They receive antenatal care in health facilities, yet do not deliver there: predictors of health facility delivery by women in rural Ghana

Michael Boah 1*, Abraham B. Mahama 2 and Emmanuel A. Ayamga 1

Abstract

Background: Research has shown that use of antenatal services by pregnant women and delivery in health facilities with skilled birth attendants contribute to better delivery outcomes. However, a gap exists in Ghana between the use of antenatal care provided by health facilities and delivery in health facilities with skilled birth attendants by pregnant women. This study sought to identify the predictors of health facility delivery by women in a rural district in Ghana.

Methods: This was a cross-sectional study conducted in June 2016. Women who delivered in the past 6 months preceding the study were interviewed. Data on socio-demographic characteristics, use of antenatal care, place of delivery and reasons for home delivery were collected from study participants. Chi-square test and multiple logistic regression analysis were used to assess an association between women’s socio-demographic and obstetric characteristics and place of delivery at 95% confidence interval.

Results: The study found that 98.8% of women received antenatal care services at least once during their recent pregnancy, and 67.9% attended antenatal care at least four times before delivery. However, 61.9% of the women delivered in a health facility with a skilled attendant. The frequently mentioned reason for home delivery was “unaware of onset of labour and delivery”. The odds for delivery at a health facility were reduced among women with four living children [(AOR = 0.07, CI = 0.15–0.36, p = 0.001)], with no exposure to delivery care information [(AOR = 0.06, CI = 0.01–0.34, p = 0.002)], who started their first ANC visit from the second trimester of pregnancy [(AOR = 0.003, CI = 0.01–0.15, p < 0.001)] and increased among women who made at least four ANC visits before delivery [(AOR = 17.53, CI = 6.89–44.61, p < 0.001)].

Conclusion: Findings from this study revealed a low rate of delivery at health facilities although visits to antenatal care sessions were high, an indication that there was the need to intensify health education on early initiation of antenatal care, signs of labour and delivery, and importance of health facility delivery.

Keywords: Predictors, Ghana, Health facility, Delivery place, Skilled attendant

* Correspondence: boahmichael@gmail.com
1 Ghana Health Service, Kassena Nankana West District Health Directorate, P.O. Box 21, Paga, Upper East Region, Ghana
Full list of author information is available at the end of the article

© The Author(s). 2018 Open Access This article is distributed under the terms of the Creative Commons Attribution 4.0 International License (http://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The Creative Commons Public Domain Dedication waiver (http://creativecommons.org/publicdomain/zero/1.0/) applies to the data made available in this article, unless otherwise stated.
Background

Low-and middle-income countries (LMIC) contribute about 99% of the maternal deaths that occur worldwide [1]. An analysis of the causes of maternal deaths in Africa shows that most of these deaths are as a result of direct obstetric complications notably, haemorrhage, hypertension, sepsis and obstructed labour that emerge around the time of labour and delivery [2]. However, deaths from these complications can be prevented. In Ghana, though there has been a decline in maternal mortality from 760 deaths per 100,000 live births in 1990 to 319 deaths per 100,000 live births in 2015, it is still very high [1].

Complications that may arise from pregnancy are impossible to predict. The World Health Organization (WHO) therefore recommends delivery by a skilled birth attendant (SBA) [3]. The presence of an SBA at delivery has also been stressed in many summits and international conferences worldwide [4]. The contribution of skilled delivery in the reduction of deaths among pregnant women and neonates has been highlighted by several studies [5–7].

A high proportion of women in developing countries are reported to have received antenatal care (ANC) at least once from a qualified health provider during pregnancy [8–12]. However, in spite of the importance placed on the use of an SBA by women during delivery to prevent complications, it is not uncommon to find one in three women using an SBA during delivery, especially in sub-Saharan Africa [13]. Cost, number of ANC visits made by a woman before delivery, maternal education, poor attitude of health care providers, parity and distance, the effect of which is compounded by the lack of transport, have been identified as some barriers to the use of health facility by pregnant women for delivery in developing countries [14–17].

To improve geographic access to health services by all, the Community-based Health Planning and Services (CHPS) initiative was implemented by the Ghana Health Service (GHS) in 2002 and covered all the regions in Ghana. This was followed by the implementation of the free maternal health care policy in 2003 under which pregnant women do not pay user fees to receive health services from the time of pregnancy to 3 months post-partum. Additionally, routine health education and promotion activities on the benefits of delivery with a SBA are carried out [18, 19]. Consequently, nine out of ten women in Ghana have utilized ANC services from health professionals during their recent pregnancy [20–23]. However, the high prevalence of ANC usage does not translate into the use of health facility for delivery. The 2014 Ghana Demographic and Health Survey (GDHS) report revealed that an overwhelming 97% of women received ANC at least once during their recent pregnancy, but 73% went on to deliver in a health facility where SBAs are available [24].

With these strategies in place, it is expected that the high prevalence of ANC utilization should correspond to an increase in health facility delivery. This is however not the case. The question is why? The reasons for this phenomenon needed to be ascertained.

Skilled delivery in the Upper East Region of northern Ghana is high (84.1%), though there are variations across the thirteen districts in the region [24, 25]. The 2014 annual report of the Buiisa district showed that an appreciable 71.5% of pregnant women received ANC services once during pregnancy, 90.7% made at least four follow up visits before delivery while only 46.2% delivered in a health facility [25, 26]. These findings on ANC utilization and health facility delivery put together demonstrate that a gap exists between receiving ANC services from health facilities and delivery in health facilities.

Studies conducted in Ghana [23, 27, 28] have identified factors such as maternal age, religion, household income and maternal occupation to predict health facility delivery. However, the focus of these studies still presents gaps in the literature. For instance, two of the studies did not assess the effect of the gestation of pregnancy at the onset of ANC on the place of delivery [23, 27]. Furthermore, the study by Esena & Sappor [28] was carried out in an urban setting, hence the results may not be wholly applicable in a rural setting. The gestation of pregnancy at the onset of ANC and place of residence (rural or urban) have been reported to influence the use of health facility for delivery services elsewhere [15, 20]. Therefore, results of this present study will inform policy and add to existing literature by examining the factors behind the existing gap between the use of ANC and health facility delivery by women.

The aim of this study was to explore socio-demographic and obstetric factors such as maternal age, education, ethnicity, religion, occupation, health insurance status, the gestation of pregnancy at first ANC attendance, and parity as predictors of health facility delivery by women in a rural district in northern Ghana.

Methods

Study setting

This study was cross-sectional by design. It was carried out in June 2016 in the Buiisa South District, a predominantly rural district located in the Upper East Region of northern Ghana. The district comprises of six sub-districts. The district has 3 health centres and 14 CHPS zones serving a population of 38, 298 (projected from the 2010 population and housing census). Women in reproductive age form 24% (9192) of the total population of the district. There are no private maternity homes [26].
Study population and sampling
Women included in this study were all women aged 15–49 years resident in the district who delivered in the past 6 months preceding the survey. Antenatal care record book of each study participant was used to confirm obstetric information given. Women not resident in the study district, who delivered more than 6 months preceding the survey were excluded.

A sample size of 423 women was computed using the formula, \( z^2pq/d^2 \): p, the proportion of first trimester ANC registrants was estimated as 49% from a previous study in Ghana [29] with 5% error margin at 95\% confidence interval and 10\% non-response rate.

A multi-stage sampling technique was used in the selection of study communities and participants. First, simple random sampling by lottery was used to select six communities, one in each of the six sub-districts. The total sample size was then allocated proportionally to the selected communities.

Second, a sampling frame of eligible women was developed with the aid of existing community filiarisis and child welfare clinic registers in the health facilities serving the selected communities. The two registers were used in order to have an up-to-date information about the women in the various households. A systematic random sampling method was employed to select a participating household. Only one woman in participating household was interviewed. A lottery was used to select one woman for the interview whenever a selected household had more than one eligible woman.

Variables
The delivery place was selected as the main outcome variable. It was dichotomized as 0 “Home” for all deliveries occurring outside the health facility and 1 “Health facility” for deliveries occurring in the health facility. This information was obtained by asking the question “Where did you deliver [name of child]?” Based on available literature, predictor variables included were age, marital status, occupation, highest educational level, religion, parity, ethnicity, health insurance validity status, exposure to information on delivery care (irrespective of source), the gestation of pregnancy at the onset of ANC and the number of ANC visits made before delivery.

Data collection
Data on socio-demographic characteristics of respondents, place of delivery and reasons for home delivery were gathered using a structured questionnaire. The questionnaires were administered mainly in the local language (Buili).

Ten data collectors with at least secondary education and familiar with the customs and traditions of the area were recruited to assist in data collection. Six supervisors with previous experience in data collection supervised the data collection process. Data collectors and supervisors were trained together in a two-day training session. Training for the first day covered translation of the questionnaire from English to Buili and the interview process. A pre-test was carried out the second day in a neighbouring district with similar characteristics as the study district. Data collected in pre-test were excluded in the final analysis. Woman’s ANC card and index child’s road to health record booklet were used to confirm information given by mother where applicable.

Data analysis
Administered questionnaires were checked daily for completeness and consistency. Data were entered in EpiData Entry Client version 2.06.20 (EpiData Association, Denmark), and the dataset exported to STATA 13 Special Edition (StataCorp, College Station Taxes, USA LP) for cleaning and analysis.

Pearson chi-square \( (\chi^2) \) and Fisher’s exact tests were used, where appropriate to identify associations between the predictor variables and the outcome variable. Tests were two-tailed and a \( p < 0.05 \) was considered statistically significant. A possible correlation between statistically significant variables was checked using the Pearson Correlation Matrix before they were put in a multiple logistic regression model. None was found to be collinear.

Ethical considerations
Approval to carry out this study was obtained from the Ethics Review Committee of the Ghana Health Service (ID No. GHS-ERC 31/12/15). Participants consented by signing or thumb printing the consent form after the purpose and benefits of participating in the study were explained to them. Approval was obtained from parents of participants younger than 18 years before the interview. Anonymity and safety of participants were ensured.

Results
Socio-demographic characteristics of study participants
The mean age of participants was 29.2 ± 7.4 SD (range 15–49 years). The majority were married 402 (95.0\%), were farmers 274 (64.8\%) and belonged to the Christian religion 263 (62.2\%). Of the 423 respondents, 172 (40.7\%) had no formal education, 101 (23.9\%) had two living children, 351 (83\%) had ever enrolled onto the national health insurance scheme, and 254 (72.0\%) had valid insurance during their recent pregnancy (see Table 1).

Obstetric characteristics of study participants
The obstetric characteristics of the study participants are presented in Table 2. Of the 423 women interviewed, 98.8\% had attended antenatal care at least once during their recent pregnancy, and the majority (67.9\%) made at least
four visits before delivery. However, less than half (43.1%) started ANC in the first 3 months of their pregnancy. Many of the women received ANC services from the CHPS facility (60.3%) and health centres (38.5%). Regarding the place of delivery, 61.9% of respondents reported delivering in a health facility, of which the majority (84.4%) were assisted by the Midwife. The most frequently mentioned reasons for home delivery were unaware of onset of labour and delivery (68.0%), and no previous complications with delivery from previous pregnancies (19.6%).

Factors associated with place of delivery
A bivariate analysis was done to assess the association between individual socio-demographic and obstetric characteristics and the place of delivery. The results showed that nine of the eleven selected variables had a significant ($p < 0.05$) association with place of delivery. These variables included age, occupation, highest educational level attained, religion, parity, having a valid insurance during pregnancy, gestational age of pregnancy at the onset of ANC attendance, number of ANC visits made before delivery, and exposure to information on delivery care during the recent pregnancy (see Table 3).

Predictors of health facility delivery
Factors that were significantly associated with place of delivery in the bivariate analysis were put into a multiple logistic regression model to measure their strength of association. Parity, exposure to information on delivery care, the gestation of pregnancy at the onset of ANC, and the number of ANC visits made before delivery were strong predictors of delivery in a health facility (see Table 4). The odds of delivering in a health facility decreased with increasing parity from two children to four.
living children. Compared to women with one living child, women with two, three or four living children had 77.0%, 80.0% and 93.0% less the chances of delivering in a health facility respectively [(AOR = 0.23, CI = 0.06–0.90, p = 0.034), (AOR = 0.20, CI = 0.04–0.99, p = 0.048), and (AOR = 0.07, CI = 0.15–0.36, p = 0.001)] respectively. However, women with at least five living children had increased odds of delivering in a health facility compared with women with four living children [(AOR = 0.11, CI = 0.02–0.67, P = 0.017)]. Also, women without exposure to information on delivery during their recent pregnancy were 94% less likely to deliver in a health facility [(AOR = 0.06, CI = 0.01–0.34, p = 0.001)]. Additionally, women who started their first ANC visit from the fourth month of pregnancy had 97.0% fewer chances of delivering in a health facility compared to women who started ANC in the first 3 months of pregnancy [(AOR = 0.03, CI = 0.01–0.15, p < 0.001)]. Furthermore, the odds of using a health facility for delivery were about 18 times more among women who attended ANC for at least four times before delivery compared to women who made less than four ANC visits before delivery [(AOR = 17.53, CI = 6.89–44.611, p < 0.001)].

**Discussion**

The results from this study aimed at identifying the predictors of health facility delivery in a rural district in Ghana showed that ANC utilization is high in the study area, as 98.8% of women reported using ANC at least once during their recent pregnancy and about 68.0% made four and more visits before delivery. However, the proportion of women who delivered in a health facility was 61.9% which was not very different from the proportion of women who made at least four follow up visits before delivery (67.9%). The high ANC utilization and low health facility delivery in this study conform to findings from other studies conducted in Ghana [20, 22, 23, 30] and other parts of sub-Saharan Africa [31–33]. The “unaware of onset of labour and delivery” mentioned as the main reason for home delivery in this study possibly explains the gap that exists between ANC utilization and health facility delivery. Women may be more vulnerable during labour than during ANC. Therefore, in the case of ANC utilization, they may have the privilege of time in deciding when, how and where they want to use ANC service but the situation is different when labour starts. The situation may be exacerbated when the woman does not know or recognize early the signs of labour and delivery.

Factors such as age, occupation, maternal education, religion, parity, having a health insurance during pregnancy, exposure to information on delivery care during the recent pregnancy, gestational age of pregnancy at onset of ANC attendance and the number of ANC visits made before delivery were significantly associated with the place of delivery in the bivariate analysis. Older women (35 years and above) were more likely than younger women to deliver at home in this study. This may be because, after many previous deliveries, older women may build more self-confidence and experience in the childbearing process than younger women especially in the absence of any previous birth complications. 

### Table 2 Obstetric characteristics of study participants (N = 423 unless stated)

| Variable                                      | Number | Percent |
|-----------------------------------------------|--------|---------|
| ANC use during recent pregnancy               |        |         |
| Yes                                           | 418    | 98.8    |
| No                                            | 5      | 1.2     |
| Gestation of pregnancy at first ANC visit (N = 418) |        |         |
| First trimester                               | 180    | 43.1    |
| Second trimester                              | 235    | 56.2    |
| Third trimester                               | 3      | 0.7     |
| Number of ANC visits made before delivery (N = 418) |        |         |
| 1                                             | 1      | 0.2     |
| 2                                             | 14     | 3.3     |
| 3                                             | 119    | 28.5    |
| 4 and more visits                             | 284    | 67.9    |
| Place of delivery                             |        |         |
| Health facility                               | 262    | 61.9    |
| Home                                          | 161    | 38.1    |
| Assistance at health facility delivery (N = 262) |        |         |
| Doctor                                        | 25     | 9.5     |
| Midwife                                       | 220    | 84.0    |
| CHN                                           | 17     | 6.5     |
| aReasons for home delivery (N = 161)           |        |         |
| Unaware of onset of labour and delivery        | 109    | 67.7    |
| No complications with delivery from previous pregnancies | 32    | 19.9    |
| The home was the only delivery place available | 18     | 11.2    |
| Better care outside the health facility        | 8      | 5.0     |
| Husband’s decision                            | 6      | 3.7     |
| Cheaper cost of delivery                      | 4      | 2.5     |
| Advice from mother-in-law                     | 3      | 1.9     |
| Health facility too far                       | 2      | 1.2     |
| No means of transport                         | 1      | 0.6     |

*aMultiple responses allowed*
and may not see the relevance to deliver in the presence of a SBA. Also, older women may be deeply buried in traditional beliefs and practices that prohibit the uptake of modern medicine [34]. This could possibly explain the reason why women belonging to the traditional religious group were less likely than their counterparts to use a health facility for delivery as revealed in this study. Age and religion were positively associated with health facility delivery in a different district in the same region [34]. Having some source of income could imply an improvement in household socioeconomic status. Though delivery services are free in public health facilities in Ghana, there may be some indirect costs involved with the use of a health facility for delivery services such as the cost of transportation which is a barrier to the use of health facility for delivery by especially rural women [35] and other materials that may be required for delivery. An employed woman may be able to overcome this barrier easily relative to an unemployed woman. An educated woman relative to a woman with no formal education may have a better access to health-related information and be more concerned about her health and the health of her unborn baby thereby choosing to deliver in a health facility. High maternal education has been associated with increased use of maternal health services in Uganda [33] and Ethiopia [36]. The health insurance scheme in Ghana aims at removing out-of-pocket user fees as barriers to accessing health services [19]. In this study, having a valid health insurance was associated with health facility delivery. This finding supports the findings of another study in Ghana that

| Exposure variable | n | Place of delivery | P-value |
|-------------------|---|------------------|---------|
| Age (years)       |   | Home | Health facility |         |
| 15–19             | 32| 5 (15.6) | 27 (84.4) | <0.001 |
| 20–24             | 99| 20 (20.2) | 79 (79.0) |         |
| 25–29             | 100| 37 (37.0) | 63 (63.0) |         |
| 30–34             | 79| 33 (41.8) | 46 (58.2) |         |
| 35–39             | 67| 36 (53.7) | 31 (46.3) |         |
| 40 and above      | 46| 30 (65.2) | 16 (34.8) |         |
| Marital status    |   |     |     | 0.921a |
| Single            | 8 | 2 (25.0) | 6 (75.0) |         |
| Married           | 402| 154 (38.3) | 248 (61.7) |         |
| Cohabiting        | 4 | 1 (25.0) | 3 (75.0) |         |
| Separated         | 5 | 2 (40.0) | 3 (60.0) |         |
| Widow             | 4 | 2 (50.0) | 2 (50.0) |         |
| Occupation        |   |     |     | <0.001 |
| Unemployed        | 79| 49 (62.0) | 30 (38.0) |         |
| Farmer            | 274| 90 (32.9) | 184 (67.1) |         |
| Self-employed     | 62| 21 (33.9) | 41 (66.1) |         |
| Formal sector employee | 8 | 1 (12.5) | 7 (87.5) |         |
| Highest educational level attained |   |     |     | <0.001 |
| No education      | 172| 107 (62.2) | 65 (37.8) |         |
| Primary           | 137| 42 (30.7) | 95 (69.3) |         |
| Middle/Junior High | 67 | 8 (11.9) | 59 (88.1) |         |
| Secondary and above | 47 | 4 (8.5) | 43 (91.5) |         |
| Religion          |   |     |     | <0.001 |
| Traditional       | 115| 70 (60.9) | 45 (39.1) |         |
| Christian         | 263| 76 (28.9) | 187 (71.1) |         |
| Moslem            | 45| 15 (33.3) | 30 (66.7) |         |
| Ethnicity         |   |     |     | 0.487a |
| Builsa            | 413| 158 (38.3) | 255 (61.7) |         |
| Mamprusi          | 4 | 0 (0.0) | 4 (100.0) |         |
| Kassena           | 4 | 2 (50.0) | 2 (50.0) |         |
| Sissala           | 2 | 1 (50.0) | 1 (50.0) |         |
| Parity            |   |     |     | <0.001 |
| 1                 | 87| 12 (13.8) | 75 (86.2) |         |
| 2                 | 101| 32 (31.7) | 69 (68.3) |         |
| 3                 | 73| 23 (31.5) | 50 (68.49) |         |
| 4                 | 86| 40 (46.5) | 46 (53.5) |         |
| 5+                | 76| 54 (71.1) | 22 (28.9) |         |
| Health insurance status during recent pregnancy (N = 351) |   |     |     | <0.001 |

Table 3 Factors associated with place of delivery in rural Ghana (N = 431 unless stated)

| Exposure variable | n | Place of delivery | P-value |
|-------------------|---|------------------|---------|
| Invalid insurance | 97| 51 (52.6) | 46 (47.4) |         |
| Valid insurance   | 254| 65 (25.6) | 189 (74.4) |         |
| Exposure to information on delivery care |   |     |     | 0.001 |
| Yes               | 387| 138 (35.7) | 249 (64.3) |         |
| No                | 36 | 23 (63.9) | 13 (36.1) |         |
| Gestation of pregnancy at the onset of ANC (N = 418) |   |     |     | <0.001 |
| First trimester   | 180| 7 (3.9) | 173 (96.1) |         |
| Second trimester and beyond | 238 | 149 (62.6) | 89 (37.4) |         |
| Number of ANC visit made before delivery (N = 418) |   |     |     | <0.001 |
| Less than 4 visits | 134 | 115 (85.8) | 19 (14.2) |         |
| 4 or more visits  | 284| 41 (14.4) | 243 (85.6) |         |

*aFisher’s exact test
Table 4 Predictors of health facility delivery in rural Ghana

| Exposure variable                        | AOR(95% CI)    | P-value |
|-----------------------------------------|----------------|---------|
| Age (years)                             |                |         |
| 15–19                                   | 1.00           |         |
| 20–24                                   | 1.67 (0.26–10.60) | 0.586   |
| 25–29                                   | 1.34 (0.20–8.83)  | 0.76    |
| 30–34                                   | 1.64 (0.22–12.42) | 0.631   |
| 35–39                                   | 0.95 (0.11–7.90)   | 0.959   |
| 40 and above                            | 0.58 (0.06–6.08)   | 0.654   |
| Occupation                              |                |         |
| Unemployed                              | 1.00           |         |
| Farmer                                  | 7.88 (2.45–25.33)  | 0.001   |
| Self-employed                           | 5.13 (1.39–18.87)  | 0.014   |
| Formal sector employee                  | 5.97 (0.44–80.94)  | 0.178   |
| Highest educational level attained      |                |         |
| No education                            | 1.00           |         |
| Primary                                 | 1.10 (0.42–2.84)    | 0.848   |
| Middle/Junior High                     | 0.44 (0.09–2.21)    | 0.318   |
| Secondary and above                     | 0.32 (0.04–2.56)    | 0.284   |
| Religion                                |                |         |
| Traditional                             | 1.00           |         |
| Christian                               | 0.80 (0.31–2.07)    | 0.651   |
| Moslem                                  | 5.96 (1.59–22.41)  | 0.008   |
| Parity                                  |                |         |
| 1                                       | 1.00           |         |
| 2                                       | 0.23 (0.06–0.90)    | 0.034   |
| 3                                       | 0.20 (0.04–0.99)    | 0.048   |
| 4                                       | 0.07 (0.15–0.36)    | 0.001   |
| 5+                                      | 0.11 (0.02–0.67)    | 0.017   |
| Health insurance status                 |                |         |
| Invalid insurance                       | 1.00           |         |
| Valid insurance                         | 1.50 (0.63–3.58)   | 0.363   |
| Exposure to information on delivery care|                |         |
| Yes                                     | 1.00           |         |
| No                                      | 0.06 (0.01–0.34)    | 0.002   |
| Gestation of pregnancy at the onset of ANC|            |         |
| First trimester                         | 1.00           |         |
| Second trimester and beyond             | 0.03 (0.01–0.15)   | <0.001  |
| Number of ANC visit made before delivery|                |         |
| Less than 4 visits                      | 1.00           |         |
| 4 and more visits                       | 17.53 (6.89–44.61)  | <0.001  |

reported high utilization of health facility delivery with the possession of a health insurance [37].

Findings from the study revealed that a woman with one child was more likely to use a health facility for delivery compared to a woman with two to four children. Also, a woman with five or more children was likely to deliver in a health facility compared with a woman with four children. It can be explained that a woman delivering for the first time does not have prior experience with childbirth, may lack self-confidence and consider the delivery very challenging and anticipate unforeseen complications. These may compel her to use a skilled attendant for a safer delivery. However, a woman delivering for the second, third or fourth time has had an experience with childbirth from her previous delivery. This may contribute significantly to her decision-making process as to whether to deliver at home or at a health facility, especially if she did not experience any complications with her previous delivery (ies). A study in Nigeria [38] reported that women were more likely to use maternal health services if they had a previous complication with delivery (e.g. stillbirth). Similar to a woman with one child, a woman with five and more children may consider herself at high risk of birth complications due to the many deliveries and thus recourse to a health facility for delivery where she is sure skilled attendants can manage any resulting complication. She may also be advised by health workers to deliver in a health facility because of the high risk involved [39]. A qualitative study in Africa reported that women perceived themselves to be at risk of adverse pregnancy outcomes after five pregnancies [40]. The positive association between parity one and health facility delivery has also been reported by studies conducted in Senegal, Zambia and Kenya [41–43]. However, a study in Nigeria did not report any association between parity and delivery in a health facility [8].

This study identified that women who were not exposed to information on delivery care during their recent pregnancy were less likely to use the health facility for delivery when compared to women who were exposed to information on delivery during their recent pregnancy. The knowledge of women regarding the benefits of health facility delivery and the opportunities available for life-saving in case of any negative outcomes may be enhanced through exposure to information on delivery care. As explained, the perceived benefits of delivery in a health facility may be decided by the knowledge of the mother on the dangers associated with home delivery and life-saving opportunities available in health facilities [44]. Another study in northern Ghana also reported a positive association between media exposure and health facility delivery [30]. A study in Ethiopia reported that women who were exposed to information on maternal health relative to women who did not receive information were over eight times more likely to give birth in a health facility [45]. Though exposure to maternal health information is very instrumental in promoting health-seeking behaviour, the type of information received should also be taken into serious consideration. Although 91.5% of the women in this study received
maternal health information during their recent pregnancy, the frequently mentioned (49.6%) health information received by women was about sleeping under insecticide-treated bed net while 9.0% of the women mentioned that they received information on signs of labour and delivery. This might have contributed to the reason (unaware of onset of labour and delivery) for home deliveries in this study mentioned earlier.

Furthermore, this study found that women who initiated ANC in the first trimester of pregnancy and women who made at least four ANC follow up visits before delivery had increased odds of using a health facility for delivery. Starting ANC in within the first 3 months may offer the woman the opportunity to attend many times and have more contact with health professionals before delivery. These contacts, first of all, serve as a window of opportunity for health professionals to provide the woman with adequate information on the benefits derived from delivering in a health facility and the dangers associated with home delivery. This might enhance the woman’s knowledge on maternal health and promote delivery in a health facility. A study in Kenya concluded that starting ANC in the first trimester was a precursor for delivery in a health facility [46]. Similarly, a study in Mali reported that women whose knowledge on maternal health was enhanced through contacts with health staff during ANC were more likely to deliver in health facilities [47]. Secondly, a woman may build confidence and trust in health professionals from continuous visits to the health facility for ANC during pregnancy. She may also listen to encouragement and advice from these health workers to deliver in the health facility. Other studies have also reported that at least four ANC visits before delivery increases the woman’s chances of using the health facility for delivery [34, 43, 48, 49].

This study, like many other studies, has strengths and limitations. The major strength of this study was that it limited respondents to women who delivered in the past 6 months, thereby minimizing the tendency of recall bias. Also, obstetric history of the woman was confirmed from the woman’s ANC card to ensure the credibility of obstetric information obtained. However, a limitation of this study was its design as cross-sectional. A cross-sectional study only assesses association and not causality. Additionally, the study did not assess the association between non-use of ANC and delivery place.

However, in spite of these limitations, the findings from this study provide information on predictors of health facility delivery in the study district since it is the first of its kind, and adds to existing literature in Ghana on issues related to maternal health-seeking behaviour.

Conclusions
This study sought to identify the predictors of health facility delivery in a rural district in Ghana. Factors such as maternal age, occupation, the educational level attained, religion, parity, health insurance status, exposure to information on delivery care, the gestation of pregnancy at the start of first ANC visit and the number of ANC visits made before delivery were more likely to influence the choice of delivery place. Additionally, the small proportion of women who received health information on signs of labour and delivery might have contributed to the significant proportion of home deliveries in this study since the common reason cited for home delivery was “unaware of onset of labour and delivery”.

In addition to using the socio-demographic and obstetric characteristics of the women by health care professionals (especially midwives) to identify potential women who will attend ANC and still deliver at home, there is an urgent need to intensify health education especially during focused ANC sessions on signs of labour and delivery, and birth preparedness to enhance the knowledge of women to be able to identify early signs of labour and report to the nearest health facility to deliver with SBAs.

Abbreviations
ANC: Antenatal care; CHPS: Community Health Planning and Services; DDHS: District Director of Health Service; GDHS: Ghana Demographic and Health Survey; GHS: Ghana Health Services; LMIC: Low and middle-income country; RDHS: Regional Director of Health Service; SBA: Skilled birth attendant; WHO: World Health Organization

Acknowledgements
We acknowledge the support of the Regional Director of Health Services (RDHS) for the Upper East Region and the District Director of Health Services (DDHS) for the Bulsa district. We also appreciate the contribution of Dominic Achinkok, Linda Abada, Emmanuel Akainpadade, Bernard Akudolgo, Drahmari Zuwah and Barnabas Ayaic during the data collection. We thank the data collectors and the participants in this study. The content of this manuscript are the sole responsibility of the authors and do not represent the views of the publisher.

Funding
This study received no funding support from any organization or institution.

Availability of data and materials
The data set and materials for which conclusions are drawn in this paper are available on request from the corresponding author.

Authors’ contributions
MB came up with the research idea, was involved in the conceptualization of the study design, reviewed literature, supervised data collection, carried out the data analysis, and wrote the methods and results section. ABM supported in revising the initial research idea, reviewed literature, supervised data collection, wrote the introductory section and reviewed the draft manuscript. EAA was involved in the conceptualization of the study design and implementation of the study, involved in the data analysis, and wrote the discussion and draft manuscript. All authors read and approved the final manuscript.

Authors’ information
Michael Boah (MPH—Public Health): Nutrition Officer, Ghana Health Service, PhD candidate in Epidemiology, Harbin Medical University, Harbin—Heilongjiang province, China. Abraham B. Mahama (MPH—Health Promotion): Nutrition officer, UNICEF Ghana country office email: bangamsi@gmail.com, and Emmanuel A. Ayamga (BSc Community Nutrition): Nutrition Officer, Ghana Health Service, Nabdam District Upper East Region;
Master of Public Health Student, School of Public Health, University of Ghana, Legon Accra, email: eaayamga@gmail.com

Ethics approval and consent to participate
Ethical approval for this study was granted by the ethics review committee of the Ghana Health Service (ID No. GHS-ERC 31/12/15). Informed consent was obtained from participants before the interview. Permission was also sought from parents of participants younger than 18 years before interviewing them.

Competing interests
The authors declare that they have no competing interests.

Publisher’s Note
Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Author details
1Ghana Health Service, Kasena Nankana West District Health Directorate, P. O. Box 21, Paga, Upper East Region, Ghana. 2UNICEF- Ghana Country Office, Accra, Ghana.

Received: 4 December 2017 Accepted: 19 April 2018
Published online: 03 May 2018

References
1. World Health Organization, Unicef, UNFPA, World Bank, United Nations Population Division. Trends in Maternal Mortality: 1990–2015: Estimates by WHO, UNICEF, UNFPA, The World Bank and the United Nations Population Division. Geneva: World Health Organization; 2015.
2. Kinney MV, Kerber KJ, Black RE, Cohen B, Nikrumah F, Coovadia H, et al. Sub-Saharan Africa’s mothers, newborns, and children: where and why do they die? PLoS Med. 2010;7(6):1–9.
3. World Health Organization. Making pregnancy safer: the critical role of the skilled attendant. A joint statement by WHO, ICM and FIGO. Geneva: World Health Organization; 2004.
4. Stanton C, Blanc AK, Croft T, Choi Y. Skilled Care at Birth in the Developing World: progress to date and strategies for expanding coverage. J Biosci. 2007;39:109–20.
5. Albera M, Gebre Mariam A, Belachew T. Predictors of safe delivery service utilization in Arsi zone, south-East Ethiopia. Ethiop J Heal Sci. 2011;21(Special Issue):101–13.
6. Adegoke AA, Van Den Broek N. Skilled birth attendance-lessons learnt. BJOG An Int J Obstet Gynaecol. 2009;116(Suppl. 1):33–40.
7. Nieburg P. Improving maternal mortality and other aspects of Women’s health: the United States’ global role. Washington, DC: 2012.
8. Oguntunde O, Aina O, Ibrahim MS, Umar HS. Antenatal care and skilled birth attendance in three communities in Kaduna state, Nigeria. African Journal Reprod Heal. 2010;14(3):89–96.
9. Tadesse B, Mulat A, Gashaw A. Previous early antenatal service utilization improves timely booking : cross-sectional study at University of Gondar Hospital, Northwest Ethiopia. J Pregnancy. 2014;2014:1–7.
10. Zeine A, Wildie M, Olola S. Factors influencing antenatal care utilization in Hadiya zone, Ethiop J Heal Sci. 2010;20(2):75–82.
11. Kawungozi PC, Alikuba D, Aleni C, Chitayi M, Kazibwe A, Sunya E, et al. Attendance and utilization of antenatal care (ANC) services: multi-center study in upcountry areas of Uganda. Open J Prev Med. 2015;5(3):132–42.
12. Smkhada B, Van Teijlingen ER, Porter M, Simkhada P. Factors affecting the utilization of antenatal care in developing countries: systematic review of the literature. J Adv Nurs. 2008;61(3):244–60.
13. Koblimsky M, Matthews Z, Hussain J, Mavalankar D, Mittra MK, Anwar I, et al. Going to scale with professional care skilled labor. Lancet. 2006;368(9544):1377–86.
14. Kruk ME, Rockers PC, BMbarku G, Paczkowski MM, Galea S. Community and health system factors associated with facility delivery in rural Tanzania: a multilevel analysis. Health Policy (New York). Elsevier Ireland Ltd. 2010;97(2):209–16.
15. Moyer CA, Mustafa A. Drivers and deterrents of facility delivery in sub-Saharan Africa: a systematic review. Reprod Health. 2013;10(1):40.
16. Anastasi E, Borchert M, Campbell OM, Sondorp E, Kazuca F, Hill O, et al. Losing women along the path to safe motherhood: why is there such a gap between women’s use of antenatal care and skilled birth attendance?

A mixed methods study in northern Uganda. BMC Pregnancy Childbirth. 2015;15(1):287.
17. Fekadu M, Regassa N. Skilled delivery care service utilization in Ethiopia : analysis of rural-urban differentials based on national demographic and health survey (DHS) data. Afr Health Sci. 2014;14(4):794–84.
18. Ghana Statistical Service. Ghana multiple Indicator cluster survey with an enhanced malaria module and biomarker. Accra, Ghana; 2011.
19. National Health Insurance Authority. 2010 annual report. Accra, Ghana, 2010.
20. 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(1):162–73.
21. Saleah E, Doctor HV, McCluskey L, Bernstein J, Yeboah-antwi K, Mills S. Using the community-based health planning and services program to promote skilled delivery in rural Ghana: socio-demographic factors that influence women utilization of skilled attendants at birth in northern Ghana. BMC Public Health. 2014;14(1):344.
22. Nakua KE, Sevugu JT, Dzomeku VM, Otkuprii E, Lipkovich HR, Owusu-Dabo E. Home birth without skilled attendants despite millennium villages project intervention in Ghana: insight from a survey of women’s perceptions of skilled obstetric care. BMC Pregnancy Childbirth. 2015;15(1):243.
23. Manyeh AK, Akpialik DE, Kukula V, Ekey RA, Narh-Bana S, Adjei A, et al. Socio-demographic determinants of skilled birth attendance at delivery in rural southern Ghana. BMC Res Notes BioMed Central. 2017;10(1):268.
24. Ghana Statistical Service, Ghana Health Service, ICF International. Ghana Demographic and Health Survey, 2014. Rockville, Maryland, USA; 2015.
25. Awonour-Williams J. 2014 Annual Report: Upper East Regional Health Services. Bolgatanga. 2015.
26. Builsa South District Health Administration. 2014 Annual Report. Bolgatanga. 2015.
27. Gyimah S, Takyi BK, Adadi I. Challenges to the reproductive-health needs of African women : on religion and maternal health utilization in Ghana. Soc Sci Med. 2006;62(2006):2930–44.
28. Esena RK, Sappor M. Factors associated with the utilization of skilled delivery services in the Ga east municipality of Ghana part 2 : barriers to skilled delivery. Int J Sci Technol Res 2013;2(8):195–207.
29. Abor P, Abekah-Nikrumah G, Sakly K, Adjasj CKD, Abor J. The Socio-Economic Determinants of Maternal Health Care Utilization in Ghana. Int J Soc Econ. 2011;38(7):628–48.
30. Mills S, Williams AE, Adjuik AM. Use of health professionals for delivery following the availability of free obstetric Care in Northern Ghana. Matern Child Heal J. 2007;12:509–18.
31. Stephenson R, Baschieri A, Clements S, Hennink M, Madise N. Contextual influences on the use of health facilities for childbirth in Africa. Am J Public Health. 2006;96(1):84–93.
32. Babalola S, Futusi A. Determinants of use of maternal health services in Nigeria-looking beyond individual and household factors. BMC Pregnancy Childbirth. 2009;13:1–13.
33. Tann CJ, et al. Use of Antenatal Services and Delivery Care in Entebbe, Uganda: A Community Survey. BMC pregnancy and childbirth. 2007;7:23.
34. Saaka M, Avisiah MA. Promoting skilled institutional deliveries: factors to consider in a free maternal health services policy environment. Med Res Chronicles. 2015;5(23):286–302.
35. Ganle KK, Parker M, Fitzpatrick R, Oktupri 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):1–17.
36. Wada YD, Afevork MF, Hindin MJ. Unintended pregnancies and the use of maternal health services in southwestern Ethiopia. BMC Int Health Hum Rights. 2013;13(1):36.
37. Nketiah-Amponsah E, Arthur E. Choice of delivery facility among expectant mothers in Ghana: does access to health insurance matter? J Health Manag. 2013;15(4):509–24.
38. Oladokun A, Oladokun R, Morhason-Bello I, Bello A, Addokun B. Proximate predictors of early antenatal registration among Nigerian pregnant women. Ann Afr Med. 2010;9(4):222–5.
39. Asudep NN, Carson AP, Turpin CA, Tameru E, Agidi AT, Zhang K, et al. Determinants of access to antenatal care and birth outcomes in Kumasi, Ghana. J Epidemiol Glob Health. Ministry of Health, Saudi Arabia. 2013;3:279–88.
40. Sadiq AA, Poggensee G, Nguku P, Sabitu K, Abubakar A, Puone T. Factors associated with adverse pregnancy outcomes and perceptions of risk factors among reproductive age women in soba LGA, Kaduna state 2013. Pan Afr Med J. 2016;25:1–8.
41. Faye A, Niane M, Ba I. Homebirth in women who have given birth at least once in a health facility : contributory factors in a developing county. Acta Obstet Gynecol Scand. 2011;90(2011):1239–43.
42. HazembA AN, Siziya S. Choice of place for childbirth : prevalence and correlates of utilization of health facilities in Chongwe district, Zambia. Med Journal Zambia. 2002;35(2):53–7.
43. Fotso J-C, Ezeh A, Madise N, Ziraba A, Ogollah R. What does access to maternal care mean among the urban Poor? Factors associated with use of appropriate maternal health Services in the Slum Settlements of Nairobi, Kenya. Matern Child Health J. 2009;13:130–7.
44. GabrysA, Campbell OM. Still too far to walk: literature review of the determinants of delivery service use. BMC Pregnancy Childbirth. 2009;9(1):34.
45. Hailu D, Berhe H. Determinants of institutional childbirth service utilisation among women of childbearing age in urban and rural areas of Tsegedie district, Ethiopia. Midwifery. Elsevier. 2014;2014(30):1109–17.
46. Ochako R, Fotso J, Ikamari L, Khasakhala A. Utilization of maternal health services among young women in Kenya : insights from the Kenya demographic and health survey, 2003. BMC Pregnancy Childbirth. 2003;11(1):1–9.
47. Gage A. Barriers to the utilization of maternal health care in rural Mali. Social Sci Med. 2007;65(8):1666–82.
48. Kidanu S, Diegu G, Tinuye TY. Factors influencing institutional delivery service utilization in Dembecha district, Northwest Ethiopia: a community-based cross-sectional study. Reprod Health. 2017;14(1):98.
49. Shah R, Rehfues EA, Maskey MK, Fischer R, Bhandari PB, Delius M. Factors affecting institutional delivery in rural Chitwan district of Nepal : a community-based cross-sectional study. BMC Pregnancy Childbirth. 2015;15(27):1–14.