the system. Under this newly reformed model, health priorities are identified at the national level, and then it is up the the regional and district level implementing units to develop operational plans and deliver health services. Capacity constraints present at lower implementation units mean that actual implementation of does not always follow national goals.

Although fully integrated into the overall health system, separate units are responsible for ensuring the delivery of reproductive health and family planning services. Reproductive health services are available at four levels: the village, the district, the region, and the national level. At the village level, Ghanaian women generally have access to a health post, a midwife, and or a traditional birth attendant (TBA). At the district and higher levels, additional services are available, including emergency obstetric care. However, the decentralized nature of health service delivery means that not all services will be available and that there is variability in the availability of services across similar geographic units.

2.3.1 Delivery-fee exemption policy and maternal and child health policy in Ghana

In 2003, prior to the DFEP, only 45% of births in Ghana were supervised by a trained medical professional (79% in urban areas, 33% in rural), 31% of births were supervised by untrained providers such as TBAs, and 25% were unsupervised [7].[3] There was also significant regional variation with the poorest regions in the countries having the highest levels of unsupervised births [15]. Ghana had a high maternal mortality ratio, estimated to range from 214 to 800 per 100,000 live births [17]. The DFEP, which was funded through Highly Indebted Poor Country (HIPC) debt relief funds, was initially implemented in September

[3]In this analysis, I use the standard definition of a trained health professional as a doctor, a nurse, or a trained midwife. TBAs, many of which have received some form of training, are not considered trained health professionals in this analysis.

2003 in the four poorest regions of the country believed to have the highest maternal mortality rates. The aim was to reduce financial barriers to accessing essential maternal services and to reduce poverty.

The Ministry of Health set tariffs to reimburse health facilities according to the type of delivery performed (e.g. normal or caesarian section). The reimbursement rates were based on an estimated average cost of a delivery of roughly 100,000 old Ghana cedis (roughly $8-10 current USD). The central government allocated funds to the districts based on an expected number of births by district. The funds were channeled through the district assemblies, which had discretion on how to reimburse individual facilities and providers. Normal deliveries were generally reimbursed at lower rates than more complicated births. Mission and private facilities were reimbursed at a higher rate because they do not receive substantial public subsidies. Variation in the interpretation of national guidelines by the district assemblies led to variation in the application of the policy at the district level. In April 2005, the policy was extended to the remaining regions in the country. Due to a shortfall in funds and a decline in political support for the policy, an assessment of the policy in late 2005 found that the policy was no longer being implemented in many regions by mid to late 2005 [16].

After the policy was implemented nationwide, an evaluation was launched to measure the effectiveness of the policy. The evaluation investigated the experiences of only a handful of districts in two regions of the country, and compared the changes in these two regions over time without a valid comparison group. It is not clear how representative the experiences of these regions were of the rest of the country. The evaluation suggested that the policy likely increased the utilization of maternity services [14] and reduced the overall cost-sharing by approximately 25-28%, however the evaluation also found that the wealthiest users benefited the most from the policy [2]. No significant effects were found on institutional maternal mortality, although the study was not adequately powered to observe any change to this measure nor was it able to adequately account for the changing composition of patients presenting at facilities following the introduction of the policy [4].

3 Data and Empirical Strategy

3.1 Data

While in general it is difficult to obtain reliable and detailed data on the utilization of health services in sub-Saharan Africa, the timing of the DFEP corresponded to a period with relatively good household survey data on health service coverage. Although no single household survey provides sufficient data on maternity services in both the pre and post policy

periods, two separate household surveys using comparable questionnaires were conducted around the time of the policy. By pooling across the survey, a time series on maternity service utilization from 2001-2005 was constructed. The two surveys are the 2003 Demographic and Health Survey (DHS) and the 2006 Multiple Indicator Cluster Survey (MICS) survey, which are both administered in part by the Ghana Statistical Service. Neither the household surveys provides sufficient data to allow an evaluation of more detailed health outcomes, such as maternal or child mortality, but there is hope that the 2008 DHS survey will eventually provide additional data to evaluated these questions at a later date.

The GDHS2003 collects detailed maternity service utilization data on the last 6 births to eligible women, however, MICS2006 only collects maternity service utilization data on the last birth of surveyed women. To minimize problems with combining data sets, data from only the last birth delivered within 24 months of the date of either surveys was used.

Comparable outcome and control variables were constructed whenever relevant data was available in both surveys. Service utilization data was available on whether the birth was supervised or not, the type of provider supervising the delivery (category of provider as well as whether the provider was public or private), the location of the delivery (type of facility and ownership of the facility), as well as antenatal care (used as a control since antenatal services were already free in Ghana). In addition, data was available on whether or not the mother received a vitamin A injection following delivery. This variable was included as a measure of the quality of maternity services. Control variables were constructed to account for the education of the mother, whether or not the household was in a rural or urban area, the ethnicity of the household, and the main religious beliefs of the household. A wealth index based on asset ownership was constructed. The relevant assets available were the ownership of a household with electricity, a bicycle, and other assets.

3.2 Empricial Strategy

The basic strategy of this paper is to compare the likelihood that a woman receives a given maternity service using nationally representative household data using a difference-in-differences (DD) framework. By comparing coverage of services in both the early rollout regions (the "treatment regions") and the other regions in the country (the "control" regions) before and after the policy change, the effect of the policy can be distinguished from other national trends that may have simultaneously affected outcomes, a methodological improvement over simple differences, the evaluation strategy employed by previous evaluations of this policy.

Since I am pooling data from two separate cross-sectional studies, I am conducting a

difference-in-differences estimation with pooled cross sectional data:

$$outcomes_{i,r,t} = \alpha + \beta_1 policy_{r,t} + X_{i,t}\beta + \beta_3 \nu_r + \beta_4 \eta_t + \epsilon_{i,r,t} \quad (1)$$

Here *outcomes* is the receipt of a targeted or non-targeted health service. In almost all cases, outcomes are measured as binary outcomes, coded 1 if the woman receives a given service or 0 otherwise. In the case of the number of tetanus vaccines received by a woman during pregnancy, the outcome variable is continuous. *Policy* is an indicator variable that is coded 1 if the birth takes place in a treatment region in a post period or 0 otherwise. $X_{i,t}\beta$ is a matrix of individual specific control variables. The variable ν is a region specific dummy, one for each of the 10 regions in Ghana. The variable η is a year time dummy, one for each year from 2001-2005. The variable ϵ is an error term.

The four regions selected for early implementation of the policy were also the poorest regions in the country, therefore whether the DD framework is appropriate for this evaluation must be considered. The major assumptions of the DD framework relevant to this analysis are that the trends in the treatment and control regions are similar prior to the introduction of the policy, that only the treatment affects the differences in trends following the treatment, and that the composition of the treatment and control groups is not altered by the treatment. Figure 1 plots the trends in the proportion of births supervised by trained medical personnel in the treatment and control regions from 2001-2005. From this plot, it appears as though the trends in coverage of supervised delivery were relatively flat in both the policy and non-policy regions over the time period of interest with the exception of the policy. To investigate if other broader health system reforms, in particular reforms targeting reproductive health services had a differential effect in the treatment and control regions, this evaluation also investigates whether or not the policy appears to have had an effect on reproductive health services not directly targeted by the DFEP. Finally, given that the treatment and control units were separate geographic units, it is believed that this policy did not have any major impact on the composition of the groups.

The time period of interest in this evaluation is a period 20 months prior to the introduction of the DFEP as well as the 20 months following the initial rollout of the policy. The choice of this time period was made for a number of reasons. First, given that reproductive health service coverage was only collected for all births within 2 years of the MICS2006 survey, I only use comparable births in the pre-policy period to ensure that recall bias did not factor into the results. Second, it has been reported that the overall implementation of the DFEP began to wane over time and that by the time the policy was rolled out nationally the program had become less effective. The second phase of the policy was therefore not evalu-

ated in this study, and I wanted to end the evaluation before the national rollout came into effect. Finally, Ghana introduced a National Health Insurance Scheme (NHIS) around the time when the DFEP was rolled out nationally. The NHIS was announced in 2003, however, it took many years for the program to actually be implemented. By mid-2005, it is believed that uptake of national health insurance was low, however, began to increase towards the second half of 2005 [16]. By limiting myself to a time period with low insurance coverage, I hope to avoid introducing any biases into the results form this competing policy.

4 Results

4.1 Summary statistics

Table 2 describes the sample of women included in the evaluation. Only about half of the women in the sample had any formal education and roughly a third of the women had any schooling beyond the primary level. The majority of the households in the sample, or over 72%, live in rural areas. Wealth was measured as an index of asset ownership. Households were evaluated as to whether or not the household had electricity and possessed any of the following: a radio, a television, a refrigerator, a bicycle, a motorcycle, or a car. Households received one point for each asset (including electricity). The distribution of households with zero, one, two, or three or more assets is given. Roughly half of the sample had no more than one of these assets indicating a relatively poor sample of households, although this is likely representative of the Ghanaian population. The age of the mother at the time of the survey is listed. The distributions of households along religious and ethnicity categories are also given.

4.2 Graphical trends in supervised deliveries

Figure 1 shows the trends in the proportion of births supervised by trained medical professionals aggregated over the treatment and control regions. From this figure a few observations can be made. First, coverage of supervised deliveries is much lower in the early intervention regions than in the other regions prior to the introduction of the DFEP. Second, the overall trends in the two groups of regions appear to be similar outside of the policy intervention time period. Third, a large jump appears to occur in the early intervention regions during the time period that roughly corresponds to the introduction of the DFEP. Therefore a simple graphically investigation of the main outcome of interest suggests that the policy may have been effective at improving the proportion of birth supervised by trained medical personnel.

4.3 Summary of changes in outcomes

Table 1 provides a summary of the changes in coverage of the outcomes of interest in the treatment and control regions before and after the implementation of the DFEP. An inspection of the changes in coverage suggest that following the policy, the treatment regions saw a disproportionate increase in the proportion of births supervised by trained health professionals, the proportion of birth delivered in public facilities, and the proportion of births delivered in any institution (public or private). There is little evidence that the policy had an effect of the proportion of births delivered in private facilities or on non-targeted reproductive health services such as antenatal care. Taken together, the data presented in this table is also suggestive that the policy had its intended effect.

4.4 Differences-in-differences estimates

Tables 3-6 are estimates from the difference-in-differences regressions. Table 3 tests the effect of the policy on the proportion of births supervised by trained health professionals using multiple specifications. All of the specifications include region fixed-effects and annual time dummy variables. The policy variable is an indicator variable coded as a "1" if the woman gave birth in a treatment region following the introduction of the DFEP or "0" otherwise. In all of the equations, the mother's education, the total number of children ever born to the mother, household characteristics (rural vs. urban, religion, and ethnicity), and the wealth of the household (as measured by asset ownership) were included as control variables.

In table 3 the first column presents the results from a linear probability model, the second column presents the results from a probit model, while the third column presents the marginal effects coefficients from the probit model. In all three columns, the policy consistently had a positive and significant effect on the proportion of birth supervised by trained health professionals ranging from 14% in the linear probability model to 17% using the probit model. Most of the control variables had relatively intuitive effects on the outcome of interest. Column 4 investigates whether or not the policy had a differential effect for wealthier patients but does not find a significant effect.

Table 4 investigates the effect of the policy on additional outcomes expected to be influenced by the policy. All of the columns in this table use the linear probability model specification similar to column 4 in table 3. The policy appears to have had a positive effect on the proportion of births delivered in public facilities (column 1), the proportion of births delivered in any institution (column 3), and the proportion of births delivered in a hospital (column 4). In none of these cases did the policy appear to have had a differential effect on

wealthier patients. The policy appears to have had a small negative effect on the proportion of births delivered by private providers, although this effect was not significant. This might seem to be a reasonable outcome if one of the effects of the policy was to crowd out use of private providers.

Table 5 investigates the effect of the policy on maternal health services not targeted by the DFEP as a falsification test of the DD framework. The policy did not appear to have any significant measurable effect on the proportion of pregnancies receiving any antenatal care, four or more antenatal visits, or antenatal care from trained medical professionals. Column 4 investigates the effect of this policy on the number of tetanus shots the mother received during the antenatal period, a test of the quality of the antenatal services but also finds no effect. The policy does not appear to have had any major affect on non-targeted maternal health services.

Table **??** presents estimates from a linear probability model investigating the effect of the policy on the quality of maternal services delivered. The only variable that was available to measure quality of maternal services was whether or not the woman received a vitamin A inject in the immediate post-partum period. Admittedly, this is a very limited view of quality. The policy appears to have had a negative impact on the utilization of this service, suggesting that perhaps the policy had a negative impact on the quality of services provided. When the sample of women are split into roughly wealth quartiles or by education level, we see that the negative impact was most severe among the poorest and least educated women, a troubling finding. However, in table 1 we see that coverage of vitamin A increased in the non-policy regions but had little impact in the policy regions, therefore it appears as though there was not necessarily a decline in coverage but may have been associated with less take up of this service. Although only suggestive, this finding suggests that the policy may have adversely affected quality and should be further investigated.

5 Discussion and Conclusion

The DFEP appears to have had a positive and significant impact on the proportion of births supervised by trained medical professionals (increased by roughly 14-17%), the proportion of births delivered in any institution (increased by 16%), the proportion delivered in a public institution (increased by 19%), and the proportion of births delivered in a hospital (increased by 14%). Among targeted health services, there does not appear to have been any major differential effects of this policy on wealthier patients, which suggests that the policy was able to achieve its pro-poor objective. The policy did not appear to have had any significant effect on maternal health services not directly targeted by the policy, strengthening

the argument that it was the DFEP that increased coverage of targeted health services. Therefore the policy appears to have increased both the level of professionalization and institutionalization of deliveries in the targeted regions, both of which are believed to play an important role in reducing maternal mortality.

However, the evaluation finds some evidence that the policy may have been associated with lower levels of quality provided. Quality of the delivery process, here proxied by the proportion of women receiving a vitamin A injection in the immediate postpartum period, was negatively associated with the introduction of the DFEP. This finding is consistent with documented reports of challenges occurred during the implementation of the policy [3]. Although the policy was designed to provide additional funding to health facilities, it is unlikely that the policy was also accompanied with any significant expansion of health workers or other resources and likely led to increased crowding at public facilities. The fact that wealthier patients appear to have suffered less declines in coverage of this indicator is consistent with a story that wealthier patients were able to identify and opt for services of higher quality.

The fact that the choices made by women in seeking care from health care providers for their deliveries were affected by the policy suggests that user fees are limiting demand for maternity services in Ghana. The government initiated evaluation estimated that total cost of deliveries was reduced by roughly 25-28% following the introduction of the DFEP [2]. Assuming that these cost-sharing declines were representative, this would suggest that the price elasticity of demand for maternity services in this case ranged from -0.50 to -0.68, a relatively inelastic measure, but a measure significantly higher than many other health services. Part of the explanation as to why this estimate is higher than the demand elasticity for other health services in other health context is that in addition to reducing the price of this service, the DFEP also effectively help to eliminate some of the risk associated with giving birth in Ghana by covering the delivery fee for both normal and assisted deliveries. Women may have also been responding to the reduction in risk and not just the decline in price.

The data and empirical approach adopted by this study suffers from a number of important limitations and therefore the findings of this study should be interpreted cautiously. First, the set up assumes that there were no other policies that differentially affected outcomes in the treatment and control regions over the same time period. The DFEP did not appear to have an effect on other maternal health services not directly targeted by the policy, strengthening these findings but this does not explicitly rule out this threat. Second, the pre and post policy period data come from two different surveys that used somewhat different questionnaires. As a result, this analysis was limited to outcome variables that were

collected in a similar fashion in the two surveys, preventing more detailed analysis of other indicators. In addition, it is possible that the questionnaires were interpreted differently over time, which may affect the generalizability of these findings, but should not affect the overall finding of the policy unless the questionnaires were interpreted differentially in the treatment and control regions. Finally, the outcome measures in this analysis are health service coverage measures and not true health outcome variables. Data were not available to allow an evaluation of this policy on other indicators such as maternal and child mortality. An increase in coverage of supervised deliveries is assumed to lead to better health outcomes, however, this is an assumption that would require further research to validate.

Although this study has demonstrated that it was feasible to introduce a targeted exemption policy to increase the proportion of births supervised by trained medical professionals, the fact that this policy became non-functional less than two years after its introduction points to the serious challenges that exist to policy implementation in sub-Saharan Africa. Despite the effectiveness of this policy, there was not sufficient resources or political will to make this policy sustainable in the long run. By the time the government had even commissioned research to evaluate the effectiveness of the policy it had already begun to abandon it as a priority. Had the effectiveness of the policy been evaluated at an earlier date, perhaps there would have been more political will given to ensuring its success. The findings of this study also point to the major challenges associated in translating what is known from experimental research studies into real world policy solutions. A number of other countries have recently implemented similar policies or are contemplating similar policies in the coming years. It is hoped that more rigorous analyses of the experiences of these countries will follow allow more generalized learnings on policies that can reduce maternal mortality in developing countries.

Table 1: Changes in mean outcome variables before and after implementation of the DFEP

	Pre-Period	Post-Period	Δ Post-Pre
Number of Births			
Non-policy regions	909	238	
Policy regions	635	212	
Main Outome			
Mean % Supervised Deliveries			
Non-policy regions	53.6%	51.3%	-2.3%
Policy regions	23.8%	35.4%	11.6%
Targeted Maternal Services			
Mean % Public Provider			
Non-policy regions	40.7%	40.8%	0.1%
Policy regions	19.2%	29.7%	10.5%
Mean % Private Provider			
Non-policy regions	11.3%	10.5%	-0.8%
Policy regions	3.3%	3.3%	0.0%
Mean % Institutional Deliveries			
Non-policy regions	52.0%	51.3%	-0.8%
Policy regions	22.5%	33.0%	10.5%
Mean % Hospital Deliveries			
Non-policy regions	37.5%	34.5%	-3.1%
Policy regions	14.3%	16.0%	1.7%
Mean % Vitamin A during post partum period			
Non-policy regions	39.6%	61.2%	21.6%
Policy regions	49.1%	49.5%	0.4%
Non Targeted Maternal Services			
Mean % At least one ANC visit			
Non-policy regions	94.9%	97.5%	2.5%
Policy regions	88.0%	92.0%	3.9%
Mean % Four or more ANC visits (cond. on any)			
Non-policy regions	74.8%	77.8%	3.1%
Policy regions	72.6%	78.9%	6.3%
Mean % Trained Antenatal Care			
Non-policy regions	93.9%	94.1%	0.2%
Policy regions	87.7%	89.6%	1.9%

Source: GDHS2003 and MICS2003 surveys. A birth is supervised if it is assisted by a trained medical professional. For the targeted services, a birth could be delivered either by a public or a private provider but there are both public and private hospitals. A non-institutional delivery would be a deliver that took place at home. ANC=Antenatal care. ANC was trained if it was assisted by a trained medical professional.

Table 2: Summary statistics of control variables

	Mean
Mother had any schooling	52.4%
Mother had any schooling beyond primary education	31.9%
Rural households	72.1%

Asset Ownership	**n**	**% of Sample**
0	292	14.6
1	599	30.0
2	614	30.8
3+ assets	489	24.5

Mother's Age	**n**	**% of Sample**
Age 15-19	124	6.2
Age 20-24	427	21.4
Age 25-29	522	26.2
Age 30-34	426	21.4
Age 35-39	314	15.8
Age 40-44	118	5.9
Age 45-49	63	3.2

Religion	**n**	**% of Sample**
No religion	137	6.9
Traditional/spritualist	152	7.6
Christian	1,261	63.2
Muslim	440	22.1
Other	4	0.2

Ethnicity	**n**	**% of Sample**
Akan	689	34.6
Ga/Dangme	128	6.4
Ewe	218	10.9
Mole Dagbani	525	26.3
Other	434	21.8

Source: GDHS2003 and the MICS2006. Asset ownership is a count of the number of assets owned by a household, including electricity, a radio, a television, a refridgerator, a bicycle, a motorcycle, and a car.

Table 3: Effect of the policy on supervised deliveries

	(1)	(2)	(3)	(4)
Dependent variable:	**Delivery was assisted by trained health professional**			
Policy	0.13***	0.43***	0.17***	0.13**
	(0.04)	(0.15)	(0.06)	(0.06)
Household - Asset Count Index	0.05***	0.19***	0.07***	0.05***
	(0.01)	(0.03)	(0.01)	(0.01)
Policy * Asset Count Interaction				0.00
				(0.01)
Mother - No education	-0.04	-0.14	-0.05	-0.04
	(0.03)	(0.10)	(0.04)	(0.03)
Mother - Primary Education	-	-	-	-
	-	-	-	-
Mother - Beyond Primary Education	0.10***	0.32***	0.13***	0.10***
	(0.03)	(0.09)	(0.04)	(0.03)
Mother - Total Parity	-0.01*	-0.04*	-0.02*	-0.01*
	(0.01)	(0.02)	(0.01)	(0.01)
Household - Rural	-0.34***	-0.99***	-0.38***	-0.34***
	0.00	(0.28)	(0.10)	0.00
Constant	0.38	0.62		0.38
	(0.04)	(0.24)		(0.04)
Observations	1972	1971	1971	1972
R-squared	0.32			0.32

Source: GDHS2003 and MICS2006. Also included but not shown are region time dummy and annual time trend dummy variables. ***=significiant at the 1% level, **=significant at the 5% level, *=significant at the 10% level. -=dropped variables. Standard errors are given in parentheses. Column 1 presents the estimates from the linear probability model, column 2 presents the estimates from a probit model, and column 3 presents the marginal effect estimates (estimated in stata with the dprobit command). Column 4 are also from a linear probability model with an interaction of the policy with the asset count index variable.

Table 4: Effect of the policy on targeted maternal health services

	(1)	(2)	(3)	(4)
Dependent Variable:	**Public Provider**	**Private Provider**	**Institutional Delivery**	**Hospital Delivery**
Policy	0.15**	-0.02	0.13**	0.10*
	(0.06)	(0.04)	(0.06)	(0.06)
Household - Asset Count Index	0.04***	0.01***	0.06***	0.07***
	(0.01)	(0.01)	(0.01)	(0.01)
Policy * Asset Count Interaction	-0.02	0.01	-0.01	-0.03
	(0.02)	(0.01)	(0.02)	(0.02)
Mother - No education	-0.06*	0.01	-0.05	-0.06**
	(0.03)	(0.02)	(0.03)	(0.03)
Mother - Primary Education	-	-	-	-
	-	-	-	-
Mother - Beyond Primary Education	0.09***	0.01	0.11***	0.06**
	(0.03)	(0.02)	(0.03)	(0.03)
Mother - Total Parity	-0.01	-0.01*	-0.01**	-0.02***
	(0.01)	(0.00)	(0.01)	(0.01)
Household - Rural	-0.26***	-0.07***	-0.33***	-0.30***
	(0.03)	(0.02)	(0.03)	(0.02)
Constant	0.35	0.05	0.40	0.24
	(0.43)	(0.27)	(0.42)	(0.38)
Observations	1972	1972	1972	1972
R-squared	0.21	0.09	0.33	0.32

Source: GDHS2003 and MICS2006. Also included but not shown are region time dummy and annual time trend dummy variables. ***=significiant at the 1% level, **=significant at the 5% level, *=significant at the 10% level. -=dropped variables. Standard errors are given in parentheses.

Table 5: Effect of the policy on non-targeted maternal health services

Dependent variable:	(1) **Any ANC visit**	(2) **4 + ANC visits**	(3) **Trained ANC**	(4) **No. Tetatus shorts**
Policy	0.00	0.06	0.00	-0.01
	(0.04)	(0.07)	(0.04)	(0.64)
Household - Asset Count Index	0.00	0.02***	0.01	0.15*
	(0.01)	(0.01)	(0.01)	(0.08)
Policy * Asset Count Interaction	0.00	-0.02	0.00	-0.13
	(0.01)	(0.02)	(0.02)	(0.24)
Mother - No education	-0.03*	-0.09***	-0.03	-0.28
	(0.02)	(0.03)	(0.02)	(0.28)
Mother - Primary Education	-	-0.03	-	-
	-	(0.03)	-	-
Mother - Beyond Primary Education	0.03*		0.03	0.26
	(0.02)		(0.02)	(0.27)
Mother - Total Parity	-0.01	-0.02**	-0.01**	0.05
	(0.00)	(0.01)	(0.00)	(0.07)
Household - Rural	-0.04**	-0.15***	-0.04**	-0.18
	(0.02)	(0.03)	(0.02)	(0.25)
Constant	1.16***	0.72***	1.16***	1.68
	(0.26)	(0.25)	(0.28)	(2.41)
Observations	1972	1778	1972	1919
R-squared	0.09	0.12	0.08	0.04

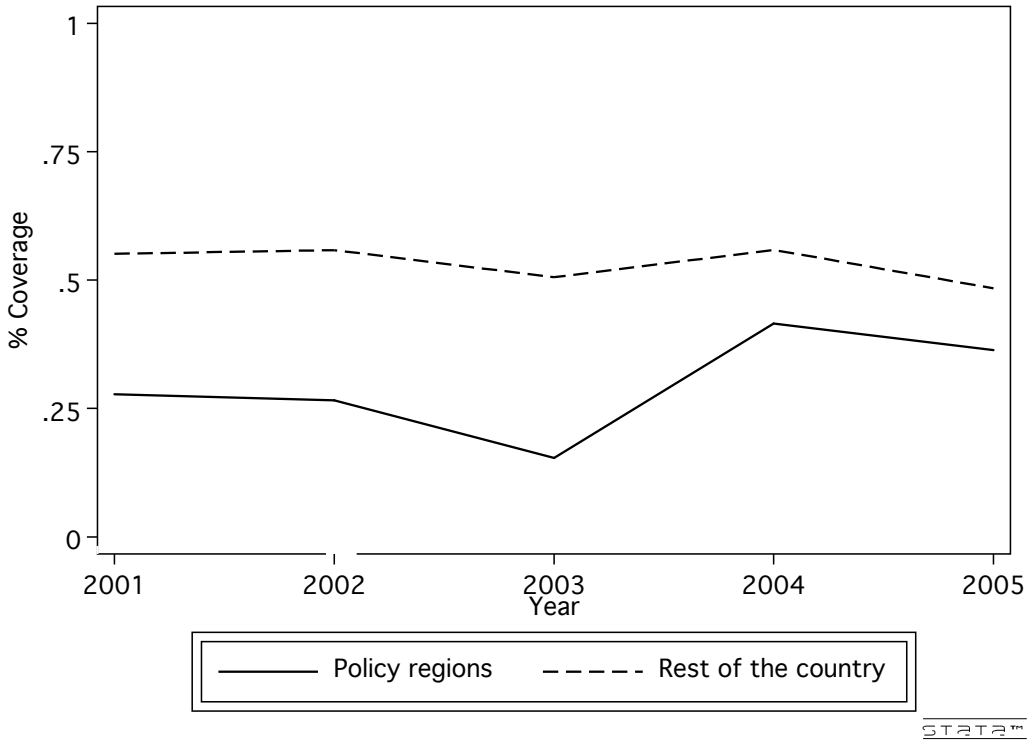
Source: GDHS2003 and MICS2006. Also included but not shown are region time dummy and annual time trend dummy variables. ***=significiant at the 1% level, **=significant at the 5% level, *=significant at the 10% level. -=dropped variables. Standard errors are given in parentheses.

Table 6: Effect of the policy on the quality of maternal health services

Dependent variable:	(1) **Vitamin A**	(2) **Lowest Wealth**	(3) **Low-Med Wealth**	(4) **High-Med Wealth**	(5) **Highest Wealth**	(6) **No Education**	(7) **Primary Education**	(8) **Beyond Primary**
Policy	-0.29***	-0.65***	-0.39***	-0.08	-0.14	-0.39***	-0.30**	-0.04
	(0.05)	(0.16)	(0.10)	(0.10)	(0.11)	(0.08)	(0.14)	(0.14)
Household - Asset Count Index	0.01					0.01	0.04*	0.00
	(0.01)					(0.02)	(0.02)	(0.02)
Mother - No education	-0.04	-0.13	-0.10*	0.01				
	(0.03)	(0.09)	(0.06)	(0.07)				
Mother - Primary Education		-0.08			0.00			
		(0.09)			(0.08)			
Mother - Beyond Primary Education	0.03		-0.04	0.10	0.02			
	(0.03)		(0.06)	(0.07)	(0.07)			
Mother - Total Parity	-0.02**	0.01	-0.02	-0.02	-0.01	-0.02**	0.00	-0.01
	(0.03)	(0.09)	(0.06)	(0.06)	(0.05)	(0.05)	(0.07)	(0.05)
Household - Rural	-0.08***	-0.10	-0.04	-0.17***	-0.05	-0.09*	-0.01	-0.11**
	(0.09)	0.00	0.00	(0.16)	(0.22)	0.00	(0.24)	0.00
Constant	0.79**	0.62	0.52***	1.16***	0.97***	0.12	0.16	0.92***
	(0.36)	(0.62)	(0.18)	(0.24)	(0.34)	(0.49)	(0.34)	(0.29)
Observations	1960	292	592	610	488	935	403	622
R-squared	0.11	0.21	0.14	0.12	0.12	0.15	0.11	0.13

Source: GDHS2003 and MICS2006. Also included but not shown are region time dummy and annual time trend dummy variables. ***=significiant at the 1% level, **=significant at the 5% level, *=significant at the 10% level. -=dropped variables. Standard errors are given in parentheses.

Figure 1: Trends in supervised deliveries in intervention and non-intervention regions



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