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Determinants of utilisation of maternal care services after the reduction of user fees: A case study from rural Burkina Faso

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ABSTRACT

Objective: To identify determinants of utilisation for antenatal care (ANC) and skilled attendance at birth after a substantial reduction in user fees.

Methods: The study was conducted in the Nouna Health District in north-western Burkina Faso in early 2009. Data was collected by means of a representative survey on a sample of 435 women who reported a pregnancy in the prior 12 months. Two independent logit models were used to assess the determinants of (a) ANC utilisation (defined as having attended at least 3 visits) and (b) skilled assistance at birth (defined as having delivered in a health facility).

Results: 76% of women had attended at least 3 ANC visits and 72% had delivered in a facility. Living within 5 km from a facility was positively associated, while animist religion, some ethnicities, and household wealth were negatively associated with ANC utilisation. Some ethnicities, living within 5 km from a health facility, and having attended at least 3 ANC visits were positively associated with delivering in a facility.

Conclusions: User fee alleviation secured equitable access to care across socio-economic groups, but alone did not ensure that all women benefited from ANC and from skilled attendance at birth. Investments in policies to address barriers beyond financial ones are urgently needed.

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1. Introduction

Recent estimates indicate that approximately 350,000 maternal deaths [1] and 4 million neonatal deaths [2] occur annually, of which respectively close to 50% and 30% are in sub-Saharan Africa (SSA). With an annual decline in maternal mortality of 0.1% [3] and a 5% increase in the proportion of neonatal deaths which occur in the continent [2], SSA is

far from achieving the objectives set by Millennium Development Goals of halving maternal deaths and reducing child deaths by two thirds by 2015.

There is a strong positive correlation between skilled attendance at birth, defined as the presence of someone with midwifery skills able to manage a normal delivery, recognize complications, and refer in due time, and lower maternal and neonatal death [2,4–8]. In fact, skilled attendance at birth has been identified as the single most important factor in preventing maternal deaths [9] and as an important element in reducing neonatal death [2]. In turn, focused antenatal care (ANC) has been shown to provide opportunities for the early detection

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of potential obstetric risks and, through counselling and education, motivate women to seek skilled attendance at birth [10–13]. Thus, access to and use of adequate maternal care services, including both ANC and skilled attendance at birth, is essential to reduce both maternal and neonatal mortality [6–8]. Most current deaths in fact, could be avoided if only known medical interventions were available and accessible to the population in need [2–4].

A number of studies have indicated the presence of multiple barriers hampering women's access to maternal care services [10,14,15]. In particular, following their introduction in the 1980s and 1990s [16], the imposition of user fees has been shown to dissuade service utilisation, to delay the process of seeking care, and to increase the use of informal care [10,17–20].

These considerations on the detrimental effect of user fees have led a number of researchers and policy makers to conclude that the alleviation of financial barriers constitutes a *sine qua non* to advance progress towards MDG 5 [21–26].

A number of countries in SSA have responded to this international call and have either strongly reduced or completely abolished user fees for maternal care services [27,28]. These rapid policy changes have been evaluated in terms of process indicators and in terms of their impact on time-trends in service utilisation [29–34]. In spite of undoubted progress towards greater coverage rates, however, evidence from various African settings has shown that one quarter to one half of women continue not to attend ANC and not to seek skilled attendance at birth even after the reduction of user fees [32–36].

It is therefore of utmost importance to understand who continues to remain excluded from access to maternal care services even following the reduction of user fees. With the exception of one paper from Ghana [37], analyses of determinants of utilisation of both ANC and skilled attendance at birth date back to a time when user fees were still in place and are therefore no longer adequate to inform policy making [10,11,15,38–40]. Understanding the remaining barriers to access through an analysis of the determinants of utilisation represents the first step towards the establishment of comprehensive policies for the reduction of maternal and neonatal mortality in SSA.

This study sets to fill this gap in knowledge by providing an analysis of the determinants of utilisation for both ANC and skilled attendance at birth in Burkina Faso, following the implementation of a financing policy reducing user fees for maternal care services.

2. Materials and methods

2.1. Study setting

The study took place in the Nouna Health District (NHD), a rural district located in north-western Burkina Faso at the border with Mali and at about 300 km from the capital Ouagadougou. The district has a population of approximately 311,000 distributed in 300 villages, served by 25 first-line health facilities, Centres de Santé et Promotion Sociale (CSPS), and one district hospital located in Nouna town.

With an estimated 332 maternal deaths per 100,000 live birth [1] and 19 neonatal deaths per 1000 births [41], providing access to adequate maternal care services has become a priority in Burkina Faso [42]. Following national directives [43], the NHD waived user fees for ANC in 2002 and introduced an 80% subsidy for facility-based delivery, i.e. the Burkinabè option for skilled attendance at birth, in 2007.

In Burkina Faso, user fees were originally introduced for hospital services in the 1970s in a centralised manner. After some pilot experiences in decentralised cost-recovery during the 1980s, user fees were implemented on a national basis in 1993. This implied that users had to be paid for all maternal care services: medical consultations, supplies (including the booklets), and drugs. Due to their detrimental effects on health service utilisation [20], the Burkinabè health authorities intervened with a number of measures to progressively reduce household costs related to maternal care: (1) abolition of ANC user fees, including booklet and iron and malaria prophylaxis tablets (2002); (2) hospital admission without pre-payment for all emergency cases (2006); (3) subsidy for C-sections (2006); (4) subsidy for all deliveries (2007). These financing policies resulted from extensive negotiations with the World Bank.

At the moment, women are required to pay nothing for all ANC-related services and drugs (for instance, iron or antimalarial prophylaxis tablets). Women, however, are still required to pay 900 CFA (CFA stands for Communauté Financière Africaine) for an uncomplicated delivery, 1800 CFA for a complicated delivery, and 11,000 CFA for a C-Section (1 US \$ is equivalent on average to approximately 535 CFA). These values correspond to 20% of the average cost estimated at 4500 CFA for an uncomplicated delivery, 9000 CFA for a complicated delivery, and 55,000 for a C-section. All 25 CSPS are equipped to provide ANC and to manage uncomplicated deliveries. The district hospital in Nouna town is the only facility capable of managing complicated deliveries and performing C-sections.

2.2. Data collection

Data were collected by means of a household survey conducted in February/March 2009. The survey sample was selected using a three-stage cluster sampling procedure. First, clusters were defined according to the catchment area of each CSPS. Second, two villages within each cluster were selected: (a) the village where the CSPS was located, and (b) another village randomly drawn from the list of all the villages in the CSPS catchment area. Third, 20 households in each village were randomly selected to undergo the interview. To take into account its larger population, 70 (10 per town sector) rather than 20 households were selected in Nouna town. A total of 1050 households were included in the survey. Further details on sampling procedures are described in an earlier manuscript, presenting an analysis relevant to a previous round of the same household survey [44].

In the sampled households, all women who had been pregnant and had completed their pregnancy in the 12 months prior to the survey date were interviewed using a structured close-ended questionnaire. The questionnaire

Table 1
Variables and their distribution in the study sample ($n = 435$ unless otherwise indicated).

Variables	Measurement	N	%	Expected sign model 1	Expected sign model 2
Attended at least one ANC		422	97.01	NA	NA
Attended at least 3 ANC ($n = 434$)		329	75.81	NA	NA
Delivered in a health-facility		315	72.41	NA	NA
Woman's age	1 = ≤ 24	190	43.68	–	–
	2 = 25–34	185	42.53		
	3 = ≥ 35	60	13.79		
Woman's religion	1 = Christian	149	34.25	–	–
	2 = Muslim	267	61.38		
	3 = Traditional African	19	4.37		
Woman's ethnicity	1 = Bwaba	148	34.02	–	–
	2 = Mossi	27	6.21		
	3 = Peuhl	67	15.40		
	4 = Samo	18	4.14		
	5 = Marka	123	28.28		
	6 = Other	52	11.95		
Woman's literacy	0 = Illiterate	385	88.51	+	+
	1 = Literate	50	11.49		
Woman's marital status	1 = Monogamous marriage/first wife	324	74.48	–	–
	2 = Polygamous marriage	104	23.91		
	3 = Not married	7	1.61		
History of miscarriage	0 = Had no miscarriage	330	75.86	+	+
	1 = Had miscarriage	105	24.14		
Parity	1 = 1 st	86	19.77	–	–
	2 = 2 nd to 4 th	202	46.44		
	3 = 5 th to 8 th	120	27.59		
	4 = 9 th and above	27	6.21		
Household head's literacy	0 = Illiterate	279	64.14	+	+
	1 = Literate	156	35.86		
Household head's age ($n = 430$)	1 = ≤ 35	97	22.56	–	–
	2 = 36–50	128	29.77		
	3 = 51–65	142	33.02		
	4 = ≥ 66	63	14.65		
Household wealth (quintiles)	1 = lowest quintile (poorest)	NA	NA	+	+
	5 = highest quintile (wealthiest)	NA	NA		
Distance to health facility	0 = >5 km	183	42.07	+	+
	1 = ≤ 5 km	252	57.93		

collected information on the women's socio-demographic characteristics, their use of ANC and delivery services, and the household overall socio-economic profile. Interviewers were instructed to consult women's ANC booklet to verify the accuracy of the information reported on the utilisation of ANC and delivery services.

2.3. Statistical analysis

Data analysis was completed using Stata IC 11. Two distinct models were estimated: one to assess which factors shaped the decision to seek ANC (model 1) and one to assess which factors shaped the decision to deliver in a health facility (model 2). The choice to estimate two distinct models was motivated by the recognition that attending ANC and delivering in a health facility are the product of two distinct decisions, independent of one another. Both decisions were modelled using multivariate logistic regression since both outcome variables were defined as binary.

The outcome variable for model 1 was defined as “having attended at least three ANC visits”, considering as essential a minimum of one visit per trimester [45]. The fact that over 97% of women in the study sample had attended at least one ANC visit further supported the decision to define the outcome variable as “having attended at least three ANC visits”. Given the very small percentage of women not

having attended ANC at all, defining the outcome variable as “having attended at least one ANC visit” would have been inappropriate to adequately inform policy makers interested in increasing steady, rather than sporadic ANC utilisation.

The outcome variable for model 2 was defined as “having delivered in a health facility”. It included both deliveries having taken place in a CSPS and deliveries having taken place in the district hospital. The choice to combine deliveries in a CSPS and deliveries in the district hospital was justified by the very small proportion of hospital-based deliveries in the sample (less than 5%) and by the absence of any information on referral.

Logistic regression was used to generate the coefficients (and its standard errors and significance levels) of a formula to predict a *logit transformation* of the probability of presence of the characteristic of interest:

$$\text{logit}(p) = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + \dots + b_kX_k$$

where p represented the probability of presence of the characteristic of interest (i.e. having attended at least three ANC visits – model 1 – or having delivered in a health facility – model 2) and X_n represented the factors affecting this probability [46].

Both models were estimated using the same set of explanatory variables outlined below. Robust standard

errors were computed using Huber–White correction techniques to account for clustering at the household level [47,48]. In model 2, “having attended at least three ANC visits” was also added as an explanatory variable.

2.4. Variables and their measurement

Table 1 lists all the explanatory variables, their distribution in the sample, and the expected signs of the coefficients for both model 1 and model 2.

The variables included in the analysis are mostly self-explanatory. For both women and household heads, literacy was defined as the ability to read and write either in French or in a local language. Standard procedures applying principal component analysis were used to estimate household wealth using a combination of housing infrastructure (i.e. roof material, toilet type, electricity availability, water type, and people per room) and durable assets (television radio, motorbike, bicycle, telephone, cart, and plough) [49–51]. Appendix A shows the percentage of households in each wealth quintile who owned a given asset.

The expected signs of the coefficients were informed by previous research on determinants of health care utilisation in general and determinants of maternal care utilisation specifically [10,11,13,38,40,52,53]. In particular, socio-economic status was expected to be positively associated with both the utilisation of ANC and of facility-based delivery. In spite of the substantial reduction in user fees, wealthier households were expected to be better equipped to cope with the remaining direct and indirect costs associated with seeking care. Both women’s and household head’s literacy were also expected to be positively associated with the utilisation of maternal care services. This was motivated both by previous evidence from the study area [52–54], indicating a higher propensity towards health service utilisation among the better educated, and by the expectation that the better educated would also be more likely to be aware of the new financing policy and to be able to benefit from it. Previous research from the study area would have also suggested the presence of a positive association between Christian religion and Bwaba ethnicity and health service utilisation [54,55], motivating the positive expected signs of the relevant coefficients. Younger women and women at an early parity were also expected to be both better informed of the new policy, due to access to more modern-oriented social networks, and more concerned with their pregnancy, thus utilising maternal care services more. Likewise, women having experienced a miscarriage were also expected to be more concerned with their pregnancy, more aware of potential complications, and thus more likely both to attend ANC and to deliver in a health facility. On the contrary, women in polygamous marriages were expected to be less likely to utilise maternal care services because they were expected to have to share resources among several wives. Younger household heads were expected to be more likely to motivate their spouses to attend maternal care services as they were also expected to be part of younger social networks with both better access to information on the new financing policy and a greater propensity towards health service utilisation. Living closer to a health facility was expected to be posi-

tively associated with health service utilisation, as both the direct and the indirect costs associated with transport and travel time are known to discourage people from health service utilisation [56–58].

3. Results

Among the 1050 households included in the survey, all 435 women who reported a pregnancy in the 12 months prior to the interview date, were interviewed. These 435 women were clustered in 356 households. Of all women in the sample, nearly 76% had attended at least 3 ANC visits and 72% had delivered in a health facility (69% in a CSPS and 3% in the district hospital). Complete information could be ascertained for 429 women, who were included in the logistic regression models.

Table 2 reports the multivariate odds ratio (OR) estimates for both model 1, looking at determinants of ANC utilisation, and model 2, looking at determinants of facility-based delivery.

The results of model 1 indicated that only a few variables were significantly associated with ANC utilisation. Living within 5 km from a health facility was positively associated with ANC utilisation, while traditional African religion, ethnicity (specifically being Samo or Marka), and higher levels of household wealth were all negatively associated with ANC utilisation.

Likewise, the results of model 2 also indicated that only a few variables were significantly associated with delivering in a health facility. Ethnicity (specifically being Mossi, Peuhl, Marka, or Other), living within 5 km from a health facility, having attended at least 3 ANC visits were all positively associated with delivering in a health facility.

4. Discussion

In line with evidence from elsewhere in SSA [32–35], this study indicated that a considerable proportion of pregnant women, about one quarter, still did not use ANC regularly and did not benefit from skilled attendance at birth. Use of maternal care services, however, was higher than in many other SSA countries. In countries as diverse as Tanzania [13], the Ivory Coast [39], and Nigeria [11,40], regular ANC and skilled attendance at birth were consistently observed to stand respectively below 60% and below 50%. Recent estimates from Ghana suggested that following the implementation of the free obstetric care policy, only 38% of women delivered with the assistance of a health professional, in spite of the fact that 98% of them had attended ANC [37].

The comparatively high rates of maternal care service utilisation described in our study could appear surprising if they were not perfectly aligned with the national and regional estimates recently compiled by the Ministry of Health. These estimates indicate that in 2009, the proportion of women attending at least 2 ANC visits was 74% for the whole of Burkina Faso and 79% for the Nouna Health District specifically [59]. Likewise, national statistics also indicate that for the same year, the proportion of women delivering in a health facility had raised to 71% in the whole of Burkina Faso and to 70% in the Nouna Health Dis-

Table 2

Determinants of ANC utilisation (i.e. “having attended at least 3 ANC visits”) and determinants of facility-based delivery (OR = odds ratio; CI = confidence interval).

Variables	Logistic regression model 1: ANC utilisation		Logistic regression model 2: Facility-based delivery	
	OR	Robust SE	OR	Robust SE
Woman's age				
≤24	1.0		1.0	
25–34	1.02	.33	.93	.39
≥35	.73	.36	.71	.45
Woman's religion				
Christian	1.0		1.0	
Muslim	1.73	.76	.64	.34
Traditional African	.31**	.16	2.11	1.77
Woman's ethnicity				
Bwaba	1.0		1.0	
Mossi	.54	.34	17.20***	14.35
Peuhl	.99	.63	8.32***	6.01
Samo	.31*	.21	4.35	6.26
Marka	.39**	.18	3.59**	1.98
Other	.42	.25	3.24*	2.18
Woman's literacy				
Illiterate	1.0		1.0	
Literate	1.04	.44	1.67	1.17
Woman's marital status				
Monogamous marriage/first wife	1.0		1.0	
Polygamous marriage	1.28	.40	1.36	.44
Not married	.30	.25	1.77	2.23
History of miscarriage				
Had no miscarriage	1.0		1.0	
Had miscarriage	.95	.27	1.47	.53
Parity				
1st	1.0		1.0	
2nd to 4th	.96	.33	.58	.24
5th to 8th	.89	.41	.44	.24
9th and above	.85	.60	.44	.37
ANC utilization				
Did not attend at least 3 ANC visits	–	–	1.0	
Attended at least 3 ANC visits	–	–	4.30***	1.59
Household head's literacy				
Illiterate	1.0		1.0	
Literate	1.22	.32	.97	.34
Household head's age (n = 430)				
≤35	1.0		1.0	
36–50	.64	.22	.90	.41
51–65	.76	.26	.79	.34
≥66	1.93	1.06	.39	.26
Household wealth				
1st quintile (poorest)	1.0		1.0	
2nd quintile	.51*	.21	.65	.32
3rd quintile	.42**	.17	.49	.24
4th quintile	.43**	.19	.94	.54
5th quintile (wealthiest)	.44**	.19	.95	.52
Distance to health facility				
>5 km	1.0		1.0	
≤5 km	1.59†	.43	28.42***	11.90
Observations	429	429		

* Significant at the 10% level.

** Significant at the 5% level.

*** Significant at the 1% level.

trict specifically [59]. This suggests that although far from achieving the objective of reaching all women, Burkina Faso is making substantial progress, especially when compared to neighbouring countries [1], towards increasing maternal care coverage, thus ultimately attempting to reduce maternal and neonatal mortality.

Understanding why the utilisation of maternal care services is higher in Burkina Faso than in neighbouring

countries is beyond the scope of this study and would require in-depth comparative qualitative inquiry in a number of different settings. Differences in the quality of the services on offer, providers' systematic efforts to sustain ample outreach program, and differences in the socio-cultural norms which govern women's behaviour and especially their mobility may explain some of the differences observed across countries. In addition, findings from

a parallel study evaluating providers' attitudes and perceptions of distributing insecticide-treated nets (ITNs) via ANC suggested that such free distribution might have also largely contributed to the increase in maternal care service utilisation observed in recent years [60].

In line with findings from Nigeria and Uganda [11,35], this study indicated that the decision to seek ANC and the decision to deliver in a health facility were shaped by different, although in some instances similar, factors. This confirmed the initial hypothesis that the two decisions are at least partly independent of one another, although, as shown by the results of model 2, ANC utilisation was influenced by the decision to deliver in a health facility. This difference in the set of factors identified as significant determinants in the two models suggests that following the reduction of user fees, policies aimed at increasing service utilisation ought to differentiate between the specific barriers to access to ANC and to facility-based delivery. Furthermore, the observed positive association between ANC use and facility-based delivery is an indication of the fact that investments ought to continue to be made to promote ANC attendance. While it is true that reductions in maternal mortality ultimately depend on access to adequate obstetric care [9], this study added to the existing evidence that ANC is instrumental in encouraging women to seek skilled attendance at birth [12,13,61,62].

Before discussing the single factors shaping the utilisation of maternal care services, a general consideration ought to be made with regard to the fact that both models only identified a handful of significant associations. Elements which previous research had recognised as significant predictors of the decision to seek ANC or skilled attendance at birth, such as age, parity, women's education or household head's characteristics [10,35,40,63,64], were not significant in the analysis presented in this paper. In the absence of a comparable analysis dating back to the time preceding the introduction of the new financing policy, it is impossible to assert whether the observed lack of association is intrinsic of the population in the study area or stands to indicate that the reduction of user fees has effectively overcome existing barriers. The observed lack of a significant association, however, can at least be taken to indicate that, with regard to the concerned factors, i.e. women's age, parity, education, and household head's characteristics, the policy has not fostered inequities, reaching equally people with different socio-demographic profiles.

The most surprising finding emerging from this analysis concerns the role of household wealth in shaping the utilisation of maternal care services. Marking a clear departure from previous research [10,11,15,39,40,63] and from earlier national statistics [41], household wealth was found to be negatively associated with ANC utilisation and not to have any significant association with facility-based delivery. Again, in the absence of an earlier comparable analysis, it is impossible to assert with certainty whether the findings are an indication of the ability of the new financing policy to counteract existing inequalities in access. A complementary analysis exploring time-trends in the utilisation of facility-based delivery identified decreasing inequities in access across socio-economic groups over time [34]. This convergence across findings can be taken

to indicate that the new financing policy has been effective in granting women of different socio-economic status an equal chance to access maternal care services. This clearly represents a very promising achievement, adding to the existing evidence from Ghana and South Africa that the reduction of user fees is instrumental in fostering equitable access to services [30,65].

The negative association between household wealth and ANC utilisation further suggests that poorer women might have benefited the most from the new financing policy. In any case, the lower ANC utilisation among the wealthiest women remains surprising. In the absence of alternative private providers, as it is the case in the NHD, it is difficult to understand why wealthier households should be less likely to use ANC than poorer ones. One plausible explanation is that poorer households are encouraged to attend ANC because of the free products dispensed during the visits, e.g. ITNs, iron, and malaria prophylaxis tablets. The free distribution of these products may not serve as an equally strong incentive to utilisation for wealthier households, who can more easily afford to purchase them on the private market. A second explanation is that wealthier women do not value ANC sufficiently to be willing to face the longer waiting times which have resulted from increased utilisation following the abolition of user fees or to mix with poorer women during waiting times. Understanding the reasons that discourage wealthier women from attending ANC requires urgent qualitative inquiry. This is essential to design adequate policies to bring them back to the health facilities.

Confirming findings from Ghana [37], this study showed that the reduction of user fees can be effective in favouring equitable access across socio-economic groups, but not in overcoming barriers to access due to distance. In line with earlier studies [10,13,14,36,38,63,64,66], the odds ratio estimates showed that women living close to a facility were much more likely to use maternal care services than women living far from a facility. Distance remained the single most important barrier in limiting access to care, both for women wishing to use ANC and women wishing to deliver in a health facility, probably largely because of the poor conditions of the roads, the absence of systematic transport, and the high direct and indirect costs associated with it [10,67–69]. In particular, the remarkable magnitude of the relevant OR in model 2 as compared to model 1 suggests that while it may be possible to organise transport to the facility for a planned event, i.e. an ANC visit, it is close to impossible to do so for an unplanned event, i.e. a delivery.

This last observation calls for the urgent adoption of innovative policies to complement existing efforts to lower user fees. Such policies ought to be especially designed to lower the barrier imposed by distance for women in labour. On the one hand, policy makers are urged to enhance geographical accessibility by increasing the number of facilities in remote areas, ensuring that all communities are within 5 km from a first-line facility. On the other hand, considering this to be an unlikely solution in the short term, policy makers are first urged to establish effective emergency transportation systems at low or no cost for women still living far from the existing facilities. Data from this analysis clearly showed that the current policy, which cov-

ers the cost of emergency transport from the CSPS to the District hospital in case of need, is not sufficient to secure that women in labour reach the CSPS in the first place.

In line with previous research [10,39,40], findings from this study also identified important differences in the use of maternal care services across religious and ethnic groups. Trends in the observed associations clearly differed across the two models, further reinforcing the initial hypothesis that the decision to seek ANC and the decision to deliver in a health facility are influenced by different factors. Understanding the role played by religion and ethnicity in shaping women's access to maternal care, however, is beyond the scope of this paper and requires additional qualitative inquiry. A plausible explanation, to be confirmed by future research, is that both access to social networks and perceptions of the potential risks and benefits derived from using medical care differ across religious and ethnic groups [70].

An important limitation of this study is the lack of indicators on the quality of the maternal care services available. Previous research has shown that the quality of the services available may shape women's decision to use ANC and to seek skilled attendance at birth [10,40,63,71–73]. Given that all facilities in the study area are equally equipped and staffed to provide maternal care services, no remarkable differences in quality of care should be expected. Previous research, however, has clearly shown that beyond the equipment and the staff available, important differences in quality of care persist depending on the motivation and attitude of the single providers [74–76]. These differences are most often reflected especially in the interpersonal aspect of care [77–80]. It is even plausible to speculate that people of different ethnicity may be treated differently by the providers and thus may be more or less motivated to use the available services. Further qualitative research is needed to understand if and how providers' behaviour differs across facilities, influencing perceptions of the quality of care, and thus ultimately influencing women's decision to use ANC and to deliver in a health facility.

5. Conclusions

Findings from this study indicate that the reduction of user fees is instrumental to secure equitable access to care across socio-economic groups, but alone it is not sufficient to ensure that all women use ANC and benefit from skilled attendance at birth. As distance continues to constitute a major barrier to access, findings from this study call for the adoption of urgent measures, such as free or low cost emergency transport and the wider availability of skilled

attendance at birth closer to women's residency. In addition, further qualitative research is needed to understand why, following the reduction of user fees, use of ANC and of facility-based delivery continues to differ across ethnic and religious groups. To ensure that the remaining one quarter of women currently not attending ANC and not delivering in a facility also gains access to maternal care, investments in adequate policies to address barriers beyond financial ones are urgently needed.

Contributions

OM, AJ, and MDA were in charge of the original study design. MDA, JT, and MY designed the data collection tools. MDA, JT, and VL were responsible for data collection. MDA conducted the data analysis with support from VL, VR, and MS. All authors contributed to the interpretation of the results. MDA wrote the manuscript with contributions from all authors. All authors had full access to all of the data (including statistical reports and tables) in the study and can take responsibility for the integrity of the data and the accuracy of the data analysis.

Conflict of interest statement

All authors declare that they have no conflict of interest.

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Appendix A. Asset distribution in the wealth quintiles

Values in the table indicate the number (and in brackets the percentage) of households in each quintile who owned a given asset. The assets included in the table are those used for the calculation of the wealth quintiles using principal component analysis. The total number of households in each quintile is indicated in the top row.

Asset	1st quintile (poorest) n = 87	2nd quintile n = 87	3rd quintile n = 88	4th quintile n = 86	5th quintile (wealthiest) n = 87
Radio	41 (47)	70 (80)	76 (86)	85 (99)	85 (98)
TV	0 (0)	3 (3)	12 (14)	19 (22)	46 (53)
Telephone	7 (8)	35 (40)	41 (47)	51 (59)	66 (76)
Motorbike	1 (1)	15 (17)	52 (59)	72 (84)	85 (98)
Bicycle	79 (91)	83 (95)	85 (97)	85 (99)	87 (100)
Cart	31 (36)	64 (74)	74 (84)	84 (98)	84 (97)
Plough	38 (44)	75 (86)	82 (93)	83 (97)	84 (97)
Electricity at home	0 (0)	1 (1)	0 (0)	1 (1)	4 (5)
Metal roof	1 (1)	5 (6)	22 (25)	48 (56)	83 (95)
Soil or straw roof	86 (99)	82 (94)	66 (75)	38 (44)	4 (5)
Modern latrine	0 (0)	0 (0)	1 (1)	1 (1)	1 (1)
Traditional latrine	11 (13)	19 (22)	26 (30)	31 (36)	49 (56)
Modern toilet	0 (0)	0 (0)	0 (0)	0 (0)	5 (6)
Toilet in nature	76 (87)	68 (78)	61 (69)	54 (63)	32 (37)
Piped water in compound	0 (0)	0 (0)	1 (1)	0 (0)	0 (0)
Piped water outside compound	4 (5)	2 (2)	1 (1)	0 (0)	1 (1)
Well in compound	12 (14)	7 (8)	11 (12)	6 (7)	8 (9)
Well outside compound	65 (75)	71 (82)	73 (83)	79 (92)	78 (90)

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