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Who benefits from removing user fees for facility-based delivery services? Evidence on socioeconomic differences from Ghana, Senegal and Sierra Leone

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Abstract

Coverage of skilled delivery care has been increasing across most low-income countries; however, it remains far from universal and is very unequally distributed according to socioeconomic position. In an effort to increase coverage of skilled delivery care and reduce socioeconomic inequalities, governments of several countries in sub-Saharan Africa have recently adopted policies that remove user fees for facility-based delivery services. There is little rigorous evidence of the impact of these policies and few studies have examined effects on socioeconomic inequalities. This study investigates the impact of recent delivery fee exemption policies in Ghana, Senegal, and Sierra Leone on socioeconomic differences in the use of facility-based delivery services. Using Demographic and Health Survey data from nine sub-Saharan African countries, we evaluated the user fee policy changes using a difference-in-differences approach that accounts for underlying common secular trends and time invariant differences among countries, and allows for differential effects of the policy by socioeconomic position. Removing user fees was consistent with meaningful increases in facility deliveries across all categories of household wealth and maternal education. We found little evidence of differential effects of removing user fees across quartiles of household wealth, with increases of 5.4 facility deliveries per hundred live births (95% CI: 2.1, 8.8) among women in the poorest quartile and 6.8 per hundred live births (95% CI: 4.0, 9.7) for women in the richest quartile. However, our results suggest that educated women benefited more from removing user fees compared to women with no education. For women with at least some secondary education, the estimated effect was 8.6 facility deliveries per hundred live births (95% CI: 5.4, 11.9), but only 4.6 per hundred live births (95% CI: 2.2, 7.0) for women with no education (heterogeneity *p*-value = 0.04). Thus, while removing fees at the point of service increased facility deliveries across the socioeconomic gradient, it did not reduce inequalities defined by household wealth and may have contributed to a widening of educational inequalities. These findings emphasize the need for concerted efforts to address financial and other barriers that contribute to large and persistent socioeconomic inequalities in delivery care.

Keywords: user fee removal; maternal health services; socioeconomic inequalities; sub-Saharan Africa

Introduction

Increasing skilled delivery care is one of the highest priorities in global efforts to reduce maternal and neonatal mortality (United Nations, 2014). A skilled provider (midwife, nurse, doctor) can administer essential life-saving maternal and newborn interventions and refer to higher-level care in cases of emergency. It has been estimated that universal coverage of midwifery services and access to emergency obstetric and newborn care when complications arise would result in up to 74% fewer maternal deaths and 30-45% fewer neonatal deaths (Darmstadt et al., 2005; Wagstaff and Claeson, 2004). However, utilization of skilled delivery care in most low-income countries is far from universal and unequally distributed according to socioeconomic position. Across forty-five developing countries, there was a nearly four-fold difference in the proportion of births attended by a skilled provider between women in the richest and poorest quintiles of wealth (Houweling et al., 2007). In some countries these inequalities are even larger—in Nigeria over 80% of women in the richest quintile gave birth in a health facility compared to 7.7% in the poorest quintile between 2003 and 2008 (Wang et al., 2011).

Many of the poorest women live far from health facilities and are often deterred from seeking care due to facility user fees and other costs such as transportation. Research across several low-income countries has found that the cost of normal delivery services in health facilities places an enormous burden on poor families (Borghi et al., 2006; Pearson and Shoo, 2005; Richard et al., 2010). Direct costs of maternal health care have been estimated at between 1-5% of total annual household expenditures (Richard et al., 2010). And when complications during childbirth occur, the cost of emergency care is often catastrophic (in excess of 10% of yearly household income) (Borghi et al., 2006; 2003). In much of sub-Saharan Africa, where only around half of all women receive skilled care at birth, charging user fees for delivery services in public facilities has been a common practice for decades. However, there is increasing consensus that user fees represent an inefficient and inequitable way to finance a health system and are a major barrier to increasing utilization of life-saving obstetric services, especially among the poor (Robert and Ridde, 2013). Abolishing user fee payments for maternity services represents one strategy to increase utilization of skilled delivery care, reduce socioeconomic inequalities, and protect the poor from deepening poverty due to high health care costs. Governments of several countries in sub-Saharan Africa, including Senegal, Kenya, Burundi, Sierra Leone, and Ghana, have recently adopted this strategy (Richard et al., 2013; Yates, 2009).

Several studies have reported increases in facility-based deliveries after the removal of user fees (De Allegri et al., 2010; Dzakpasu et al., 2012; El-Khoury et al., 2011; Witter et al., 2008). Less is known about the effect of this type of policy change on socioeconomic inequalities in utilization of delivery services, and existing research has shown mixed results (De Allegri et al., 2012; Dzakpasu et al., 2012; 2013; El-Khoury et al., 2011; Witter et al., 2008). Moreover, most previous evaluations have been simple pre-post designs that compare the magnitude of inequality before and after the policy change. In this type of design, underlying secular trends in inequality cannot be separated from effects of the policy. Quasi-experimental designs, such as difference-in-differences (DD), can account for secular trends in the outcome by using a control group to estimate the counterfactual outcome trajectories (i.e., the outcome trend in the post-policy period had the policy change not occurred). We recently used a DD design to evaluate the effects of user fee exemption policies, finding evidence that removing fees increased facility-based deliveries and possibly contributed to a reduction in neonatal mortality (McKinnon et al., 2014). In this paper, we extend our previous work to investigate whether there are differential effects of the fee exemption policy across socioeconomic groups.

Materials and Methods

We used data from Demographic and Health Surveys (DHS) conducted in nine sub-Saharan African countries between 2003-2013. The DHS are nationally representative household surveys that are generally repeated in a country approximately every 5 years in order to monitor trends in population health and utilization of health services (http://www.measuredhs.com/). All women aged 15-49 living in each household are asked to provide complete birth histories and to report on the use of maternal and child health services for all live births that occurred in the past 5 years. A household questionnaire provides information on the demographic, socioeconomic, and environmental conditions of each household surveyed. We used available surveys that provided information on 150 541 live births that occurred between 2000-2012. Ethics approval was not required for this study, as it involved secondary analysis of DHS data.

Women who participated in the DHS were asked to report the location of delivery for each birth in the past 5 years. Births reported to have taken place in a public or private health facility (hospital, health center, maternity, clinic) were coded as one and births that took place at home (either the woman's or someone else's) were coded as zero. We considered singleton births to the same mother within the 5-year period as separate observations, but used only one observation for multiple births.

Our main exposure was whether each live birth occurred after the adoption of a policy exempting user fees for deliveries in health facilities. Senegal, Ghana, and Sierra Leone removed fees for delivery services (including normal delivery services, Caesarean section, and complications during pregnancy and labor) over the period of observation and thus contribute outcomes to the "intervention" group (Dzakpasu et al., 2013; Richard et al., 2013). In Ghana and Senegal, the policy was implemented first in selected regions/provinces and subsequently rolled out in the rest of the country. For these two countries we defined the exposure based upon region of residence. The policy in Ghana was implemented first in September 2003 in the four poorest regions (Northern, Upper East, Upper West, Central) and then subsequently rolled out to the rest of the country in April 2005 (Witter et al., 2008; 2007). Similarly, the policy change in Senegal was implemented first in January 2005 in the five most deprived provinces (Kolda, Ziguinchor, Tambacounda, Matam and Fatick) and then extended to the rest of the country one year later in January 2006 (Witter et al., 2010). The Government of Sierra Leone abolished all charges to pregnant women and children less than 5 years of age as of April 2010 (Sierra Leone Ministry of Health and Sanitation, 2012). Kenya was also considered as a potential intervention country, having introduced a national policy to abolish delivery fees in all public dispensaries and health centers in July 2007. However, evidence that this policy was not implemented as intended from the start led us to exclude Kenya from the analysis (Richard et al., 2013). In addition to the three intervention countries, we selected a control group of six countries that did not pass a policy exempting user fees for deliveries during the study period. The control countries were: Cameroon, Congo (Brazaville), Ethiopia, Guinea, Mozambique, and Tanzania. We used the following criteria to select potential control countries: at least two available DHS surveys covering the study time period, with the most recent conducted in 2008 or later; 2) sub-Saharan African countries; 3) no evidence of major reforms affecting maternal health care financing (e.g., Burkina Faso subsidized delivery services by 80%, Mali and Benin removed fees for Caesarean sections). The availability of birth history data for the intervention and control countries is shown in Figure 1.

[Figure 1]

We examined differential effects of the policy according to three measures of socioeconomic position: household wealth, number of household assets, and level of education. For household wealth, wealth quartiles were constructed from the continuous asset-based wealth index provided in the DHS. The asset index is based on a set of variables related to household conditions (e.g., water source, sanitation facilities, electricity) and ownership of consumer goods (e.g., a bicycle, a telephone, a refrigerator) and is constructed for each survey using factor analysis (Rutstein and Johnson, 2004). We generated wealth quartiles separately for each policy area used in the analysis, so that the wealth index is a measure relative to other households within the same area. This type of relative wealth measure is useful for examining the distribution of health outcomes within a population; however, we were also interested in an absolute measure of wealth that would be comparable across countries. Given that the DHS program does not collect measures of income/expenditures, we generated a household assets variable using a set of seven common assets (electricity, radio, television, refrigerator, bicycle, motorbike, car or truck) available across all surveys. We categorized number of assets into four categories (0, 1, 2, 3+). Lastly, level of education was assessed as a three-level categorical variable (no education, some or completed primary, some secondary or higher). Additional individual-level covariates included maternal age, urban vs. rural residence, and parity (firstborn vs. other).

Statistical Analysis

We estimated the impact of the fee exemption policy change on socioeconomic differences in the proportion of facility-based deliveries using a DD approach. We extend the typical DD model to allow for differential effects by socioeconomic position by including interaction terms for each socioeconomic variable, fitting logistic regression models of the form:

$$logit[P(Y_{ict})] = \alpha + \beta_1 Policy_{ct} + \beta_2 Wealth_{ict} + \beta_3 Policy_{ct} * Wealth_{ict} + \gamma_t + \delta_c + \beta_4 Wealth_{ict} * \gamma_t + \beta_5 Wealth_{ict} * \delta_c + X_{ict}$$

where Y is an indicator of whether birth i was delivered in a health facility in area c at time t, $Policy_{ct}$ is a dummy variable indicating whether the birth occurred after the adoption of a delivery fee exemption policy, γ_t is a fixed effect for year of birth, δ_c is a fixed effect for area (country or sub-national area in the cases of Ghana and Senegal), and X_{ict} is a vector of individual-level covariates. Year fixed effects control for secular trends common among areas and area fixed effects control for time-invariant differences in health facility delivery between countries. The interaction term $Wealth_{ict}* \gamma_t$ controls for any common differential secular trends in the outcome according to wealth group and the term $Wealth_{ict}*\delta_t$ controls for time-invariant socioeconomic differences in the outcome across areas. The term $Policy_{ct}*Wealth_{ict}$ allows for differential effects of the policy by wealth quartile. To facilitate interpretation for all models and to assess differences by socioeconomic position on the absolute probability scale, we report estimated marginal effects calculated from the logistic coefficients (Kleinman and Norton, 2009). We adjusted standard errors for clustering at the level of primary sampling unit and performed all analyses using Stata 12.

In estimating the causal effect of an intervention, the DD approach uses a control group to approximate the counterfactual outcome trajectories of the intervention group had it not received the intervention. In this case, we are making the assumption that changes in the proportion of facility deliveries by socioeconomic position that are due to factors other than the policy do not differ between the intervention and control areas. This assumption can be partially checked by ensuring that trends in the proportion of facility-based deliveries by socioeconomic position are similar for the intervention and control areas prior to introduction of the policy. We investigated pre-policy trends to ensure the control group of countries had pre-intervention trends that were statistically indistinguishable from the intervention countries.

Results

Figure 2 shows pre-policy trends in facility-based deliveries by wealth quartile, number of assets, and maternal education, comparing the intervention countries (countries that eventually removed delivery fees) and control countries. We also estimated covariate adjusted logistic regression models that included a three-way interaction between birth year, country group (intervention or control) and socioeconomic position (wealth quartile, assets, or education) to assess whether there was formal statistical evidence that pre-policy trends by socioeconomic position differed significantly between the policy and control countries. In general, there was little evidence that trends in the prevalence of facility delivery by any of the socioeconomic measures differed between the intervention and control countries. The only exception was among women with a secondary education, where an interaction *p*-value of 0.06 testing for equality of trends in the control vs policy countries suggested a slightly more rapid pre-policy trend for the control group.

[Figure 2]

Figure 3 presents the predicted prevalence of delivering in a health facility by socioeconomic position in the presence and absence of the policy, and Table 1 displays the corresponding values. The fourth column of Table 1 shows average marginal effects of the policy change on the prevalence of facility delivery, estimated separately for the three socioeconomic variables and conditional on individual covariates, year and area fixed effects and their two-way interactions with socioeconomic position. There were absolute increases in facility births across categories of all three socioeconomic variables. Little evidence was found of differential effects across wealth quartiles (p-value testing the null hypothesis of homogeneity of the stratum-specific effect estimates (p_H) was 0.53 comparing the richest to the poorest wealth quartiles). For number of assets, there was some indication that women in the zero asset category benefited more than women in the 3+ asset category (p_H =0.11). The policy change increased facility deliveries by an estimated 8.2 per hundred live births (95% CI: 5.1, 11.4) among women living in households with zero assets and 4.4 per hundred live births (95% CI: 0.5, 8.2) for those from households with 4+ assets. By contrast, effects of the policy change were stronger among more educated women. The policy change was associated with increases of 4.6 facility deliveries per hundred live births (95% CI: 2.2, 7.0) for women with no education and an 8.6 per hundred live births (95% CI: 5.4, 11.9) for women with at least some secondary education (p_H =0.04).

[Figure 3]

[Table 1]

Table 1 also presents differences between the most and least advantaged socioeconomic groups in the absence and presence of the policy change. There was no evidence the policy change was associated with a reduction in the rich-poor wealth quartile difference (p_H =0.50). The high to low asset difference for facility delivery declined from 17.9 per hundred births in the absence of the policy to 14.0 per hundred births with the policy change (p_H =0.08). By contrast, we found a significant increase in the high-low education difference for facility delivery, from 21.3 to 25.2 per hundred live births (p_H =0.04)

Discussion

We found evidence that removing user fees increased the proportion of women delivering in health facilities across the socioeconomic gradient. This was true for three different measures of socioeconomic position:

household wealth, number of household assets, and level of education. Overall there was no indication that the fee exemption policy disproportionally benefited richer women, and some evidence the policy was associated with relatively greater increases in facility deliveries among women living in the most materially deprived households. We did, however, find greater increases in facility deliveries associated with removing user fees among women with a secondary education compared to women with no education.

Existing evidence on the distributional effects of removing user fees for health services is mixed and most previous evaluations have suffered from serious methodological limitations (Dzakpasu et al., 2013). There is evidence that free health services either reduce (Dzakpasu et al., 2012; Nabyonga et al., 2005), widen (El-Khoury et al., 2011; Preker and Langenbrunner, 2005), or fail to impact socioeconomic gradients (De Allegri et al., 2010). These discrepancies may stem from methodological limitations of the evaluations or they may reflect true differences in the distributional effects across diverse policy environments. The only previous study we are aware of that used time series analysis to account for secular trends in their evaluation of a delivery fee exemption policy found a significant reduction in socioeconomic inequality, with socioeconomic position measured by an asset-based wealth index, in seven rural districts of Ghana (Dzakpasu et al., 2012). Our results are consistent with some reduction in the rich-poor difference when number of assets was used as the socioeconomic variable, although we did not find robust evidence that removing user fees was associated with a reduction in wealth-related inequality. The study from Ghana did not examine differential effects of user fee exemptions by level of maternal education.

To obtain a more comprehensive picture of the effect of removing delivery fees on inequalities in facility-based delivery care, we investigated three different measures of socioeconomic position. Our results suggest some notable differences between the three measures. In particular, there appeared to be a larger effect of the policy within the lowest asset category compared to the lowest category of the relative wealth index, although there is considerable uncertainty in the estimates. The lowest category of the wealth index includes the poorest quartile for each country, whereas the proportion of women in the lowest asset category varied considerably across countries (e.g., 36% of women from Sierra Leone fell into the zero asset category, while this figure was only 14% for Ghana). This may suggest a stronger effect of user fee removal in countries where a greater proportion of women live in very materially deprived households. Finally, our results suggest that user fee removal may have widened educational inequalities in facility delivery. This is an important finding, particularly as few previous studies have examined differential effects of free health services by maternal education level. However, it should be noted that there was limited variation in level of education across some of the countries included in our analysis—52% of women in the full sample were in the "no education" category (for Senegal, Sierra Leone, Ethiopia, and Guinea, this proportion was over 70%). The proportion of women with a secondary education also ranged from less than 10% in Senegal, Guinea, and Ethiopia to over 30% in Ghana, Cameroon, and Congo.

Some other important limitations should be considered in interpreting our results. First, as the data are from cross-sectional household surveys that retrospectively collect information about births within the past five years, there is potential for differential recall over time. However, unless the accuracy of reporting delivery location differs between the intervention and control groups and varies by socioeconomic position, this should not affect the estimated policy effects. In addition, socioeconomic variables were obtained at the time of the survey, which is subsequent to the occurrence of the outcome by as much as 5 years. However, as household asset measures and education level show little fluctuation over short periods of time and represent more permanent measures of socioeconomic position, we expect misclassification of the socioeconomic variables should be minimal (Rutstein and Johnson, 2004).

The DD design assumes that changes in the distribution of the outcome by socioeconomic position that are due to factors other than the policy do not differ between the intervention and the control areas (i.e., trends in the outcome by socioeconomic position in the control group represent a good approximation of the trend in the intervention group in the absence of the intervention). In general, we did not detect any major differences in pre-policy inequality trends between the control and intervention groups. However, there was some evidence that the trends for the most educated group differed slightly between the policy and control groups, with the prevalence of facility delivery increasing more rapidly in the control group. If this trend continued into the post-policy time period, it may have led us to underestimate the effect of the policy among the most educated women. The other major assumption of the DD design is that no other factors differentially affected outcomes in the control and policy countries at the time of user fee policy changes. Our use of multiple policy and control countries and multiple pre- and post-policy time periods helps to minimize this threat to validity (Angrist and Pischke, 2008). We also reviewed the literature, finding little evidence of major policy changes or reforms that occurred simultaneous to the delivery fee exemption policies in the four intervention countries that would be likely to explain our results. Ghana's National Health Insurance Scheme (NHIS) began to be implemented in 2005, although the delivery fee exemption policy remained in effect until 2008 when it was officially replaced by the NHIS (Dzakpasu et al., 2012; United Nations, 2014). As delivery fees were already exempt for normal deliveries and Caesarean sections, we would not expect much additional effect on utilization of delivery services due to implementation of the NHIS.

Conclusion

Most of the evidence to date has shown positive effects of delivery fee exemption policies on service utilization and we now contribute further evidence that increases in facility-based deliveries have occurred across all socioeconomic groups. Yet despite these encouraging findings, the richest 20% of women were still around twice as likely to give birth in a health facility compared to the poorest 20% after the policy change. Moreover, our results also suggest that more educated women may be benefiting more from user fee removal, leading to a widening of educational inequality in facility delivery. Further research is needed to confirm this finding and to understand the mechanisms underlying the observed differential effects by maternal education. While user fees appear to be one barrier women face in accessing skilled delivery care, other barriers (e.g., geographical access to health services, other costs like transportation, socioeconomic/cultural factors) may be more important determinants of inequalities. Current evidence suggests reductions in maternal and child health inequalities have been achieved through incentive programs like conditional cash transfers and voucher schemes in South Asia and Latin America, as well as through participatory community interventions, such as participatory women's groups and home-based care from community health workers (Houweling et al., 2013; Målqvist et al., 2013). In addition to removing user fees, policy approaches that target socioeconomically disadvantaged populations appear to play an important role in reducing inequalities, although further evidence is needed on these different policy approaches for sub-Saharan African settings.

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Figure 1: Availability of birth history data by country and dates of delivery fee exemption policies

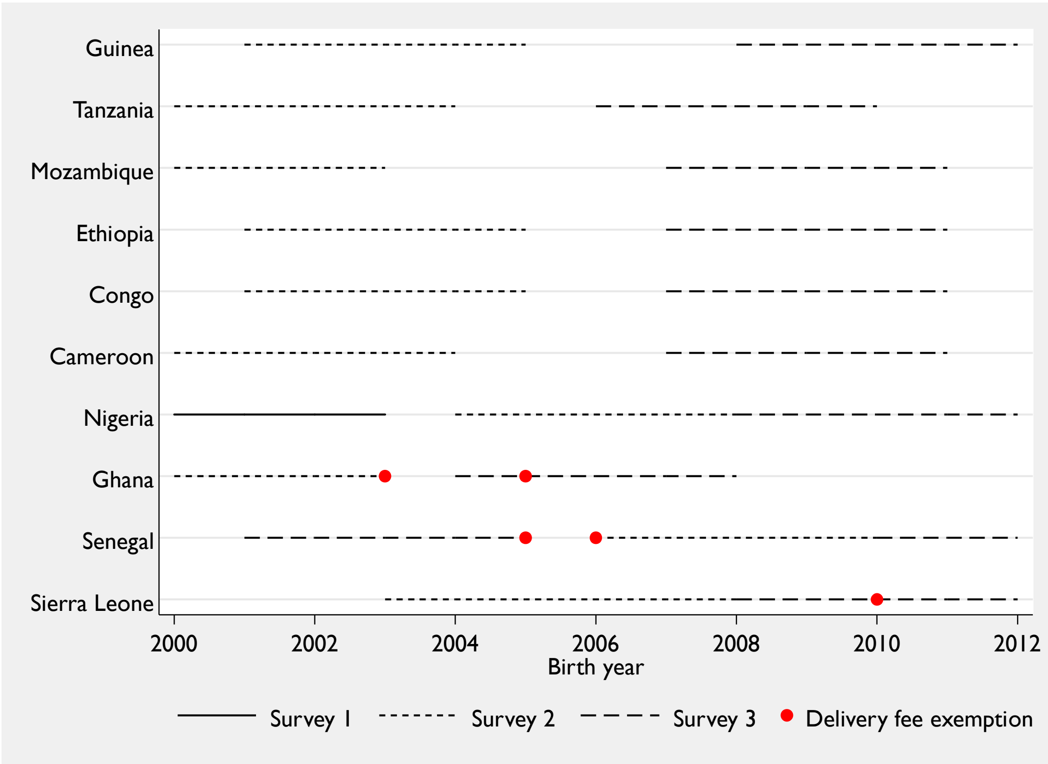


Figure 2: Pre-policy trends in the prevalence of facility-based delivery by wealth quartile, number of assets, and maternal education comparing policy countries (i.e., countries that eventually exempt user fees) and control countries

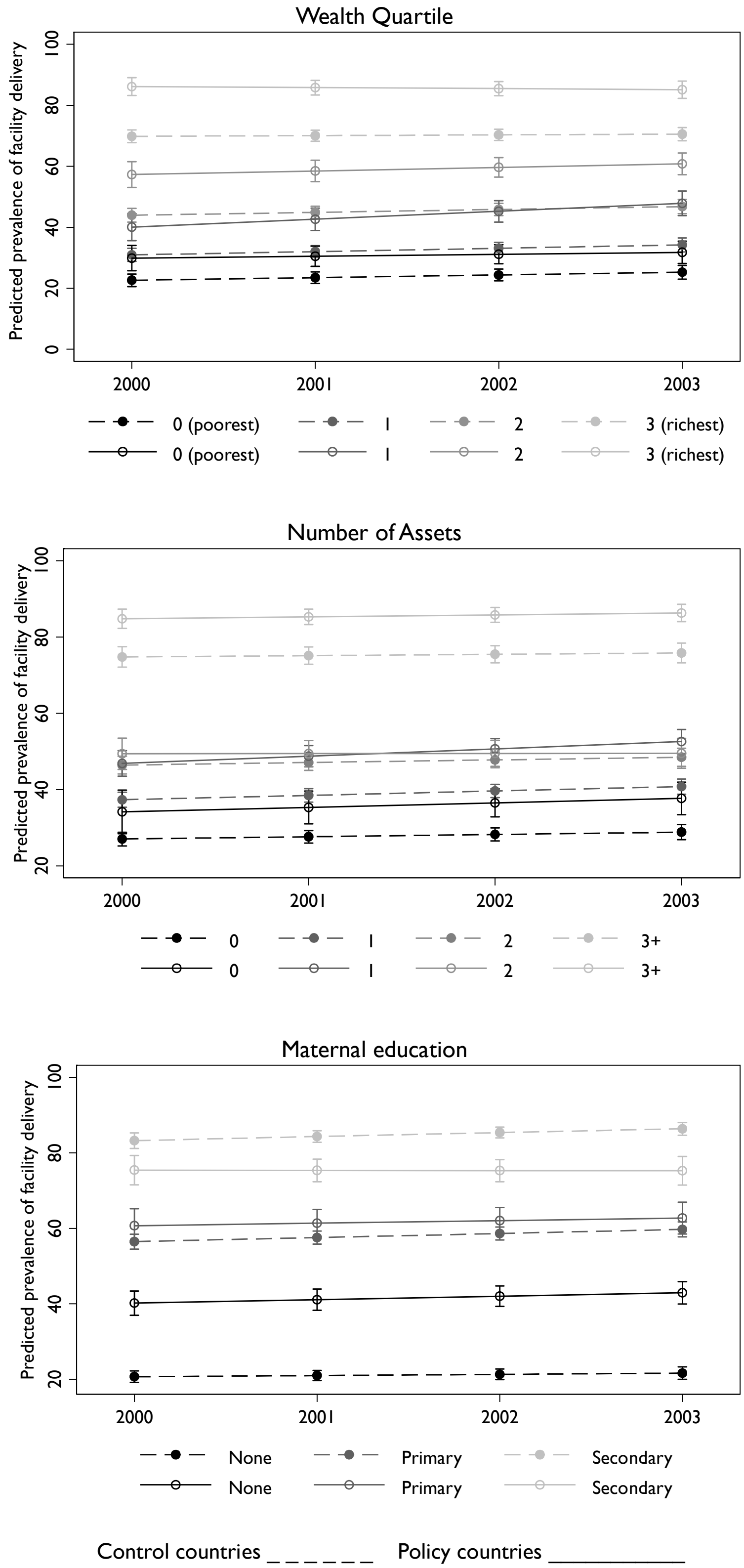


Table 1: Estimated effects of the user fee policy change on facility-based deliveries per 100 births, stratified by each socioeconomic variable and adjusted for other covariates

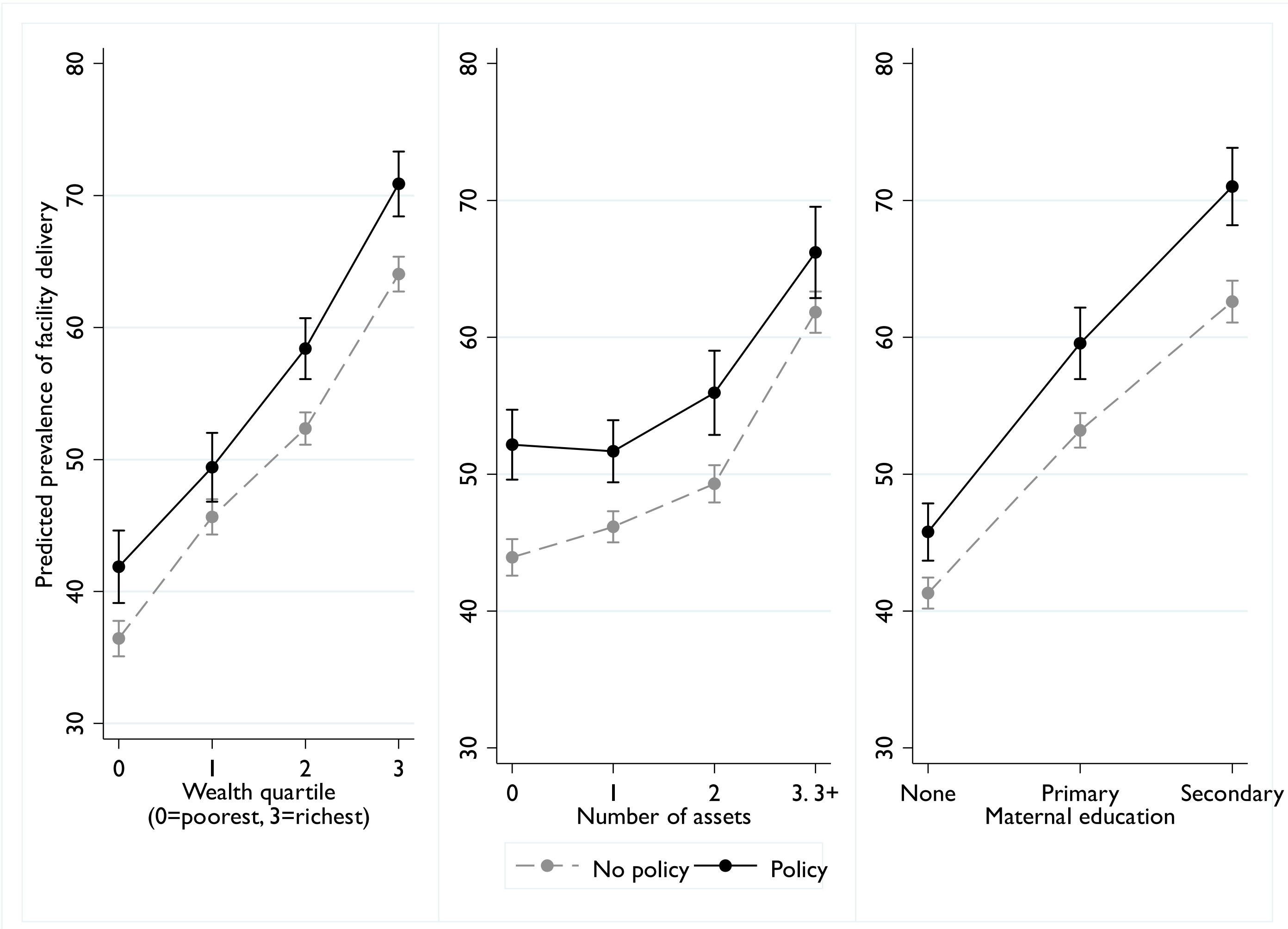
	Predicted prevalence of facility delivery (95% CI)		Average prevalence difference (95% CI)
	No Policy	Policy	
Wealth quartile			
Poorest	36.4 (35.1, 37.8)	41.9 (39.1, 44.6)	5.4 (2.1, 8.8)
2nd	45.6 (44.3, 47.0)	49.4 (46.8, 52.0)	3.8 (0.5, 7.0)
3rd	52.3 (51.1, 53.6)	58.4 (56.1, 60.7)	6.1 (3.3, 8.8)
Richest	64.0 (62.7, 65.4)	70.9 (68.4, 73.3)	6.8 (4.0, 9.7)
			p-value[a]=0.53
Richest-poorest quartile difference	27.6 (25.8, 29.4)	29.0 (25.4, 32.6)	1.4 (-3.0, 5.8)
			p-value[b]=0.50
Number of Assets			
0	43.9 (42.6, 45.3)	52.2 (49.6, 54.7)	8.2 (5.1, 11.4)
1	46.2 (45.0, 47.3)	51.7 (49.4, 53.9)	5.5 (2.8, 8.2)
2	49.3 (47.9, 50.7)	55.9 (52.9, 59.0)	6.6 (3.0, 10.3)
3+	61.8 (60.3, 63.3)	66.2 (62.9, 69.5)	4.4 (0.5, 8.2)
			p-value[a]=0.11
High-low asset difference	17.9 (16.2, 19.6)	14.0 (10.1, 18.0)	-3.9 (-8.6, 0.9)
			p-value[b]=0.08
Level of Education			
None	41.3 (40.2, 42.4)	45.8 (43.7, 47.9)	4.6 (2.2, 7.0)
Primary	53.2 (51.9, 54.4)	59.6 (56.9, 62.2)	6.6 (3.4, 9.7)
Secondary	62.6 (61.1, 64.1)	71.0 (68.2, 73.8)	8.6 (5.4, 11.9)
			p-value[a]=0.04
High-low education difference	21.3 (19.7, 22.9)	25.2 (22.0, 28.5)	4.1 (0.2, 7.9)
			p-value[b]=0.04

Effect estimates adjusted for maternal age, urban residence, parity, and birth year and area fixed effects. In addition, estimates by wealth quartile and number of assets are conditioned on level of education and estimates by education level are conditioned on wealth quartile.

[a] p-value from χ^2 test for homogeneity comparing the average prevalence differences between the most vs least advantaged categories

[b] p-value from χ^2 test for homogeneity comparing the most vs least advantaged differences in the absence and presence of user fee removal

Figure 3: Adjusted predicted prevalence of facility delivery (and 95% confidence interval) in the presence and absence of a delivery fee exemption policy according to three measures of socioeconomic position (wealth quartile, number of assets, and education level)



Effect estimates are adjusted for maternal age, urban residence, parity, and year and area fixed effects. In addition, estimates by wealth quartile and number of assets are conditioned on level of education and estimates by education level are conditioned on wealth quartile.