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RESEARCH ARTICLE

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Understanding factors influencing home delivery in the context of user-fee abolition in Northern Ghana: Evidence from 2014 DHS

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Summary

User-fee exemption for skilled delivery services has been implemented in Ghana since 2003 as a way to address financial barriers to access. However, many women still deliver at home. Based on data from the 2014 Ghana Demographic and Health Survey, we estimated the prevalence of home delivery and determined the factors contributing to homebirths among a total of 622 women in the Northern region in the context of the user-fee exemption policy in Ghana. Binary and multivariate logistic regression analyses were employed. Results suggest home delivery prevalence of 59% (365/622). Traditional birth attendants attended majority of home deliveries (93.4%). After adjusting for potential confounders, making less than four antenatal care visits (aOR = 2.42; CI = 1.91-6.45; $p = 0.001$), being a practitioner of traditional African religion (aOR = 16.40; CI = 3.10-25.40; $p = 0.000$), being a Muslim (aOR 2.10; CI = 1.46-5.30; $p = 0.042$), not having a health insurance (aOR = 1.85; CI = 1.773-4.72; $p = 0.016$), living in a male-headed household (aOR = 2.07; CI = 1.02-4.53; $p < 0.01$), and being unexposed to media (aOR = 3.10; CI = 1.12-5.38; $p = 0.021$) significantly predicted home delivery. Our results suggest that unless interventions are implemented to address other health system factors like insurance coverage, and socio-cultural and religious beliefs that hinder uptake of skilled care, the full benefits of user-fee exemption may not be realized in Ghana.

KEYWORDS

Ghana, health insurance, home delivery, skilled delivery, user-fee exemption

1 | BACKGROUND

Maternal mortality remains a public health concern in many low-income countries. While considerable progress has been made to reduce maternal mortality, many pregnant women still lack access to life-saving maternal health care services in many South Asian and sub-Saharan African countries where the burden of maternal, neonatal, and infant mortality is very high. In 2015, there were 303 000 maternal deaths globally, with a maternal mortality ratio (MMR) of 216 per 100 000 live births.[1] Almost 99% (302 000) of these maternal deaths occurred in low-income countries, with sub-Saharan Africa (SSA) alone accounting for about 66% (201 000).[1] In 2015, SSA's MMR was estimated to be 542 per 100 000 live births compared with 12 per 100 000 live births in developed regions.[1]

Accessibility to, and utilization of supervised delivery services, is one of the key proven interventions that could reduce maternal death. However, a significant proportion of deliveries in SSA still take place at home without skilled birth attendants. For instance, while in East Asia and the Pacific as well as in Latin America and the Caribbean, about nine in 10 births occur in health facilities with a skilled birth attendant, only about half of births (46%) are delivered in a health facility with a skilled birth attendant in SSA.[2]

Like many countries in Africa, Ghana's MMR in 2014 stood at 380 per 100 000 live births.[2] Maternal mortality accounts for 14% of deaths among females aged 12 to 49 years and is the second largest cause of mortality among women of childbearing age.[3] In Ghana, numerous maternal health interventions implemented in recent years such as the implementation of a user-fee exemption policy for skilled maternal health care services since 2003, the expansion of a community-based health planning services (CHPS) programme, and national health insurance scheme (NHIS) were expected to expand access to skilled delivery services to all pregnant women in the country.[4] In particular, the user-fee exemption policy was targeted at women with lower socio-economic status. Under the policy, all women are entitled to a "Maternal Benefit Package" that includes six free antenatal visits; additional medically necessary outpatient visits; free delivery at a health facility, including all delivery-related complications; two postnatal visits within 6 weeks; and care for the newborn up to three months.[4] The main argument in support of Ghana's user-fee exemption policy is that financial costs are a major barrier to skilled care and that the poor would not be able to afford to pay for the use of necessary services.[4] Indeed, within SSA, Senegal, Burkina Faso, Mali, Kenya, Niger, and Tanzania have implemented similar policies.[5-9]

Notwithstanding the popularity of this new health policy intervention, not all Ghanaian women deliver in health facilities. For example, national antenatal care (ANC) coverage of at least four visits increased from 92% in 2003 to 97% in 2014.[10] Skilled delivery also improved from 47% in 2003 to 74% in 2014, while 81% of mothers and 23% of newborns received postnatal checkup in the first 2 days after birth.[10] There are however important spatial and socio-economic variations. In some parts of the country such as the Northern and Upper West regions, more than 63% and 35% of births, respectively, still occur at home and are unsupervised.[10] The situation is even worse in rural Ghana where supervised delivery is 59% compared with 90% in urban areas.[10]

In both public health and social science literatures in diverse contexts, several studies have identified numerous factors contributing to home deliveries, including socio-demographic, maternal, socio-cultural, economic, health system, and geographical factors.[11-14] Studies have shown that mothers' socio-demographic characteristics, such as educational status, occupation, and residential area, influence their choice of place of delivery.[15-17] In different contexts, it has been shown that the educational status of the pregnant woman does influence the woman's perception of home delivery and health seeking behaviour.[18-21] Kitui et al analysed the 2008/2009 Kenya DHS data and demonstrated that women who were more educated, lived in urban residence, and had lower parity were less likely to

deliver at home.[22] Also, women who are Muslims were more likely to deliver at home compared with other religions.[23,24]

Regarding maternal factors, women with poor knowledge on complications at birth and those who did not attend ANC had a higher odds of home delivery.[19] Women who have had many deliveries usually draw on their maternity experiences, and those with previous uncomplicated deliveries often do not see the need for professional care.[19] Other factors include socio-cultural factors such as preferences for traditional birth attendants (TBAs),[18,24] the influence of mothers-in-law,[24] and beliefs that health facility delivery is a sign of weakness or marital infidelity.[13,25,26] Economic factors such as low socio-economic status[14] and lack of health insurance[22] have also been implicated. Health system factors including poor attitude of health care providers in Ghana,[11] intimidation, unfriendliness and cultural insensitivity displayed by some health care providers in health care facilities in Ghana,[27,28] poor quality of care alongside long distances to health care facilities in Ghana,[27,29] and informal payments even in the context of user-fee exemption for skilled delivery services also influence home delivery.[30]

While the above studies shed important lights on the factors influencing home deliveries in many parts of the developing world, population level analysis of the determinants of home delivery is rare in Ghana more generally and in the Northern region in particular. While there are several area-based cross-sectional surveys as well as qualitative studies on the determinants of skilled or health facility delivery in Ghana,[11-13] few empirical studies have used population level data to examine the factors contributing to home delivery in Ghana in the context of the user-fee exemption policy. The purpose of this study was to use population level data to estimate the prevalence of home delivery and determine the factors contributing homebirths in the Northern region of Ghana.

2 | MATERIALS AND METHODS

2.1 | Study design

This study was a retrospective analysis of secondary data drawn from the most recent Ghana Demographic and Health Survey, 2014. The study focuses on home delivery in the Northern Region, the region with the lowest rate of supervised delivery in Ghana.[10]

2.2 | Description of survey and data

The data for this study were accessed from the 2014 Ghana Demographic and Health Survey (GDHS) carried out as part of the global Demographic and Health Surveys Programme. Data for the 2014 survey were taken from 11 835 households, and interviews were conducted with 9396 women aged 15 to 49 and 4388 men aged 15 to 59.[10] Data collected on women included information about reproductive history, marriage, contraception knowledge and use, and antenatal and delivery care. Further detailed methodological descriptions can be found in the 2014 GDHS report.[10] For the purposes of the current study, data for individual women interviewed, and data relating to place of delivery with the women interviewed from the Northern Region, were used.

2.3 | Study context

The Northern Region is the largest of 10 administrative regions in Ghana in terms of land size, covering 31% of Ghana's total land area.[31] The region's population was estimated to be almost 2.5 million in 2010 with a little over half (50.4%) being females.[31] The region records the lowest in education with about 66% of women and 47% men having no education. The main occupation of the region is farming. Polygyny is also highest in the region, affecting 42% and 27% of women and men, respectively. Husbands often make decisions about family planning, child spacing, and family size.[32]

The region has a number of health facilities, including one (1) teaching hospital, seven (7) polyclinics, ninety-four (94) health centers, forty-three (43) clinics, seven (7) maternity homes, and one hundred and eighty-one (181) functional CHPS compounds.[33] The region however regularly experiences shortage of health care workers and consumables, often culminating in poor health care delivery and reliance on herbal medical products and traditional birth attendants during childbirth.[27]

2.4 | Study sample

We included data for all women aged 15 to 49 years in the Northern region who gave information on their most recent delivery in the 5 years preceding the 2014 GDHS. Out of the 786 eligible women surveyed, 164 did not have their place of delivery reported and were excluded from our sample.

2.5 | Study variables

2.5.1 | Dependent variable

The dependent variable of interest is "home delivery" of the most recent child in the last 5 years preceding the 2014 GDHS. This variable was derived from the GDHS variable "place of delivery," which was categorized into five different places: your home, other home, public health facility, private health facility, and other in the survey. For purposes of this study, however, the variable "place of delivery" was categorized into two, and the outcome dichotomized: whether the delivery was at home or not at home. This was coded as one if delivery was at home (own or other) and zero if delivery was at a health facility (public, private, or other).

2.6 | Independent variables

The following variables were identified from the 2014 GDHS dataset and included in our study as independent variables.

(a) Age of the woman in the 2014 GDHS was continuous from age 15 to 49. However, for a better comparison, we recoded age into three categories: under 25 for all women aged 15 years to 24 years as one, age 25 to 35 for all women aged 25 years to 35 years as two, and all women aged above 35 was coded as three.

(b) Woman's education was categorized into no education, primary education, junior high school (JHS), secondary education, and tertiary education. For this study, education was recoded as one if no education, two if basic (comprising primary and JHS), three for secondary, and above (comprising secondary and tertiary).

(c) In the GDHS data for the Northern region, ethnicity was categorized as Akan, Ga/Dangme, Guan, Mole-Dagbani, Grusi, Gurma, Mande, and others. To allow for better comparison, however, respondent's ethnicity was recoded as one if Mole-Dagbani (the predominant ethnic group in the region), two if Gurma, and three if other ethnic groups.

(d) Marital status of the woman was recorded in the 2014 GDHS dataset as married, living with partner, never in union, widowed, divorced, and no longer living together/separated. This was recoded as one if single (comprising never in union), two if married (comprising married and living with partner), and three if divorced/separated (comprising divorced, widowed, and no longer living together/separated).

(e) Religion was recorded in the original 2014 GDHS as Catholic, Methodist, Presbyterian, Pentecostal/charismatic, other Christian, Islam, Traditional/spiritual, and No religion. For better comparison, however, we recoded religion as one for Christianity (catholic, Methodist, Presbyterian, Pentecostal/charismatic, other Christian), two for Islam, three for traditional/African religion, and four for No religion.

(f) Wealth index: The Level of household income was defined using wealth quintile as a proxy. The wealth index was constructed from household ownership of assets and consumer goods using the methods of principal component analysis. Detailed description of the scoring, weighting, and standardization of the different wealth components can be found in the 2014 GDHS report.[10] Individual women were ranked according to the total score of the household they came from; the sample was then divided into quintiles from lowest (one) to highest (five). For purposes of this study, we recoded wealth as one for poor (representing quintiles one and two), two for middle (representing quintiles three and four), and three for rich (representing quintile five).

(g) Residence: this is a proxy for accessibility and was coded as one if rural and two if urban.

(h) Husband's educational status is recorded in the 2014 GDHS as secondary education, tertiary education, JHS, primary education, and no education. For purposes of this study, we recoded this variable as one if no education, two if basic (primary and JHS), three for secondary, and above (comprising secondary and tertiary).

(i) Parity: this is the number of children a woman ever gave birth to. It is reported in the GDHS dataset as one, two, three to 12 children. But in this work, it is recoded one if one, two if two, three if three, four if four, and five if more than four.

(j) ANC attendance. This is the number of times the woman visited ANC during her most recent pregnancy which resulted in delivery before the survey. It is coded as zero for all those who had less than four visits and one for more than four antenatal visits.

(k) Distance to health facility. This is categorized in the 2014 GDHS dataset under getting medical care for self and attempts to reveal major barriers preventing mothers from getting medical treatment or advice. This was coded as one if distance to health facility is a big problem and two if not a big problem. We maintained this original coding.

(l) Media exposure. In the 2014 GDHS dataset, media exposure was categorized into five: (1) read newspaper/magazine at least once a week; (2) watches TV at least once a week; (3) listens to radio at least once a week; (4) access all three media at least once a week; and (5) access none of the three media at least once a week. For easy comparison, we dichotomized the media exposure variable into "exposed" and "unexposed" and recoded it as one (exposed) if respondent read newspaper/magazine at least once a week or watches TV at least once a week or listens to radio at least once a week, and two (unexposed) if respondent access none of the three media at least once a week.

(m) Health insurance coverage. This is coded as one if no, and two if yes. We also maintained this original coding from the 2014 GDHS data set.

(n) Maternal occupation. This was coded as one if respondent was currently working, and two if not working. This original coding from the 2014 GDHS data set was maintained in this study.

(o) Household headship. This is coded as one if male and two if female.

2.7 | Quality control measures

To ensure data quality, first, only the data set needed were downloaded from the DHS programme website; critically examined and the information needed extracted. Second, the extracted data were recoded according to the categorizations made. This was independently done by the first and second authors, and the results were compared. All inconsistencies were resolved, and a final database was created for use in the analysis. Cleaning of the data was also done by running frequencies on each variable and cross tabulations where indicated.

2.8 | Data analysis

The cleaned and recoded dataset was imported for analysis in Stata/SE 14.1. Descriptive statistics using frequencies were first performed to describe important characteristics of both the dependent and independent variables. Binary and multiple logistic regression models were fitted to examine the relationship between the dependent and independent variables. Statistical significance was held at 95%confidence level and *P*-value of 0.05.

2.9 | Ethical issues

Written permission was sought and obtained from the Measure DHS programme before the data was accessed and used. The purpose of study was communicated, and access to the data was granted. Confidentiality and anonymity were maintained as all identifiable information were removed. We followed the Strengthening the Reporting of Observational studies in Epidemiology (STROBE) guidelines in analysing and reporting our findings.

3 | RESULTS

3.1 | Background characteristics

Table 1 presents the background characteristics of women whose place of delivery was recorded in the Northern Region of Ghana for their most recent delivery before the 2014 GDHS. The mean age of the women was 31.18 ± 7.46 years. Some 469(75.4%) of the women had no formal education, while 426(72.1%) of their partners did not also have formal education. Further, 520(83.6%) of respondents were in the poor wealth bracket, and about 445(72%) of the respondents were covered by health insurance. Also, 558(89.7%) of the respondents lived in male headed households, while some 302(48.6%) were not media exposed.

3.2 | Home delivery and delivery assistant among respondents

Figure 1 describes the place of delivery among the 622 women. The prevalence of home delivery was 365(59%). Traditional birth attendants assisted in 341(93.4%) of the deliveries at home (see Figure 2).

3.3 | Factors influencing home delivery

Table 2 presents results of bivariate analysis that was conducted to determine any associations between a total of 15 independent variables and home delivery. The results show that maternal education ($P = 0.001$), partner's educational level ($P < 0.01$), religion ($P < 0.01$), number of ANC visits ($P < 0.01$), wealth index ($P = 0.01$), residence ($P = 0.046$), ethnicity ($P = 0.034$), distance to health facility ($P < 0.01$), household headship ($P < 0.01$), media exposure ($P < 0.01$), and health insurance coverage were statistically associated with home delivery.

From the bivariate analysis, a total of 11 variables were significantly associated with home delivery. These variables were then pulled into binary and multivariate logistic regression models for further analysis, and odds ratios were estimated. The results are shown in Table 3. After adjusting for theoretically relevant potential confounders, six factors—making less than four ANC visits, being a practitioner of traditional African religion, being a Muslim, not having a health insurance, living in a male-headed household, and being unexposed to media—significantly independently predicted home delivery. Specifically, women who made less than four ANC visits during their most recent pregnancy before the survey were almost four times more likely to have a home birth compared with those who made four or more visits (cOR = 3.99; CI = 2.50-6.36; $P < 0.01$). When other theoretically relevant factors were

TABLE 1 Background characteristics of respondents

Characteristic	Frequency	Percent
Maternal age (*n* = 622)		
Mean age	31.18 ± 7.46	
15-24	115	18.5
25-35	303	48.7
35+	204	32.8
Maternal educational (*n* = 622)		
No education	469	75.4
Basic	53	8.5
≥ secondary	100	16.1
Partners educational level (*n* = 622)		
No education	426	72.1
Primary	42	7.1
≥ secondary	123	20.8
Maternal occupation (*n* = 622)		
Not working	109	17.5
Working	513	82.5
Marital status (*n* = 622)		
Single	31	5.0
Married	567	91.2
Divorce/separated	24	3.8
Wealth index (*n* = 622)		
Poor	520	83.6
Middle	51	8.2
Rich	51	8.2
Religion (*n* = 622)		
Christian	216	34.7
Islam	293	47.1
Traditional/spiritual	75	12.1
No religion	38	6.1
Residence (*n* = 622)		
Urban	186	29.9
Rural	436	70.1
Ethnicity (*n* = 622)		
Mole Dagbani	276	44.4
Gurma	283	45.5
Others	63	10.1
Distance to health facility (*n* = 622)		
Big problem	313	50.3
Not big problem	309	49.7
Media exposure (*n* = 622)		
Exposed	320	51.4
Unexposed	302	48.6

(Continues)

TABLE 1 (Continued)

Characteristic	Frequency	Percent
Household head (*n* = 622)		
Male	558	89.7
Female	64	10.3
Covered by health insurance (*n* = 622)		
No	177	28.5
Yes	445	71.5
Parity (*n* = 622)		
One	105	16.9
Two	90	14.5
Three	94	15.1
Four	88	14.1
≥ five	245	39.4
Antenatal visits (*n* = 619)		
< 4 visits	274	44.3
≥ 4 visits	345	55.7

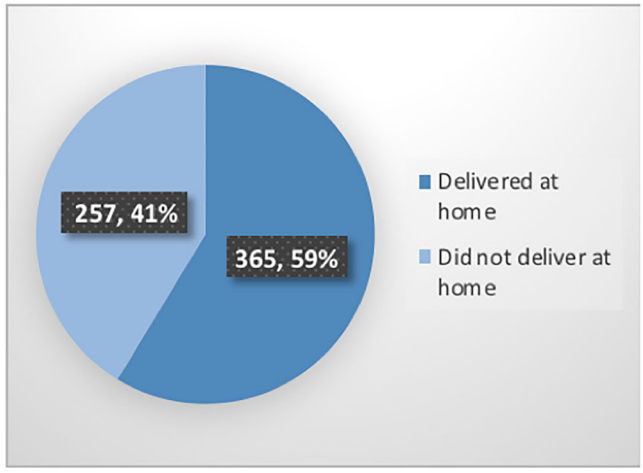

FIGURE 1 Prevalence of home delivery [Colour figure can be viewed at wileyonlinelibrary.com]

adjusted for, the odds reduced to 2.4 times, but the association was still statistically significant (aOR = 2.42; CI = 1.91-6.45; *P* = 0.001). When compared with women who said they professed no religion, women who practice traditional African religion were 16.8 times more likely to deliver at home (cOR = 16.80; CI = 1.10-26.30; *P* < 0.01). After adjusting for other factors, the odds of having a home birth was 16.4 times among practitioners of traditional African religion compared with those without religion (aOR = 16.40; CI = 3.10-25.40; *P* < 0.01). Similarly, being a Muslim increased the odds of home delivery by 5.1 times compared with those without religion (cOR = 5.11; CI = 1.46-6-35; *P* < 0.01). After controlling for other factors, the odds of having a home birth reduced to 2.1 times for Muslim women compared with women without religion, and the association was still statistically significant (aOR 2.10; CI = 1.46-5.30; *P* = 0.042). Not having a health insurance also significantly increased the odds of home delivery by almost 3.4 times (cOR = 3.38; CI = 2.20-5.20; *P* < 0.01). When other factors were adjusted for, those who did not have insurance were still significantly more likely to deliver at home compared with those who had (aOR = 1.85; CI = 1.773-4.72; *P* = 0.016). Also, living in a male-headed household more than doubles the odds of home delivery

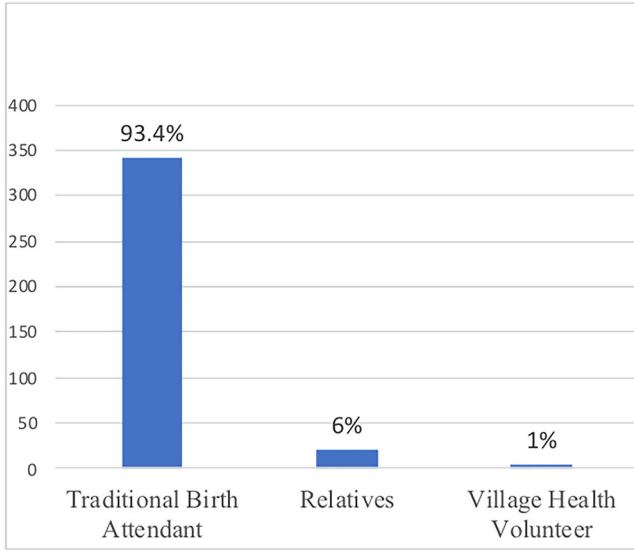

FIGURE 2 Type of birth attendant at delivery among women who delivered at home [Colour figure can be viewed at wileyonlinelibrary.com]

when compared with living in a female-headed household (cOR = 2.22; CI = 1.05-4.73; $P < 0.01$). After adjusting for other factors, this association was still statistically significant (aOR = 2.07; CI = 1.02-4.53; $P < 0.01$). Further, being unexposed to media almost quadruples the odds of having a home birth (cOR = 3.50; CI = 1.15-5.43; $P = 0.002$), and this relationship remained statistically significant after adjusting for other factors (aOR = 3.10; CI = 1.12-5.38; $P = 0.021$). Although husband's education appears to correlate negatively with home delivery, having a husband with secondary or higher education was the only factor that significantly negatively predicted home delivery after adjusting for other variables (aOR = 0.07; CI = 0.01-0.61; $P = 0.016$).

4 | DISCUSSION

This study aimed to identify population level determinants of home delivery in the Northern Region of Ghana in the context of a user-fee exemption policy for maternal health care using data from the 2014 GDHS. Findings revealed that 59% of births occurred at home, with TBAs conducting 93.4% of the deliveries. In multivariable logistic regression analysis, making less than four ANC visits, being a practitioner of traditional African religion, being a Muslim, not having a health insurance, living in a male-headed household, and being unexposed to media significantly independently predicted home delivery after adjusting for theoretically relevant covariates.

Taken together, findings from this study indicate that although maternal health care services including skilled facility delivery may be free in Ghana, a number of health system, socio-cultural, and individual level factors still drive women towards home delivery. In this study, high preference for home delivery is clearly demonstrated. Home delivery per se should not be a problem as long as the delivery is supervised by a skilled birth attendant with the required skills to detect complications and make timely referrals. While in high income settings, it is possible to have supervised delivery at home, this is simply not possible in many low-income settings. In Ghana for instance, all pregnant women are expected to go to a health facility for skilled birth attendants (SBAs) to supervise the delivery. This means that the home environment is usually without appropriate equipment and supplies as compared with a health facility.

TABLE 2 Factors associated with home of delivery (bivariate analysis)

Characteristic	Home Delivery Yes *n*(%)	No *n*(%)	Chi-Square *P*-value
Maternal age			0.899
15-24	66(60.2)	49(39.8)	
25-34	178(60.6)	125(39.4)	
35+	121(62.8)	83(37.2)	
Maternal education			0.001*
No education	307(65.3)	162(34.7)	
Primary	23(46.1)	30(53.9)	
≥ secondary	35(45.1)	65(54.9)	
Husbands education			0.000**
No education	292(68.9)	134(31.1)	
Primary	19(43.9)	23(56.1)	
≥ secondary	37(39.1)	86(60.9)	
Maternal occupation			0.902
Working	298(61.1)	215(38.9)	
Not working	67(61.9)	42(38.1)	
Parity			0.154
One	44(46.8)	61(53.2)	
Two	50(54.9)	40(45.1)	
Three	59(68.3)	35(31.7)	
Four	56(63.2)	32(36.8)	
≥five	156(66.1)	89(33.9)	
Marital status			0.246
0.2069			
Single	17(62.5)		
Married	331(60.5)	236(39.5)	
Divorced/separated	17 (77.9)	7(22.1)	
Antenatal visits			0.000**
≥ four visits	214(78.1)	60(21.9)	
< four visits	148(46.9)	197(53.1)	
Wealth index			0.000**
Poor	347(66.5)	173(33.5)	
Middle	15(32.2)	36(67.8)	
Rich	8(15.7)	43(84.3)	
Religion			0.000**
No religion	32(86.5)	6(13.5)	
Christianity	75(34.7)	141(65.3)	
Islam	189(64.4)	104(35.6)	
Traditional/spiritual	69(91.3)	6(8.7)	
Residence			0.046*
Urban	56(35.5)	130(64.5)	
Rural	309(68.92)	127(31.08)	

(Continues)

TABLE 2 (Continued)

Characteristic	Home Delivery Yes *n*(%)	No *n*(%)	Chi-Square *P*-value
Ethnicity			0.034*
Others	24(38.10)	39(61.9)	
Mole Dagbani	126(48.1)	150(51.9)	
Gurma	215(77.6)	68(22.4)	
Distance to health facility			0.000**
Not big problem	142(50.82)	167(49.18)	
Big problem	223(71.76)	90 (28.24)	
Media exposure			0.000**
Exposed	123(38.5)	197(61.5)	
Unexposed	242(80.1)	60(19.9)	
Household head			0.000**
Female	13(20.3)	51(79.7)	
Male	352(63.1)	206(36.9)	
Covered by health insurance			0.000**
Yes	45(25.4)	132(74.6)	
No	320(71.8)	125(28.2)	

*$P < 0.05$.

**$P < 0.01$.

While training of TBAs has been shown to improve birth outcomes,[34] we are unable to judge from our data if these TBAs were trained. Nonetheless, the high involvement of TBAs in home births could be due to a number of factors. Apart from health system and individual levels factors (some of which are considered below) which may make TBAs the only available option, TBAs may be preferred for their ability to ensure that cultural norms and labour rituals are performed. They may also be preferred for their ability to show empathy and care, and to allow women more liberty on birthing positions. For instance, a study in Nigeria indicated that TBAs are preferred because they are believed to be more caring and affectionate.[35] Also, cost of skilled delivery may be a factor. Even though skilled delivery services including caesarean section are free in Ghana, costs that may be incurred during delivery may include supplies and medications, transportation, unofficial provider fees, as well as the opportunity costs of travel time and waiting time lost from productive activities. These are costs not covered under the current user-fee exemption policy. At the same time, payments to TBAs for delivery services are often cheap and considered negotiable, with respect to amount and time and could even be in kind. This may present TBAs as an affordable option. Given the shortage of skilled birth attendants in the Northern region in particular, and the fact that the services of TBAs are still highly patronized, TBAs will have to be productively engaged, at least in facilitating early referrals. For instance, the Ghana Health Services could use innovative incentive schemes like recognition or material reward to encourage TBAs to promptly refer mothers to health care facilities especially during labour. They can also be made to act as birth companions for cases they refer to the health facility such that their empathy and care can still be felt by the women. Indeed, this type of collaboration is needed to enable the health care system to identify, train, and enhance the skills set of TBAs. Partnerships between skilled care providers within the Ghana Health Service and other private providers, and TBAs would also be critical for helping health care workers to learn from TBAs how best to address the cultural needs and concerns of child bearing women.

Also, women who attended ANC for less than four times were more likely to deliver at home. This finding confirms the results of a number of recent studies that show that limited number of ANC attendance increased the likelihood of homebirth.[36-38] It has been suggested that ANC is a proximate determinant of women's choice on whether

TABLE 3 Predictors of home delivery (binary and multivariate logistic regression analysis)

Characteristics	Home Delivery		Crude		Adjusted	
	Yes, *n*(%)	No, *n*(%)	OR (95% CI)	*P*- value	OR (95% CI)	*P*- value
Maternal education						
No education (*ref*)	307(65.3)	162(34.7)	1		1	
Basic	23(46.1)	30(53.9)	0.45(0.24-0.85)	0.014*	0.31(0.07-1.46)	0.138
≥secondary	35(45.1)	65(54.9)	0.44(0.26-0.74)	0.002*	0.23(0.10-1.57)	0.724
Husband education						
No education (*ref*)	292(68.9)	134(31.1)	1		1	
Basic	19(43.9)	23(56.1)	0.35(0.16-0.80)	0.013*	0.62(0.23-1.68)	0.347
≥secondary	37(39.1)	86(60.9)	0.29(0.17-0.50)	0.000*	0.07(0.01-0.61)	0.016*
Antenatal visits						
≥ 4 visits (*ref*)	214(77.9)	60(22.1)	1		1	
<4 visits	148(46.9)	197(53.1)	3.99(2.50-6.36)	0.000*	2.42(1.91-6.54)	0.001*
Wealth index						
Poor (*ref*)	347(66.5)	173(33.5)	1		1	
Middle	15(32.2)	36(67.8)	0.24(0.12-0.50)	0.000*	1.02(0.31-3.42)	0.970
Rich	8(15.7)	43(84.3)	0.04(0.01-0.14)	0.000*	0.33(0.07-1.62)	0.170*
Religion						
No religion *(ref)*	32(86.5)	6(13.5)	1		1	
Christianity	75(34.7)	141(65.3)	2.88(1.19-4.20)	0.009*	1.11(0.61-4.63)	0.181
Islam	189(64.4)	104(35.6)	5.11(1.46-6.35)	0.000*	2.10(1.46-5.30)	0.042*
Traditional religion	69(91.3)	6(8.7)	16.8(1.10-26.3)	0.000*	16.4(3.10-25.40)	0.000*
Residence						
Urban (*ref*)	56(35.5)	130(64.5)	1		1	
Rural	309(68.9)	127(31.1)	4.02(2.60-6.21)	0.000*	1.41(0.57-3.50)	0.458
Ethnicity						
Others (*ref*)	24(41.2)	39(58.8)	1		1	
Mole-Dagbani	126(48.1)	150(51.9)	1.32(0.71-2.47)	0.372	1.42(0.38-5.28)	0.603
Gurma	215(77.6)	68(22.4)	4.96(2.71-9.08)	0.000*	1.45(0.33-6.36)	0.618
Distance to health facility						
Not big problem (*ref*)	142(50.8)	167(49.2)	1		1	
Big problem	223(71.8)	90(28.2)	2.46(1.63-3.70)	0.000*	0.74(0.31-1.84)	0.534*
Media exposure						
Exposed (*ref*)	123(38.5)	197(61.5)	1		1	
Unexposed	242(80.1)	60(19.9)	3.50(1.15-5.43)	0.002*	3.10(1.15-5.43)	0.021*
Household head						
Female (*ref*)	13(20.3)	51(79.7)	1		1	
Male	352(63.1)	206(36.9)	2.22(1.05-4.74)	0.000*	2.07(1.02-4.53)	0.000*
Insurance coverage						
Yes *(ref)*	45(25.4)	132(74.6)				
No.	320(71.8)	125(28.2)	3.38(2.20-5.20)	0.000*	1.85(1.73-4.72)	0.016*

*$P < 0.05$.

Abbreviations: CI, confidence interval; OR, odds ratio; *ref* = reference category.

to deliver at home or in a health facility.[39] When expectant mothers attend ANC regularly, it is the most favourable point of contact with health personnel where these women can get information on risks and complications they may encounter during labour and delivery. Two studies conducted in Tanzania and Rwanda show that when expectant mothers are informed about pregnancy complications during ANC visits they are more likely to deliver at a health facility.[24,40] This recognition appears to have influenced the WHO's recent guidelines that recommend eight ANC contacts, up from the previous recommendation of at least four contacts.[41]

While ANC attendance may not translate into skilled delivery in the same proportion partly because of unpredictability of onset of labour, there are several ways that limited ANC attendance could easily drive women towards home delivery. First, fewer ANC visits means that many of the interventions and services routinely offered to pregnant women at the ANC clinic may be delayed or missed completely. As some qualitative studies have shown, women may feel reluctant to deliver at a health facility if they feel they have not made sufficient number of ANC visits during their pregnancy.[27] This reluctance may arise from fear of being blamed by health care providers, particularly if there are complications during childbirth. Second, advice received on where to deliver during routine ANC services may be missed or the opportunity to adequately counsel and educate women on the need for skilled care at birth maybe completely missed if women had fewer contacts with health care providers. This is more likely as previous studies show that counselling and advise on the need to seek, and where exactly to seek supervised delivery during ANC positively impact on women's decision to receive supervised delivery during childbirth.[42] The discussion here would suggest a need for both health facility and community-based preconception and conception care interventions to educate women and community members on the importance of early ANC initiation, and the need for continued skilled care beyond the antenatal period. In this regard, efforts must be made to address health system barriers such as long distances to service centres as well as engage community members (men and mothers-in-law in particular) to address socio-cultural barriers such as the need to perform traditional pregnancy-related rituals before permission is granted for pregnant women to access ANC services as shown in previous research in northern Ghana.[28,43]

Religious beliefs and other associated cultural beliefs and norms are known factors affecting skilled delivery. In this study, religious affiliation independently predicted home delivery, such that women who professed traditional African religion were 16.4 times more likely to deliver at home compared with those without religion after co-variates were adjusted for (aOR = 16.40; CI = 3.10-25.40; $P < 0.01$). Linked to religion may be traditional and cultural norms that may not support supervised delivery especially in a health facility. The results here are however not surprising because previous studies have shown that most societies in northern Ghana are deeply rooted in culture, and therefore women are expected to respect even unwholesome cultural practices that govern reproductive behaviour and which may directly or indirectly affect their health.[28,43] As Alhassan notes, there is frequent recourse to the ancestoral spirits and divinities in accounting for incidents in the lives of people in many communities in the region.[32] This would suggest a need for continuous community education and engagement to address religious beliefs and cultural norms that do not support supervised delivery.

Another inter-related factor is the role of women in decision-making at the family level. In this study, women living in households headed by men were more than twice more likely to deliver at home compared with those living in female-headed households (aOR = 2.07; CI = 1.02-4.53; $P < 0.01$). This is not surprising given our study context, especially the role of men in facilitating or discouraging women's access to essential reproductive and maternal health care services. Indeed, in many low-income settings where patriarchal norms are dominant, men are often major decision-makers for the family; hence, decisions around when, where, and even if a woman should have access to health care often are made by men.[44,45] Together with findings from previous studies, our results here suggest that although improved maternal and newborn survival requires making services accessible and free or less costly as well as improvements in basic and comprehensive obstetric care quality, men's involvement in maternal and safe motherhood interventions may be required to address delays in accessing care, and promote timely referral when problems arise, and increase uptake of skilled birth services. Perhaps, this is one of the reasons why WHO's recent recommendations on health promotion interventions for maternal and newborn health emphasize male involvement in maternal and safe motherhood issues and interventions.[46] Our finding that

male-headed household is a predictive risk factor for home birth in the Northern region clearly supports the call for greater male involvement.

Our results also show that not being registered on the NHIS plays a significant role in home delivery. As indicated earlier, Ghana has since 2003 implemented a user-fee exemption policy to cover several aspects of institutional maternal and child health care services. Under this policy, all pregnant may be enrolled on the NHIS without paying the required premium. It is therefore surprising that several women in the northern region are not covered and more so during their most recent pregnancy and childbirth. There are a number of ways that health insurance coverage could affect home delivery. Apart from the fact that insurance coverage could be a marker for wealth and education as well as better access to other services, fears that supervise delivery may generate more additional costs among women who are not registered on the NHIS may explain why such women are more likely to deliver at home. This is particularly more likely as there is some evidence in many contexts in Ghana showing that even if women are NHIS registered, they still pay other informal fees in addition to bearing the cost of consumables that are required during facility delivery such as clean sheets.[47,48] This situation could therefore be worse when a woman is not registered on the NHIS. But it is also even possible that women who are not NHIS registered may have had less contact with the health care system in relation to accessing more general health care services precisely because they are not NHIS registered. This lack of regular contact with the health care system could easily cascade into lack of uptake of skilled delivery services. This discussion would suggest moving beyond making maternal health care services free to implementing pragmatic strategies that identifies pregnant women early, encouraging early registration on the NHIS, as well as strengthening and ensuring effective general coverage of the free delivery policy, especially in rural areas.

Furthermore, being exposed to media including reading newspapers, watching television, or listening to radio at least once a week significantly reduced the odds of home delivery. This again is not surprising given that women are more likely to make informed choices due to access to positive health messages or education they may receive via the media. These could positively equip mothers with the right information to seek better maternal services. We however note that the 2014 GDHS did not measure access to more recent sources of information, including internet and social media sources. Given the growing popularity of social media platforms like WhatsApp and Facebook in many low-income countries, future research should consider including them as sources of education and health information.

Finally, we are surprised that some factors did not statistically predict home delivery. Maternal education was not a significant factor influencing home delivery after other covariates were adjusted for. This finding is contrary to many cross-sectional area-based studies, which found significant statistical association between maternal education and home delivery. We think that it is probably because of the relatively high representation of women with no formal education (75.4%) in our study. We also think that it is probably because women's maternal health seeking behaviours in the study area are greatly influenced by husbands and other male family heads, as illustrated by the strong statistical association between male-headed households and home delivery as well as the negative statistical association between husband's education and home delivery. Also, while mothers who are poor have been found to prefer home delivery due to their inability to pay of skilled delivery services, wealth was not statistically associated with home delivery after accounting for other variables in this study. Again, we believe this is related to women's weak decision-making power at the household level.

This study has helped to identify new findings related to the factors associated with home deliveries at the population level in the Northern Region. However, the nature of the data limited our ability to establish causal relationships. The design did not also offer opportunities for probing into reasons that could help understand some of the findings. Also, any data errors resulting from inaccurate interviews, recall bias on the part of respondents, or data capture could not have been addressed since we did not have our own independent means of verifying the accuracy of these results. Finally, and from literature reviewed, several factors could potentially influence home delivery. Some of these factors are however not measured in the 2014 GHDS, which is a clear limitation to our analysis in this paper. These limitations notwithstanding, we believe our findings have implications for interventions to improve access to skilled care.

5 | CONCLUSION

This paper provides new insights into population level determinants of home delivery in the context of the user-fee exemption policy for maternal health care in Ghana. The results and discussion in this paper suggest that unless interventions are concurrently implemented to address other health system factors like insurance coverage, and socio-cultural factors like cultural and religious beliefs that hinder uptake of skilled delivery services, the full benefits of user-fee exemption for maternity care may not be realized in contexts like northern Ghana. This conclusion has potential policy and service delivery implications. Specifically, there is a need to focus on addressing the remaining factors apart from costs (which is largely addressed through the user-fee exemption policy) that discourage uptake of skilled delivery services.

In addition to expanding skilled birth services to hard-to-rich areas, new interventions such as supervised domiciliary delivery services, community mobilization and engagement, especially male involvement, should be considered. Innovative and transformative male engagement strategies beyond encouraging men to accompany their spouses during ANC or labour, provide resources including money, arrange transport, or assist in household chores, would be particularly critical. For example, invitation cards could be used to invite men to routine ANC classes and pregnancy schools to enhance men's understanding of maternal and safe motherhood issues as well as the importance of supervised delivery. This has been shown elsewhere to enhance male involvement and health outcomes.[49] Also, community level engagement with men in socially safe and empowering spaces to reflect on such issues as gender and power inequalities at home and in public spaces, and men's role in maternal and child health, could generate positive social transformations. In addition to other health delivery strengthening interventions like cultural competence and client-centred training for maternal health care providers, TBAs could also still help in mobilizing and persuading women at the community level to seek skilled care services in health care facilities.

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REFERENCES

1. World Health Organisation. *Making Pregnancy Safer: The Critical Role of the Skilled Attendant*. Geneva: World Health Organisation; 2016.
2. World Health Organisation. *Global Strategy for Women's, Children's and Adolescents' Health, 2016-2030*. Geneva: World Health Organisation; 2015.
3. Abor PA, Abekah-Nkrumah G, Sakyi K. The socio-economic determinants of maternal health care utilization in Ghana. *Int J Soc Econ*. 2011;38(7):628-648.
4. Ganle JK, Parker M, Fitpatrick R, Otupiri E. Free maternity care and equity of access to maternal health services in Ghana: a descriptive study. *Int J Equity Health*. 2014;13(1):89.
5. De Allegri M, Ridde V, Louis RV, et al. Determinants of utilization of maternal care services after the reduction of user fees: a case study from rural Burkina Faso. *Health Policy*. 2010;10:10.
6. Witter S, Dieng T, Mbengue D, Moreira I, De Brouwere V. The national free delivery and caesarean policy in Senegal: evaluating process and outcomes. *Health Policy Plan*. 2012;25:384-392.
7. El-Khoury M, Hatt L, Gandaho T. User fee exemptions and equity in access to caesarean sections: an analysis of patient survey data in Mali. *Int J Equity Health*. 2012;11(49):1-7.
8. Ridde V, Kouanda S, Bado A, Bado N, Haddad S. Reducing the medical cost of deliveries in Burkina Faso is good for everyone, including the poor. *PLoS One*. 2012;7(3):e33082.

9. Obare F, Warren C, Njuki R, et al. Community-level impact of the reproductive health vouchers programme on service utilization in Kenya. *Health Policy Plan*. 2013;28(2):165-175. https://doi.org/10.1093/heapol/czs033
10. Ghana Statistical Service (GSS), Ghana Health Service (GHS), ICF International. *Ghana Demographic and Health Survey 2014*. Rockville, Maryland, USA: GSS, GHS, and ICF International; 2015.
11. Akum FA. A qualitative study on factors contributing to low institutional child delivery rates in northern Ghana: the case of Bawku municipality. *J Community Med Health Educ*. 2013;3(06):236. https://doi.org/10.4172/2161-0711.1000236
12. Speizer IS, Story WT, Singh K. Factors associated with institutional delivery in Ghana: the role of decision-making autonomy and community norms. *BMC Public Health*. 2014;13:1.
13. Gudu W, Addo B. Factors associated with utilization of skilled service delivery among women in rural northern Ghana: a cross sectional study. *BMC Pregnancy Childbirth*. 2017;17(1):159. https://doi.org/10.1186/s12884-017-1344-2
14. Manyeh AK, Akpakli DE, Kukula V, et al. Socio-demographic determinants of skilled birth attendant at delivery in rural southern Ghana. *BMC Res Notes*. 2017;10(1):268. https://doi.org/10.1186/s13104-017-2591-z
15. Hailu M, Gebremariam A, Alemseged F. Knowledge about obstetric danger signs among pregnant women in Aleta Wondo District, Sidama zone, southern Ethiopia. *Ethiopian J Health Sci*. 2010;20(1):25-32.
16. Bogale D, Markos D. Knowledge of obstetric danger signs among child bearing age women in Goba district, Ethiopia: a cross-sectional study. *BMC Pregnancy Childbirth*. 2015;15(1):77. https://doi.org/10.1186/s12884-015-0508-1
17. Tiku S. Awareness on birth preparedness and complication readiness among antenatal care clients in Federal Police Referral Hospital Addis Ababa, Ethiopia. *Am J Health Res*. 2015;3(6):362. https://doi.org/10.11648/j.ajhr.20150306.18
18. Mwewa D, Michelo C. Factors associated with home deliveries in a low-income rural setting: observations from Nchelenge district, Zambia. *Med J Zambia*. 2010;37:4.
19. Shifraw T, Berhane Y, Gulema H, Kendal T, Austin A. A qualitative study on factors that influence women's choice of delivery in health facilities in Addis Ababa, Ethiopia. *BMC Pregnancy Childbirth*. 2016;16(1):307.
20. Tsegay R, Aregay A, Kidanu K, Alemayehu M, Yohannes G. Determinant factors of home delivery among women in northern Ethiopia: a case control study. *BMC Public Health*. 2017;17(1):289. https://doi.org/10.1186/s12889-017-4159-1
21. Adewuyi EO, Zhao YUN, Auta ASA, Lamichhane R. Prevalence and factors associated with non-utilization of healthcare facility for childbirth in rural and urban Nigeria: analysis of a national population-based survey. *Scand J Public Health*. 2017;45(6):675-682. https://doi.org/10.1177/1403494817705562
22. Kitui J, Lewis S, Davey G. Factors influencing place of delivery for women in Kenya: an analysis of the Kenya demographic and health survey, 2008/2009. *BMC Pregnancy Childbirth*. 2013;13(1):40.
23. Ganle JK. Why Muslim women in northern Ghana do not use skilled maternal healthcare services at health facilities: a quality study. *BMC Int Health Hum Rights*. 2015;15(1):10.
24. Sarker BK, Rahman M, Rahman T, Hossain J, Reichenbach L, Mitra DK. Reasons for preference of home delivery with traditional birth attendants (TBAs) in rural Bangladesh: a qualitative exploration. *PLoS One*. 2015;11:1.
25. Ganle JK. Addressing socio-cultural barriers to maternal healthcare in Ghana: perspectives of women and healthcare providers. *Journal of Women's Health, Issues & Care*. 2014;3(6).
26. Sychareun V, Hansana V, Somphet V, Xayavong S. Reasons rural Laotions choose home deliveries over delivery at health facility: a qualitative study. *BMC Pregnancy Childbirth*. 2012;12(1):86.
27. Ganle JK, Parker M, Fitzpatrick R, Otupiri E. A qualitative study of health system barriers to accessibility and utilization of maternal and newborn healthcare services in Ghana after user-fee abolition. *BMC Pregnancy Childbirth*. 2014;14(1):425. https://doi.org/10.1186/s12884-014-0425-8
28. Ganle JK, Otupiri E, Parker M, Fitpatrick R. Socio-cultural barriers to accessibility and utilization of maternal and newborn healthcare services in Ghana after user-fee abolition. *Int J Matern Child Health*. 2015;3(1):1-14.
29. Saleh K. *The Health Sector in Ghana: A Comprehensive Assessment*. Washington, DC: World Bank; 2013.
30. Kebede B, Gebeyehu A, Andargie G. Use of previous maternal health services has a limited role in reattendance for skilled institutional delivery: cross-sectional survey in Northwest Ethiopia. *Int J Women's Health*. 2013;5:79. https://doi.org/10.2147/IJWH.S40335
31. Ghana Statistical Service. *Ghana Population and Housing Census 2010*. Accra: Ghana Statistical Service; 2012.
32. Alhassan E. Early marriage of young females: a panacea to poverty in the northern region of Ghana? *Res Humanit Soc Sci*. 2013;3(12):18-31.
33. Ghana Statistical Service. *Ghana Multiple Indicator Cluster Survey with an Enhanced Malaria Module and Biomarker with Enhanced Module Biomarker*. Accra: Ghana Statistical Service; 2011.

34. Matendo R, Engmann C, Ditekemena J, et al. Reduced perinatal mortality following enhanced training of birth attendants in the Democratic Republic of Congo: a time-dependent effect. *BMC Med*. 2011;9(1):93 http://www.biomedcentral.com/1741-7015/9/93.
35. Olufunke ME, Akintujoye IA. Perception and utilization of traditional birth attendants by pregnant women attending primary health clinics in a rural local government area in Ogun state Nigeria. *Int J Women's Health*. 2012;4:25-34.
36. Rockers PC, Wilson ML, Mbaruku G, Kruk ME. Source of antenatal care influences facility delivery in rural Tanzania: a population-based study. *Matern Child Health J*. 2009;13(6):879-885.
37. Hazarika I. Factors that determine the use of skilled care during delivery in India: implications for achievement of MDG-5 targets. *Matern Child Health J*. 2011;15(8):1381-1388.
38. Akazili J, Doctor HV, Abokyi L, Hodgson A, Phillips JF. Is there any relationship between antenatal care and place of delivery? Findings from rural northern Ghana. *Afr J Health Sci*. 2011;18:62-73.
39. Tieba M, Musenge E, Azongo D, Kouanda S, Oduro RA. Trends and changes in home deliveries in Kassena-Nanakana districts in Northern Ghana: results from repeated cross-sectional surveys. *Int J Gynaecol Obstet*. 2016;10:2.
40. Danforth EJ, Kruk ME, Rockers PC, Mbaruku G, Galea S. Household decision-making about delivery in health facilities evidence from Tanzania. *J Health Popul Nutr*. 2009;27(5):696-703.
41. World Health Organisation. *WHO Recommendations on Antenatal Care for a Positive Pregnancy Experience*. Geneva: World Health Organisation; 2016.
42. Duysburgh E, Ye M, Williams A, et al. Counselling on and women's awareness of pregnancy danger signs in selected rural health facilities in Burkina Faso, Ghana and Tanzania. *Trop Med Int Health*. 2013;18(12):1498-1509.
43. Ganle JK, Obeng B, Segbefia YA, Mwinyuri V, Yeboah YJ, Baatiema L. How intra-familial decision-making affects women's access to, and use of maternal healthcare services in Ghana: a qualitative study. *BMC Pregnancy Childbirth*. 2015;15(1):173.
44. Ganle JK, Dery I. What men don't know can hurt women's health: a qualitative study of the barriers to and opportunities for men's involvement in maternal healthcare in Ghana. *Reproductive Health*. 2015;12(1):93.
45. Ganle JK, Dery I, Manu A, Obeng B. 'If I go with him, I can't talk with other women': understanding women's resistance to men's involvement in maternal and child healthcare in Northern Ghana. *Soc Sci Med*. 2016;166:195-204.
46. World Health Organization. *WHO Recommendations on Health Promotion Interventions for Maternal and Newborn Health*. Geneva: World Health Organization; 2015.
47. Witter S, Arhinful KD, Kusi A, Zakariah-Akoto S. The experiences of Ghana in implementing a user fee exemption policy to provide free delivery care. *Reprod Health Matters*. 2007;15(30):61-71.
48. Dzakpasu S, Soremekun S, Manu A, et al. Impact of free delivery care on health facility delivery and insurance coverage in Ghana's Brong Ahafo region. *PLoS One*. 2012;7(11):e49430.
49. Nyondol AL, Choko TA, Chimwaza FA, Muula SA. Invitation cards during pregnancy enhance male partner involvement in prevention of mother to child transmission (PMTCT) of human immunodeficiency virus (HIV) in Blantyre, Malawi: a randomized controlled open label trial. *PLoS One*. 2015;10(3):e0119273.

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