Factors behind Institutional Delivery Preference in the Republic of Benin: An Analysis of 2011-2012 Benin Demographic and Health Survey (BDHS) data

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Abstract

Background: *Ending preventable maternal and newborn morbidity and mortality remains a core component of the Sustainable Development Goals (SDG) which is a continuation of the Millennium Development Goals (MDG). It has been documented that most women in developing countries give birth at home without the intervention of skilled attendants despite the prevailing multitude risks associated with childbirth for both mother and the unborn child. The study was aimed at identifying the most significant factors influencing selection of health facility based delivery among reproductive age mothers.*

Data and methods: *Data was obtained from Benin Demographic and Health Survey (BDHS) of 2011-2012 using percent distribution, binomial logistic regression and multinomial regression. Out of 16,599 interviewed only 9,111 were eligible for the present study.*

Results: *Most (76.0%) of the respondents gave birth at public health centers, 11% in private health centers and the rest outside health institutions. Out of 17 variables examined, 13 were found (using Akaike Information Criterion in a stepwise algorithm) to be the most important factors for institutional delivery. Among them, Antenatal Care (ANC) frequency, mother's education, and household wealth index had most impact on institutional deliveries with positive and linear relationships. Most of the educated women (secondary or above) were more likely to give birth in a private health facility (Private Health OR=5.2, 95% CI 2.47-10.88; Public Health OR=3.7, 95% CI 1.82-7.6). Similar results were found among the richest women (Private Health OR=8.6, 95% CI 3.5-21.3; Public Health OR=4.4, 95% CI 1.90-10.4). Female education and economic status were the most important factors for institutional delivery preference.*

Conclusion: *Encouraging regular ANC visits (at least the four recommended visits), and girls' education up to secondary school will help getting women to deliver in a well-equipped health facility. There is also a need to investigate thoroughly through qualitative researches reasons behind their preference of health facility for reproductive health services, including institutional delivery.*

Keywords

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Background

The Millennium Development Goals (MDG) has contributed to substantial reduction in maternal and infant mortality (maternal and under-five mortality rate worldwide has dropped to about 50% between 1990 and 2015) (Requejo & Bhutta, 2015; UNICEF, 2015). Despite such progress, numerous women and children below 5 years still die due to preventable diseases. On average, each day around 1,500 women die from complications related to pregnancy and childbirth, with most of occurring in sub-Saharan Africa (UNICEF, 2009). Ending preventable maternal and newborn morbidity and mortality remains a core component of the Sustainable Development Goals (SDG), a continuation of MDG. It has been well established in the developing countries that majority of maternal deaths occur during labor, delivery, and the immediate postpartum period, with obstetric haemorrhage as the primary medical cause (Bhutta et al., 2012). For instance, about 72.5% (1,771,000 of 2,443,000) of all maternal deaths recorded between 2003 and 2009 were due to direct obstetric causes (Say et al., 2014). Most women in the world's least developed countries give birth at home without skilled attendants (UNICEF, 2009) despite multitude risks associated with childbirth for both mother and the unborn child. Recent studies in Kenya, revealed that some traditional birth attendants can potentially cause harm to pregnant women by advising them to restrict food intake during pregnancy (Byrne et al., 2016). Their opinions have been known to strongly influence women's decision making regarding access to and use of modern maternal healthcare services in Ghana (Ganle et al., 2015). Studies also reported a wide gap between women's preference of the place of delivery and the actual venue for birth (Lerberg et al., 2014). In the Republic of Benin, factors behind user preference for place of delivery has not been well studied. Utilization of private health services is seen as an index of wealth and status (Kesterton et al., 2010). This suggests the need to assess whether institutional delivery, especially private health facility delivery, is mostly used by wealthy groups.

In view of the rise in preventable maternal and early neonatal morbidity and mortality during delivery, facility-based delivery especially by skilled birth attendance is recommended. Increasing women's access to skilled delivery care has a great positive impact on maternal and child outcomes. It reduces the risk of death or disability for both the mother and the baby (de Graft-Johnson et al., 2006). The correlation between the place of delivery and maternal and neonatal mortality is well established. Facility based delivery is inversely related to both maternal and early neonatal mortality when examined on a nation-wide scale. Throughout sub-Saharan Africa, there is a proven correlation between facility based delivery and both maternal mortality ratio and early neonatal mortality rate (Moyer et al., 2013). Facility based delivery reduces neonatal mortality risk by 29.0% in low and middle income countries (Tura et al., 2013). It also helps reduce preterm births and stillbirths (Barros et al., 2010). Ensuring pregnant women deliver in a health facility and attended to by skilled birth attendants is critical to reduce maternal and infant morbidity and mortality (Kashitala et al., 2015). Institutional delivery is also a key factor allowing women to attend postnatal check-ups especially to meet recommended postnatal care guidelines (Dansou et al., 2017).

In Benin, reproductive health issues remain among top priorities despite recent progress. None of the MDGs related to health, in particular reproductive health namely MDGs 4 and 5, was not achieved. Despite a relatively high level of use of maternal health services, some reproductive health indicators are below expectations. The number of maternal deaths per 100,000 live births declined from 576 to 405 between 1990 and 2015 (WHO et al., 2015). In 2004, neonatal mortality rate was estimated at 36 deaths for 1,000 live births (UNICEF, 2009). The average births of reproductive age women estimated at 5.8 in 2000, declined to about 4.9 in 2014 (UNDP, 2014). About 4 out of 5 Beninese (77.0%) live less than 5 km from a health facility but have a lower utilization rate (44.0%) (WHO, 2009). However, in recent years the

government attempted to reduce maternal mortality and increase newborn survival rates. For instance, on December 22, 2008, the government set up a national agency to provide gratuity for caesarean sessions (OCS/MGEP & DGAE/MEF, 2012) which become operative with the decree 2009-096 on March 30, 2009

Benin has 34 health districts, with six departmental hospitals and one national hospital. Skilled health personnel are mostly concentrated in large cities and below the required ratio (1 obstetrician per 36,162 reproductive age women, and 1 midwife per 17,846 reproductive age women) (Borchert et al., 2012). The rate of health facility delivery was high (87.0%) (INSAE & ICF, 2013) but high maternal mortality rates suggest problems with the quality of care (Borchert et al., 2012). About 11% and 76% of the women chose private health facility and public health facility (government health center) respectively. Beyond physical availability of services, reasons underlying such differences are not well known. Moreover, factors behind users' preference for institutional delivery were underexplored in Benin.

Most of the earlier studies (Amano et al., 2012; Mazalale et al., 2015; Byrne et al., 2016) focused on the factors behind either home delivery or facility based delivery without comparing the reasons for choosing private or public health centers access. Studies examining factors associated with institutional delivery in general, particularly women's preference of the type of health facility (private or public) to give birth are scarce. The present study aims to identify the most important factors for institutional delivery among reproductive age mothers. Additionally, it explores similarities and differences in factors responsible for private and public health facility deliveries. These will indicate how health policies and programmes could be directed and implemented with the ultimate goal of improving and promoting institutional delivery for both public and private health facility access. The study hypothesizes socioeconomic factors as most important for private health facility delivery. The most educated and richest women are more likely to deliver in a private health facility.

The current study reviewed literature on the factors that influence women's delivery location in sub-Saharan Africa using online search tools such as Google, Google Scholar and PubMed (MEDLINE) using the following terms: ("determinants") AND ("delivery") OR ("institutional delivery preference") OR ("home delivery") AND ("sub-Saharan-Africa"). Several factors were identified: woman's current age (Amano et al., 2012), woman's level of education (Ono et al., 2013; Mazalale et al., 2015; Shehu et al., 2016), religious background and ethnicity (Shehu et al., 2016), birth order number (Ono et al., 2013), ANC frequency (Amano et al., 2012; Pervin et al., 2012), woman's marital status (Ono et al., 2013; Mazalale et al., 2015), place of residence (Amano et al., 2012; Mazalale et al., 2015; Shehu et al., 2016), health facility accessibility (Shehu et al., 2016), intra-familial decision making (Ganle et al., 2015), household wealth index (Mazalale et al., 2015).

The likelihood of health facility delivery is greater among women who started attending ANC earlier (before 24 weeks of gestation) (Abebe et al., 2012), education (Abebe et al., 2012; Shehu et al., 2016), and place of residence (Abebe et al., 2012; Amano et al., 2012; Mazalale et al., 2015; Shehu et al., 2016).

In some cases, the relationship between female education and facility based delivery was found to be positive and linear (Kitui et al., 2013). Similar results were also reported when tested on variables such as ANC frequency (Pervin et al., 2012; Kitui et al., 2013) and household wealth (Kitui et al., 2013). For instance, according to Pervin et al. (2012), ANC visits are associated with increased uptake of facility-based delivery and improved perinatal survival. A good education combined with a stable marriage (being in union) will lead the women to choose a health facility (Ono et al., 2013).

Women's experience in pregnancy completion is related to subsequent venue for delivery. Birth order number is negatively associated with facility – based delivery (Kitui et al., 2013; Ono et al., 2013). Ono et al. in their studies found that primiparas mothers were more likely to give birth in a health facility. Likewise, younger mothers (aged below 20 years) have higher odds of giving birth at a health facility (Amano et al., 2012).

In rural Nigeria, distance to the health facility was found to be among the leading reasons for home deliveries (Shehu et al., 2016). Geographical access refers to the condition of the roads and the high transportation costs associated with travel, and the cost-sharing still applied at point of use representing two major barriers to access facility-based delivery in Burkina Faso (De Allegri et al., 2015).

Studies also revealed that decision making regarding access to and use of skilled maternal healthcare services is strongly influenced by the values and opinions of husbands, mothers-in-law, traditional birth attendants and other family and community members, more than those of individual childbearing women (Ganle et al., 2015). Cultural factors can serve as significant deterrents to facility delivery throughout sub-Saharan Africa (Moyer et al., 2013). Despite such findings, however, evidence regarding factors influencing women's choice of birth venue is inconsistent. In Burkina Faso, qualitative findings indicated that cultural factors do not shape the decision where to deliver (De Allegri et al., 2015), while in Nigeria, women's religious background and ethnicity were found to have significant influence on their place of delivery (Shehu et al., 2016).

Conceptual Framework

The current study presents a conceptual framework based on findings from past studies.

Figure 1 presents the conceptual framework of the study. It suggests that socioeconomic and demographic variables and environmental background influence institutional delivery preference through their influence on fertility background.
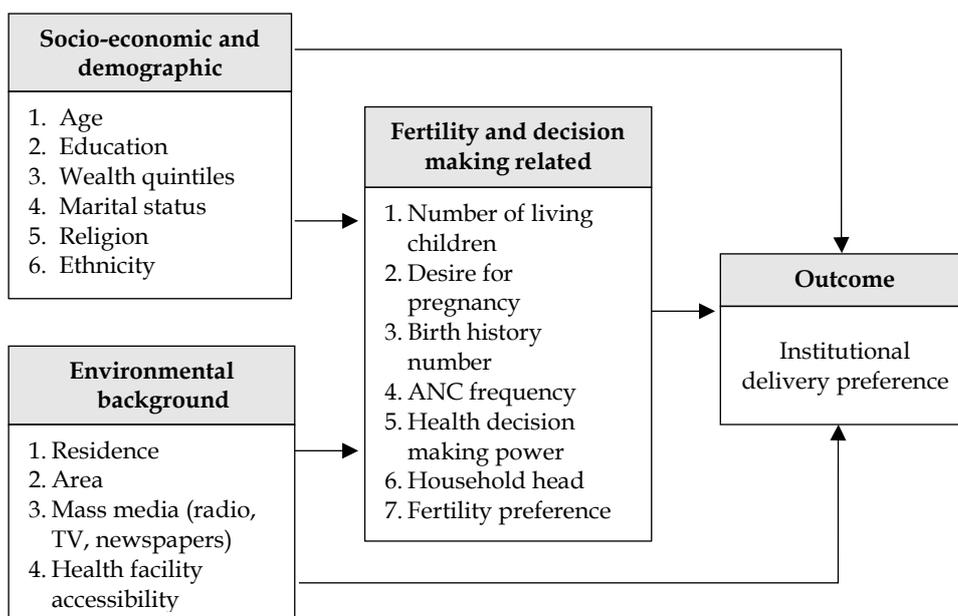
*Source: Author's conception based on findings from past studies*

Figure 1 : Conceptual framework

Data and Methods

Data and study population

The current study is based on secondary data obtained from Benin's Demographic and Health Survey (BDHS) conducted between 2011 and 2012 (INSAE & ICF, 2013). Using a nationally representative sample, the Measure DHS collects data on women of reproductive age (15-49 years) on several areas including pregnancy and delivery. The present study focuses on reproductive age mothers who have completed at least a pregnancy within the preceding five years of the survey. Those mothers on which the study is focused were 9,111 among the total of 16,599 women interviewed during the BDHS. The study uses data from the child and individual recode datasets.

Figure 2 shows the percentage of the sample recruited for the survey (16,599) and those eligible (9,111) for the present study across the study area.
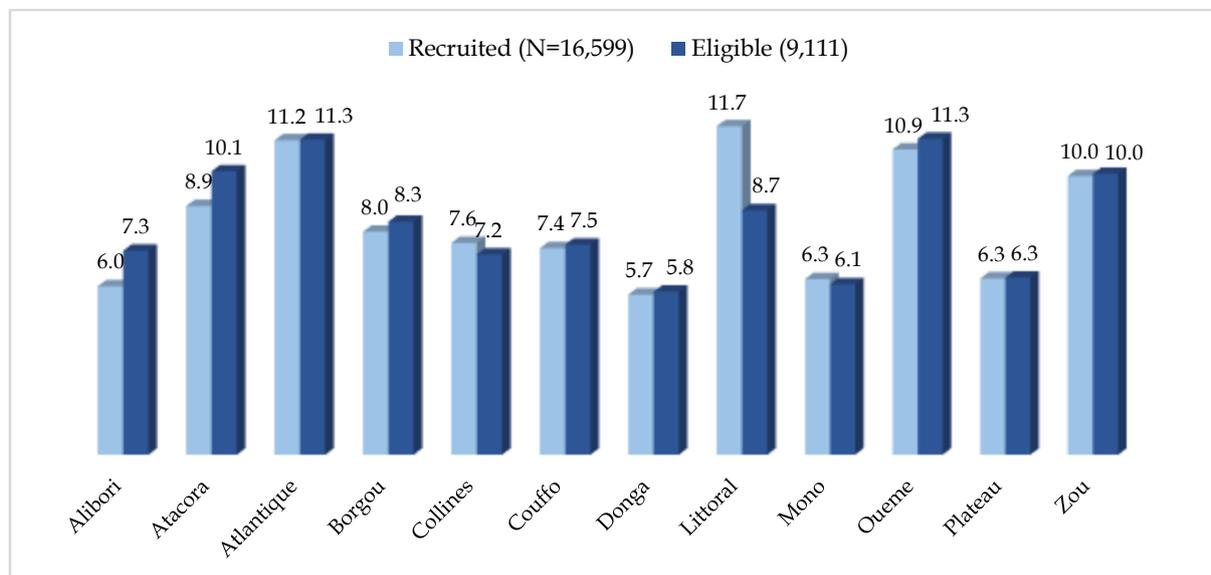
Source: Data mining – BDHS 2011/2012

Figure 2 : Sample characteristics by area

Outcome variables

The study examined two different outcomes. The first, institutional delivery (regardless of the type of the health facility: private or public): response was coded 1 if a woman delivered at a health facility (private or public) and 0 otherwise. The second outcome distinguished private health facility deliveries from public health facility ones: response was coded 1 if a woman delivered at home, 2 if she delivered at a public health facility and 3 if she delivered at a private health facility. Among the 9,111 most recent deliveries, most (76.3%) took place at public health centers, 10.9% at private health centers, and 12.8% was non-institutional deliveries.

Independent variables and measurement

The study draws correlates from most important theoretically relevant and objectively measurable variables identified in the literature review and available in our datasets. They were mother's age at delivery (less than 18, 19-24, 25-29, 35-49), mother's education attainment (none, primary, and secondary or above), religion (Traditional, Christian, Muslim and no-religion), ethnicity (Fon, Adja, Bariaba, Betamaribe, Dendi, Peulh, Yoa, Yoruba, and other ethnicity), number of living children (0-2 children, 3-5 children, and 6 or more), birth history number (first, 2-5, and 6 or more), ANC frequency during the pregnancy (none, less than 4 visits, 4 or more visits), the desire of the pregnancy (wanted then, wanted later, wanted no more), number of co-wives (none, one, two or more, and not in union), frequency of listing to radio, frequency of watching TV, and frequency of reading newspapers coded each as "not at all", "less than once a week", and "at least once a week". Other covariates were mothers' perception of the distance to get to the nearest health facility (big problem, and not a big problem), household wealth index (poorest, poorer, middle, richer, and richest), sex of household head (male, female), main health decision maker (respondent alone, respondent with someone else), area of residence (North east, North west, Centre, Southern), and place of residence (rural, urban). For the area of residence, the following consolidation was considered: North east (Borgou + Alibori), North west (Atacora + Donga), Centre (Zou + Collines + Couffo + Plateau), Southern (Atlantique + Littoral + Mono + Oueme). Regarding the place of residence, the two categories considered (urban and rural) were those officially recognized and initially recorded in the datasets. However, results were presented by combining selected independent variables into mains groups: group 1 = maternal characteristics, group 2 = history of pregnancies, group 3 = surrounding environment, group 4 = mass media exposure (see Table 1).

Methods and analytical approach

Data analysis was conducted at three levels that is: univariate, bivariate and multivariate. The univariate involved the use of percentages to describe the study population according to the selected variables. Bivariate analysis involved cross-tabulation and use of Pearson chi-square test to examine association between health facility delivery (first outcome) and each of the independent variables. Unadjusted Odds Ratios and 95% confidence interval (CI) were also computed for facility delivery and each of selected characteristics. Multivariate analyses relied on the use of binomial logistic regression (for the first outcome: institutional delivery) and multinomial regression (for the second outcome) to assess similarities and differences in factors associated to a private vs a public health facility delivery. Binomial logistic regression included all variables while multinomial regression was based only on the most important covariates for institutional delivery analysis drawn from the best model chose by the AIC in a stepwise algorithm. Adjusted odds ratios with their corresponding 95% confidence intervals (95% CI) were computed. A p-value < 0.05 was considered statistically significant in this study. Statistical analyses were computed using the software R version 3.3.1 (2016-06-21) for MacBook.

To assess some of the study premises namely the association between female economic background and her marital status on one hand and the association between female economic status and her ANC frequency on another hand, and make the analysis more robust, interaction terms were added between household wealth index and ANC frequency and between number of other co-wives and household wealth index in all regression models performed.

Ethical Considerations

The International Review Board of Macro International and the "Comité National d'Ethique pour la Recherche en Santé (CNERS)" of Republic of Benin approved fourth BDHS's tools before the survey was conducted. Participations was voluntary and respondents give their consent preceding the interview. DHS data are freely attainable through DHS MEASURE website and there is no need for ethical approval before using this data. Thus, DHS data can be downloaded from the website and is free to use by researchers for further analysis. In order to access data from DHS MEASURE website, a written request was submitted to DHS MACRO and permission was granted.

Results

Sample characteristics and unadjusted odds ratios for institutional delivery

Table 1 presents study population description based on selected characteristics. It also shows unadjusted Odds Ratios of each of the independent variables for delivery in a health facility (regardless of the kind of health center: private or public). Among 16,599 women interviewed during the fourth BDHS of 2011-2012; 9,111 were eligible for the present study with 100% response rate for each selected variable. Women eligible for the current studies were those who have completed at least one pregnancy within the preceding 5 years of the survey. Most recent deliveries were considered. The average age of mothers at the birth of their youngest child was 27.8 years (27.7 years and 28.3 years for public and private health facility delivery respectively). Most (72.8%) mothers were uneducated, living in rural areas (62.2%), headed in majority (88%) by men, declared to be Christian (55.3%) and from the majority` ethnic group (42.1%) of the country (Fon). Two out of five mothers had two or less living biological children while most (63.2%) of their youngest children were between 2 and 5 years. About twenty percent of their last completed pregnancies were untimed (13.6% was wanted later and 7.0% was wanted no more). More than half (59.8%) of mothers were in monogamous union while 6.6% were not in union. More than half (59.8%) of mothers declared not watching television (TV) at all, 39.0% did not listen to radio at all and 92.0% for no newspapers/magazines reading. During the pregnancy of their youngest children, 61.1% of mothers received at least four recommended ANC visits. With regards to the place of delivery, most (76.3%) mothers gave birth to their youngest children in a public health facility, 10.9% in a private health facility and the rest were non-institutional.

However, regarding the distribution of the sample across the kind of health facility delivery based selected characteristics, among others, some remarks can be made: the proportion of delivery in a private health facility increases with women's education (from 7.4% among uneducated to 25.3% among most educated). In addition, the unadjusted odds ratios support this evidence. Similar results were observed with other covariates such as household wealth index, the frequency of listening to radio, watching TV and reading newspapers/magazines, and frequency of ANC visits during pregnancy. Overall, except "desire for pregnancy", the unadjusted Odds Ratio (OR) of selected covariates confirm the expectations regarding the association of each independent variable with a facility delivery. Indeed, surprisingly, untimed pregnancies seemed more likely to be delivered in a health facility.

Table 1 : Study population description by selected characteristics and unadjusted Odds Ratios
(n=9,111): <u>Maternal characteristics</u>

Variable	Univariate analysis: Total sample n (%)	Bivariate analysis		
		Public health facility delivery[Υ] n=6,948 (76.3%) n (%)	Private health facility delivery[Υ] n=998 (12.8%) n (%)	Odds Ratio (95% CI)[τ]
Mother's age at the birth of the child	Mean: 27.8 years (sd=6.4)	Mean: 27.7 years (sd=6.4)	Mean=28.3 years (sd=6.3)	
Less than 18	516 (5.7)	421 (81.6)	35 (6.8)	1.2 (0.9-1.6)
19-24	2,532 (27.8)	1,959 (77.4)	273 (10.8)	1.2 (0.9-1.4)
25-29	2,678 (29.4)	2,026 (75.6)	296 (11.0)	1.0 (0.8-1.2)
30-34	1,885 (20.7)	1,415 (75.1)	215 (11.4)	1.00
35-49	1,500 (16.5)	1,127 (75.1)	179 (11.9)	1.0 (0.8-1.3)
Mother's education attainment				
No education	6,632 (72.8)	5,038 (75.9)	490 (7.4)	1.00
Primary	1,451 (15.9)	1,152 (79.4)	248 (17.1)	5.5 (4.2-7.4)**
Secondary or above	1,028 (11.3)	758 (73.7)	260 (25.3)	20.3 (11.5-40.8)**
Religion				
Traditional	1,291 (14.2)	992 (76.8)	91 (7.0)	1.00
Christian	5,040 (55.3)	4,016 (79.7)	752 (14.9)	3.4 (2.8-4.1)**
Muslim	2,294 (25.2)	1,573 (68.6)	133 (5.8)	0.6 (0.5-0.7)**
No religion	486 (5.3)	3 67 (75.5)	22 (4.5)	0.8 (0.6-1.0)*
Ethnicity				
Fon	3,831 (42.05)	3,108 (81.13)	616 (16.08)	1.00
Adja	1,366 (14.9)	1,107 (81.0)	163 (11.9)	0.4 (0.3-0.5)**
Bariba	891 (9.8)	633 (71.0)	24 (2.7)	0.08 (0.1-0.1)**
Betamaribe	743 (8.2)	517 (69.6)	24 (3.2)	0.08 (0.0-0.1)**
Dendi	352 (3.8)	253 (71.9)	26 (7.4)	0.11 (0.0-0.2)**
Peulh	421 (4.6)	182 (43.2)	3 (0.7)	0.02 (0.02-0.03)**
Yoa	355 (3.9)	247 (69.6)	18 (5.1)	0.08 (0.06-0.12)**
Yoruba	992 (10.9)	785 (79.1)	94 (9.5)	0.2 (0.17-0.29)**
Other	160 (1.7)	116 (72.5)	30 (18.7)	0.3 (0.17-0.56)**
Household wealth index				
Poorest	2,027 (22.2)	1,377 (67.9)	86 (4.2)	1.00
Poorer	1,944 (21.3)	1,519 (78.1)	99 (5.1)	1.9 (1.6-2.2)**
Middle	1,935 (21.2)	1,574 (81.3)	141 (7.3)	3.0 (2.5-3.6)**
Richer	1,775 (19.5)	1,487 (83.8)	242 (13.6)	14.5 (10.8-19.9)**
Richest	1,430 (15.7)	991 (69.3)	430 (30.1)	60.9 (33.4-127.6)**
Place of delivery				
Home	1,165 (12.8)			
Public health facility	6,948 (76.3)			
Private health facility	998 (10.9)			

[Υ] The percentages in these two columns are row percentages, that is 81.59% for women whose age is below 18 years is derived by dividing the column's 'n' (421 and 35 in this case for public health and private health facility delivery respectively) by the 'n' under sample distribution, that is column for total sample distribution (which is n=516 in this case). Thus, 81.59=421*100/516 and 6.78=35*100/516

[τ]Unadjusted OR (95% CI) presented was that of institutional delivery (1 if a woman delivers in a health facility: either private or public health, and 0 otherwise)

* and ** indicate statistical significance at 5% and 1% respectively.

Source: Data mining – BDHS 2011/2012

Table 1 : (continued): History of pregnancies

| Variable | Univariate analysis: Total sample n (%) | Bivariate analysis | | |
		Public health facility delivery[Y] n=6,948 (76.26%) n (%)	Private health facility delivery[Y] n=998 (12.79%) n (%)	Odds Ratio (95% CI)[τ]
Number of living children				
0-2	3,660 (0.7)	2,825 (77.2)	463 (12.6)	1.00
3-5	4,217 (58.3)	3,200 (75.9)	442 (10.5)	0.7 (0.6-0.8)**
6 or more	1,234 (34.6)	923 (74.8)	93 (7.5)	0.5 (0.4-0.6)**
Pregnancy desired				
Wanted then	7,240 (79.5)	5,506 (76.0)	746 (10.3)	1.00
Wanted later	1,237 (13.6)	974 (78.7)	157 (12.7)	1.7 (1.4-2.1)**
Wanted no more	634 (6.9)	468 (73.8)	95 (14.9)	1.2 (0.9-1.6)*
Birth history number				
First	1,676 (18.4)	1,307 (77.9)	215 (12.8)	1.00
2-5	5,760 (63.2)	4,381 (76.1)	639 (11.1)	0.7 (0.6-0.8)**
6 or more	1,675 (18.4)	1,260 (75.2)	144 (8.6)	0.5 (0.4-0.6)**
ANC frequency				
Poor ANC history (0-3)	3,541 (38.9)	2,431 (33.7)	207 (20.7)	1.00
Good ANC history (4+ visits)	5,570 (61.1)	4,607 (66.3)	791 (79.3)	12.2 (10.4-14.5)**

[Y] The percentages in these two columns are row percentages, that is 81.59% for women whose age is below 18 years is derived by dividing the column's 'n' (421 and 35 in this case for public health and private health facility delivery respectively) by the 'n' under sample distribution, that is column for total sample distribution (which is n=516 in this case). Thus, 81.59=421*100/516 and 6.78=35*100/516

[τ] Unadjusted OR (95% CI) presented was that of institutional delivery (1 if a woman delivers in a health facility: either private or public health, and 0 otherwise)

* and ** indicate statistical significance at 5% and 1% respectively.

Source: Data mining – BDHS 2011/2012

Table 1 : (continued): Surrounding environment variables

| Variable | Univariate analysis: Total sample n (%) | Bivariate analysis | | |
		Public health facility delivery[Y] n=6,948 (76.26%) n(%)	Private health facility delivery[Y] n=998 (12.79%) n(%)	Odds Ratio (95% CI)[τ]
Place of residence				
Rural	5,670 (62.2)	4,422 (77.9)	360 (6.3)	1.00
Urban	3,441 (37.8)	2,526 (73.4)	638 (18.5)	2.1 (1.8-2.4)**
Area				
Southern	3,406 (37.4)	2,677 (38.5)	675 (67.6)	1.00
Centre	2,828 (31.0)	2,334 (33.6)	232 (23.2)	0.16 (0.12-0.21)**
North East	1,423 (15.0)	909 (13.1)	46 (4.6)	0.03 (0.02-0.04)**
North West	1,454 (16.0)	1,028 (14.8)	45 (4.5)	0.05 (0.03-0.06)**
Number of other co-wives				
None (0)	5,449 (59.8)	4,213 (77.3)	652 (11.9)	1.00
One	2,167 (23.8)	1,608 (74.2)	185 (8.5)	0.6 (0.5-0.7)**
Two or more	891 (9.8)	671 (75.31)	80 (8.9)	0.6 (0.5-0.8)**
Not in union	604 (6.6)	456 (75.5)	81 (13.4)	0.9 (0.7-1.3)
Perception of the distance to get to health facility				
Big problem	4,305 (47.2)	3,209 (74.5)	320 (7.4)	1.00
Not a big problem	4,806 (52.7)	3,739 (77.8)	678 (14.1)	2.5 (2.2-2.8)**

[Y] The percentages in these two columns are row percentages, that is 81.59% for women whose age is below 18 years is derived by dividing the column's 'n' (421 and 35 in this case for public health and private health facility delivery respectively) by the 'n' under sample distribution, that is column for total sample distribution (which is n=516 in this case). Thus, 81.59=421*100/516 and 6.78=35*100/516

[τ] Unadjusted OR (95% CI) presented was that of institutional delivery (1 if a woman delivered in a health facility: either private or public health, and 0 otherwise)

* and ** indicate statistical significance at 5% and 1% respectively.

Source: Data mining – BDHS 2011/2012

Table 1 : (continued): Mass media exposure

Variable	Univariate analysis: Total sample n (%)	Bivariate analysis		
		Public health facility delivery[ʏ] n=6,948 (76.26%) n (%)	Private health facility delivery[ʏ] n=998 (12.79%) n (%)	Odds Ratio (95% CI)[τ]
Frequency of listening to radio				
Not at all	3,575 (39.2)	2,654 (74.2)	274 (7.6)	1.00
Less than one a week	1,807 (19.8)	1,401 (77.5)	168 (9.3)	1.5 (1.2-1.7)**
At least once a week	3,729 (40.9)	2,893 (77.6)	556 (14.9)	2.7 (2.3-3.1)**
Frequency of watching TV`				
Not at all	5,451 (59.8)	4,065 (74.6)	344 (6.3)	1.00
Less than one a week	1,244 (13.6)	1,037 (83.4)	128 (10.3)	3.5 (2.8-4.4)**
At least once a week	2,416 (26.5)	1,846 (76.4)	526 (21.8)	12.7 (9.5-17.5)**
Frequency of reading newspapers				
Not at all	8,424 (92.5)	6,448 (76.5)	824 (9.8)	1.00
Less than one a week	308 (3.4)	226 (73.4)	73 (23.7)	5.3 (2.9-11.1)**
At least once a week	379 (4.2)	274 (72.3)	101 (26.6)	14.8 (6.3-48.1)**
Sex of household head				
Male	7,920 (86.93)	5,993 (75.67)	839 (10.59)	1.00
Female	1,191 (13.07)	955 (80.18)	159 (13.35)	2.3 (1.83-2.95)**
Main health decision maker				
Respondent alone	1,056 (11.6)	758 (71.8)	116 (10.9)	1.00
Respondent with someone else	8,055 (88.4)	6,190 (76.8)	882 (10.9)	1.5 (1.2-1.8)**

[ʏ] The percentages in these two columns are row percentages, that is 81.59% for women whose age is below 18 years is derived by dividing the column's 'n' (421 and 35 in this case for public health and private health facility delivery respectively) by the 'n' under sample distribution, that is column for total sample distribution (which is n=516 in this case). Thus, 81.59=421*100/516 and 6.78=35*100/516

[τ] Unadjusted OR (95% CI) presented was that of institutional delivery (1 if a woman delivers in a health facility: either private or public health, and 0 otherwise

* and ** indicate statistical significance at 5% and 1% respectively.

Source: Data mining – BDHS 2011/2012

Determinants of institutional delivery preference among reproductive age mothers

Table 2 shows outputs of logistic and multinomial regressions of institutional deliveries. The best model of institutional delivery based on AIC in a stepwise algorithm is also presented. The underlying estimated model is the same in both of these results and the interpretations are the same except the difference in the outcomes. The adjusted odds ratios (for binomial logistic regression) and the adjusted relative risk ratios (for multinomial logistic regression) compare outcomes across the different categories of institutional delivery, indicating how the probability of a woman of giving birth in particular health facility – such as in private health facility or in a public health facility – are determined by the explanatory variables, relative to being in the base category of delivering outside health facility (home delivery).

When the adjusted odds ratio (aOR) or the adjusted relative risk ratio (aRRR) estimated for a specific combination of a particular institutional delivery (private or public health facility or both) and explanatory variable is close to 1, the variable does not have any effect of changing the probability of giving birth in that health facility category, compared with giving birth in the base category – outside health facility. Variables that increase the probability (aOR or aRRR) of delivering in a specific health facility category (compared to outside health facility delivery) will have aOR or aRRR significantly greater than 1. Variables that lower the relative probability of giving birth in a particular health facility category (compared to outside health facility delivery) will have an aOR or aRRR significantly less than 1.

Except the age of mothers at the birth of their youngest children (p-value = 0.3), all other variables were significantly associated with institutional delivery at bivariate level using binomial logistic regression. Thus, the age of mothers at delivery was not included in the multivariate analyses. Out of 17 variables included in the logistic regression model, 13 were found to be important for institutional (either public or private health facility) delivery analysis at the end of AIC stepwise algorithm application and then included in the multinomial regressions. These were: Education attainment, religion, ethnicity, household wealth index, pregnancy desire, ANC frequency, place of residence, area, marital status, perception to the distance to get to health facility, frequency of watching TV, main decision maker and sex of household head. Covariates which were not important for institutional delivery analysis were: number of living children, birth history number, the frequency of reading newspapers, frequency of listening to radio. They were excluded in the multinomial regression model. The best model including just all important variables from the AIC stepwise algorithm confirmed the least role played by these variables. The AIC coefficients were almost equal for both initial and the best models. Additionally, the odds ratios for the covariates considered for the best model did not significantly differ from those obtained from the initial model, confirming the less role played by the variables known as not important from the initial model. All covariates of the best model included in the multinomial regression were statistically significant as in the initial model.

The main assumption of the study is confirmed. Educational attainment and household wealth index appeared to be among the most significant deterrents for institutional delivery especially for a private health facility delivery. The probability of giving birth in a private health facility delivery was far higher than that of a public health facility among the more educated (secondary or above) and richest women.

However, the study premises assessed by adding interaction terms were not statistically significant either in the binomial logistic or multinomial regression models. The study's assumptions postulating that polygamous is associated with low socio-economic background on one hand and that ANC frequency is associated with women's wealth index are inconsistent. Indeed, results showed no statistically significant association in the interaction terms between ANC frequency and the economic background. The interaction term between economic background and marital status showed a significant variation in the odds of institutional delivery among women from the middle wealth index. An increase in the number of co-wives in a union with a middle household wealth index decreases female's chance of having institutional delivery, compared to their counterpart from the poorest households and without co-wife.

Positive and linear relationships (either in binomial logistic regression model or multinomial regression model) were noted with mothers' education and household wealth index. Results from multinomial regression clarified potential similarities and differences among factors behind private vs public health facilities deliveries. For instance, the influence of mother's education attainment is much clearer at home vs private health facility delivery compared with public health facility deliveries. Increasing female education and household wealth index increases institutional deliveries (either public or private health facility or both combined). The ANC history, household wealth index and female education attainment were found as the most important determinants for institutional delivery after adjusting for other covariates and controlling for potential interaction terms. Mothers with good ANC history (meeting the recommended 4 ANC visits or more) during pregnancy were 6.0 times (6.1 times for a public health facility delivery and 5.1 times for a private health facility delivery) more likely to deliver in health facility compared to those with poor ANC history (less than 4 ANC visits). Mothers living in the richest households were about 7.0 times (6.4 times for public health

facility, and 10.3 times for private health facility) to have a facility delivery compared to those living in the poorest households. Educated mothers (secondary or above) were 4 times (3.9 for public health facility and 5.7 for private health facility) more likely to deliver at the facility relative to uneducated mothers. In addition to good ANC history, household wealth index, and female education attainment, the residences in urban area were found to have a positive impact for institutional delivery especially at private center. The probability of institutional delivery was 20% (for public health facility) and 100% (for private health facility) higher for mothers living in urban area relative to mothers who were living in rural area.

Christians and to a lesser extent Muslims were more likely to deliver at a health facility even though the differences were not statistically different. Ethnic differences were also shown. Living in urban area increases the odds for institutional delivery especially for a private health facility delivery. Also, in the area of Littoral (which comprised Cotonou, the most urbanized area of the country) the odds of institutional delivery were higher than everywhere in the country. Women in households headed by a female were also more likely to have institutional delivery. On the other hand, those who were not in union (unmarried or separated/divorced) were less likely to have institutional delivery compared with their counterpart living in monogamous union. Their probability of institutional delivery was 30% lower than that of their counterpart living in monogamous union. Mass media exposure regular television increases the chances of institutional delivery. Mothers watching TV at least once were 1.7 times (1.8 times for public health facility and 1.9 times) more likely to have institutional delivery. Against all expectations, mothers who perceived the distance to reach the nearest health facility as a big problem were more likely to have a facility delivery.

Table 2 : Adjusted Odds Ratio (aOR) and adjusted Relative Risk Ratio (aRRR) of institutional delivery preference: maternal characteristics

Variable (*Reference*)	Logistic regression (LR)	LR, best model	Multinomial regression	
	Home vs Institutional[a]	Home vs Institutional[b]	Home vs Public[c]	Home vs Private[d]
Mother's education attainment (No education)				
Primary	1.9 (1.3-2.6)**	1.7 (1.3-2.4)**	1.7 (1.2-2.4)**	2.2 (1.5-3.1)**
Secondary or above	4.8 (2.3-10.8) **	3.9 (2.1-8.1)**	3.9 (2-7.6)**	5.7 (2.8-11.5)**
Religion (Traditional)				
Christian	1.8 (1.4-2.3) **	1.8 (1.4-2.3)**	1.8 (1.4-2.3)**	1.9 (1.4-2.7)**
Muslim	1.6 (1.2-2.2) **	1.6 (1.2-2.2)**	1.6 (1.2-2.2)**	1.6 (1-2.6)
No religion	1.1 (0.8-1.5)	1.1 (0.8-1.5)	1.1 (0.8-1.6)	0.7 (0.4-1.2)
Ethnicity (Fon)				
Adja	0.6 (0.4-0.8)**	0.6 (0.4-0.8)**	0.6 (0.4-0.8)**	0.5 (0.4-0.8)**
Bariba	0.3 (0.2-0.5)**	0.3 (0.2-0.5)**	0.3 (0.2-0.5)**	0.1 (0.1-0.3)**
Betamaribe	0.4 (0.3-0.7)**	0.4 (0.3-0.7)**	0.4 (0.3-0.7)**	0.4 (0.2-0.9)*
Dendi	0.3 (0.2-0.5)**	0.3 (0.2-0.5)***	0.3 (0.2-0.5)**	0.3 (0.1-0.6)**
Peulh	0.1 (0.1-0.2)**	0.1 (0.1-0.2)**	0.1 (0.1-0.2)**	0 (0-0.1)**
Yoa	0.3 (0.2-0.6)**	0.3 (0.2-0.5)**	0.3 (0.2-0.5)**	0.3 (0.1-0.7)**
Yoruba	0.4 (0.3-0.6)**	0.4 (0.3-0.5)**	0.4 (0.3-0.6)**	0.3 (0.2-0.4)**
Autres	0.4 (0.2-1)*	0.4 (0.2-1)*	0.4 (0.2-0.9)*	0.4 (0.2-1.1)
Household wealth index (Poorest)				
Poorer	1.5 (1.2-2)**	1.5 (1.2-2)**	1.6 (1.2-2)**	1.2 (0.7-2.2)
Middle	1.9 (1.4-2.7)**	1.9 (1.4-2.6)**	1.9 (1.4-2.7)**	1.5 (0.8-2.8)
Richer	4.2 (2.6-7.1)**	4.1 (2.5-7)**	4.2 (2.5-7)**	4.6 (2.3-9.2)**
Richest	7 (2.2-32.5)**	6.9 (2.2-31.5)**	6.4 (1.7-23.3)**	10.3 (2.6-41.4)**

(a): logistic regression including all covariates
(b): logistic regression of the best model chose by AIC stepwise algorithm
(c) (d): multinomial regression including only covariates of the best model chose by AIC stepwise algorithm
* and ** indicate statistical significance at 5% and 1% respectively.

Source: Data mining – BDHS 2011/2012

Table 2: (continued); History of pregnancies

Variable (*Reference*)	Logistic regression (LR)	LR, best model	Multinomial regression	
	Home vs Institutional[a]	Home vs Institutional[b]	Home vs Public[c]	Home vs Private[d]
Number of living children (0-2)				
3-5	1 (0.8-1.2)			
6 or above	0.8 (0.5-1.2)			
Pregnancy desired (Wanted then)				
Wanted later	1.4 (1.1-1.8)*	1.4 (1.1-1.8)*	1.4 (1.1-1.8)*	1.4 (1-1.9)*
Wanted no more	1.2 (0.9-1.7)	1.3 (0.9-1.8)	1.2 (0.9-1.7)	1.7 (1.2-2.5)**
Birth history number (First: 1)				
2-5	0.9 (0.7-1.2)			
6 or more	1.2 (0.8-1.9)			
ANC frequency (Poor ANC history)				
Good ANC history	6 (4.5-8.1)**	6 (4.5-8.1)**	6.1 (4.6-8.2)**	5.1 (3.1-8.6)**

(a): logistic regression including all covariates
(b): logistic regression of the best model chose by AIC stepwise algorithm
(c) (d): multinomial regression including only covariates of the best model chose by AIC stepwise algorithm
* and ** indicate statistical significance at 5% and 1% respectively.

Source: Data mining – BDHS 2011/2012

Table 2: (continued); Surrounding environment variables

Variable (*Reference*)	Logistic regression (LR)	LR, best model	Multinomial regression	
	Home vs Institutional[a]	Home vs Institutional[b]	Home vs Public[c]	Home vs Private[d]
Place of Residence (Rural)				
Urban	1.2 (1-1.5)*	1.2 (1-1.5)*	1.2 (1-1.5)*	2.1 (1.6-2.7)**
Area (Southern)				
Centre	0.3 (0.2-0.4)**	0.3 (0.2-0.4)**	0.3 (0.2-0.5)**	0.2 (0.1-0.3)**
North East	0.2 (0.1-0.4)**	0.2 (0.1-0.4)**	0.2 (0.1-0.4)**	0.1 (0.1-0.2)**
North West	0.2 (0.1-0.4)**	0.2 (0.1-0.4)**	0.2 (0.1-0.4)**	0.1 (0-0.1)**
Number of other co-wives (None: 0)				
One	1 (0.8-1.3)	1 (0.8-1.3)	1 (0.8-1.3)	0.9 (0.5-1.7)
two or more	0.9 (0.6-1.4)	0.9 (0.6-1.4)	0.9 (0.6-1.4)	1 (0.4-2.3)
Not in union	0.5 (0.3-0.9)*	0.5 (0.3-0.9)*	0.7 (0.4-1.1)*	0.7 (0.2-1.9)
Perception of the distance to get to health facility (Not a big problem)				
Big problem	1.3 (1.1-1.5)**	1.3 (1.1-1.5)**	1.3 (1.1-1.5)**	1.6 (1.3-2)**

(a): logistic regression including all covariates
(b): logistic regression of the best model chose by AIC stepwise algorithm
(c) (d): multinomial regression including only covariates of the best model chosen by AIC stepwise algorithm
* and ** indicate statistical significance at 5% and 1% respectively.

Source: Data mining – BDHS 2011/2012

Table 2: (Continued); Mass media exposure and health decision making

Variable (*Reference*)	Logistic regression (LR)	LR, best model	Multinomial regression	
	Home vs Institutional[a]	Home vs Institutional[b]	Home vs Public[c]	Home vs Private[d]
Frequency of listening to radio (Not at all)				
Less than one a week	0.9 (0.8-1.2)			
At least once a week	0.9 (0.7-1.1)			
Frequency of watching TV (Not at all)				
Less than one a week	1.4 (1.1-1.9)*	1.4 (1-1.8)*	1.4 (1-1.9)*	1.4 (1-2)
At least once a week	1.9 (1.3-2.7)**	1.7 (1.2-2.5)**	1.8 (1.2-2.6)**	1.9 (1.2-2.9)**
Main health decision maker (Respondent alone)				
Respondent with someone else	1.8 (1.4-2.2)**	1.8 (1.4-2.2)**	1.7 (1.3-2.1)**	1.8 (1.3-2.4)**
Frequency of reading newspaper (Not at all)		-		
Less than one a week	0.5 (0.2-1.2)	-		
At least once a week	0.8 (0.3-2.9)	-		
Sex of household head (Male)				
Female	1.5 (1.1-2.1)*	1.5 (1.1-2.1)	1.5 (1.1-2.1)*	1.5 (1.0-2.2)*

(a): logistic regression including all covariates
(b): logistic regression of the best model chose by AIC stepwise algorithm
(c) (d): multinomial regression including only covariates of the best model chose by AIC stepwise algorithm
* and ** indicate statistical significance at 5% and 1% respectively.

Source: Data mining – BDHS 2011/2012

Table 2: (Continued); Interaction terms

Variable (*Reference*)	Logistic regression (LR)	LR, best model	Multinomial regression	
	Home vs Institutional[a]	Home vs Institutional[b]	Home vs Public[c]	Home vs Private[d]
Wealth Index*Number of other co-wives				
One*Poorer	0.9 (0.6-1.3)	0.8 (0.6-1.3)	0.8 (0.6-1.3)	0.9 (0.4-2)
Two or more*Poorer	0.9 (0.5-1.7)	0.9 (0.5-1.7)	0.9 (0.5-1.7)	1.2 (0.4-3.7)
Not in Union*Poorer	2.1 (0.9-4.8)	2.1 (0.9-4.8)	2 (0.9-4.4)	2.4 (0.6-10.4)
One*Middle	0.6 (0.4-0.9)*	0.6 (0.4-0.9)*	0.6 (0.4-0.9)*	0.7 (0.3-1.5)
Two or more*Middle	0.5 (0.3-0.9)*	0.5 (0.3-0.9)*	0.5 (0.3-0.9)*	0.4 (0.1-1.3)
Not in Union*Middle	2.7 (1-9.1)	2.7 (1-9)	2.5 (0.8-7.5)	3.7 (0.8-17.5)
One*Richer	1 (0.5-2.2)	1 (0.5-2.2)	1 (0.5-2.2)	1.4 (0.5-3.7)
Two or more*Richer	0.9 (0 .3-2.7)	0.9 (0.3-2.8)	0.9 (0.3-2.5)	1.2 (0.3-4.6)
Not in Union*Richer	1.6 (0.4-10.7)	1.6 (0.4-10.9)	1.5 (0.3-7.2)	1.5 (0.2-9.6)
One*Richest	1.1 (0.2-7.9)	1.1 (0.2-7.5)	1.1 (0.2-5.5)	1.3 (0.2-7.6)
Two or more*Richest	99+ (99+-1000+)	99+ (99+-1000+)	99+ (99+-1000+)	99+ (99+-1000+)
Not in Union*Richest	0.7 (0.1-13.9)	0.7 (0.1-13.1)	0.6 (0.1-5.9)	0.6 (0.1-6.8)
Wealth Index*ANC frequency				
Good ANC History*Poorer	0.9 (0.6-1.4)	0.9 (0.6-1.4)	0.9 (0.6-1.4)	1.2 (0.6-2.4)
Good ANC History*Middle	1.3 (0.8-2.2)	1.3 (0.8-2.2)	1.3 (0.8-2.1)	2.1 (1-4.6)
Good ANC History*Richer	0.8 (0.4-1.6)	0.8 (0.4-1.6)	0.7 (0.4-1.5)	1 (0.4-2.5)
Good ANC History*Richest	0.3 (0.1-1.4)	0.3 (0.1-1.4)	0.3 (0.1-1.4)	0.5 (0.1-2.5)

(a): logistic regression including all covariates
(b): logistic regression of the best model chose by AIC stepwise algorithm
(c) (d): multinomial regression including only covariates of the best model chose by AIC stepwise algorithm
* and ** indicate statistical significance at 5% and 1% respectively.

Source: Data mining – BDHS 2011/2012

Discussion

The current study examined factors influencing institutional facility based delivery among reproductive age mothers in the Republic of Benin. Relative to other sub-Saharan African countries, the prevalence of facility based delivery in Benin Republic (87%) is greater than that reported in Senegal "78%" (Faye et al., 2011) and Uganda "83%" (Tann et al., 2007).The fact that in Benin Republic nearly 13% of all pregnant women still give birth outside a health facility suggests that current strategies fall short of reaching all pregnant women and that there is still room for improvement to ensure every birth takes place in a safe environment and receive required interventions.

Unadjusted descriptive results based on Pearson chi-square test and logistic regression models confirmed all expected outputs regarding the association between each variable and institutional delivery. At the multivariate level, most findings from the current study corroborate with those earlier ones. In alignment with past studies from sub-Saharan Africa (Amano et al., 2012; Pervin et al., 2012; Kitui et al., 2013; Ono et al., 2013; Mazalale et al., 2015; Shehu et al., 2016), the present study found a positive and linear relationship between facility based delivery and covariates pertaining to woman's education, and the household wealth index. Additionally, the present study found that these two covariates were among the most decisive factors behind the preference for private health facility delivery. Better educated mothers and those living in wealthy households were more likely to give birth in a private health facility than public health facility. The positive impact of wealth on institutional delivery may be attributed to the fact that household wealth index is considered as a key indicator of the level of access to goods and services. The correlation between wealth and health is well documented. In general, ill health and poverty are closely linked, with the cause-and-effect running in both directions (SIDA, 2002). Moreover, there is a considerable evidence that individuals and families in low-income groups are particularly strained by ill health (NPDHS, 2015).

Educational attainment has a positive impact, and is a key to access knowledge and information, and sometimes associated with wealth generation. Educated mothers may be more likely to be well informed about the importance and advantages of a facility delivery. Evidences show that education has important social impacts (even causal impacts) on health. It was discovered that education is strongly linked to health and to determinants of health such as health behaviors (Feinstein et al., 2006). It influences health through its use and lifestyle changes. Further, education has a positive impact on employment, social behaviors and attitudes, and personal behaviors and attitudes which in turn influence use of healthcare services (Higgins et al., 2008). Furthermore, even if the correlation is not a causation, education is also found to have a strong correlation with money (Boshara et al., 2015).

However, the conclusive role played by these two covariates (household wealth index and female education) for the preference of private or public health facility may be attributed to their differences in terms of quality of care, cost of services and health workers' attitude toward patients/users. Private health facility delivery may be more expensive but with good quality of care and good health practitioners' attitude towards users relative to public health facility. However, BDHS does not collect data on the actual level of satisfaction of mothers during delivery, more research may be required to understand the reasons behind mothers' preference for the type of health facility during pregnancy and childbirth. However, a study using mixed method design in north Uganda showed that poor quality of care constituted a key barrier to health facility delivery. A number of respondents described their fear or past experience of being hurt, shamed, humiliated, or treated negligently at the hands of health

workers (Anastasi et al., 2015). Moreover, utilization of private health services is seen as an index of wealth and status (Kesterton et al., 2010).

Woman's health behavior during pregnancy (ANC frequency) was also found to have a positive impact on institutional delivery. This finding was supported by past studies elsewhere (Amano et al., 2012; Pervin et al., 2012; Kitui et al., 2013; Ono et al., 2013; Mazalale et al., 2015; Shehu et al., 2016). This may be attributed to the fact that pregnant women who attended ANC check-ups in a health facility were attended by skilled personnel, who may encourage and educate them on the benefits of a facility delivery. However, BDHS does not collect data on whether mothers attending ANC received skilled personnel counselling and education on the importance and benefits of a facility delivery, further investigations may be needed to ensure the continuity of care during pregnancy and childbirth. Moreover, there is considerable evidence on the benefits of ANC attendance and its key role in future health facility attendance. Good care during pregnancy is important for the development of the mother and her unborn baby. It links the woman and her family with the formal health system and encourages her to access health services regularly (Lincetto et al., 2006).

The current findings show that a facility delivery is associated with women's marital status as confirmed by past studies (Ono et al., 2013; Mazalale et al., 2015). Here, women who were not in union (single or separate/divorced) were more likely to deliver outside a health facility compared with their counterparts in a monogamous union. The differences between those in monogamous and polygamous unions were not statistically visible. This contradicts the present study's expectations. In Benin, polygyny is commonly practiced by the least educated and least economically off groups. The study suggests a lower institutional delivery probability among women living in polygynous unions. In addition, findings indicate that women who report that decisions concerning health issues are made jointly with someone else (including partner) have higher chances of giving birth in a health facility. Past studies also reported on the importance of joint decision making in accessing and using maternal health facility (Ganle et al., 2015). There are unequal gender relationships, namely those relating to within household decision making where women are the most disadvantaged.

It is surprising that the present findings indicate unexpected effects of covariates such as the desire for pregnancy and the perception of the distance to health facility. Women with unplanned pregnancies had a better chance of giving birth in a health facility. This finding is in direct contradiction to that of prior studies on maternal health services use (De-Banguirys et al., 2015) which showed a weak follow-up and outside facility delivery for unplanned pregnancies.

Women who point to the distance to reach the health facility as a big problem were more likely to have a facility based delivery. Though this factor is cited among the leading barriers to health facility use, it is still correlated with traditional beliefs as reported in the study context (WHO, 2009). WHO (2009) reported that though most (77%) Beninese live less than 5km from a health facility, they have a lower (44%) utilization rate. Perhaps cultural distance (cultural belief)'s influence is greater than physical distance regarding women's preference of the place of delivery. However, evidence from past studies could, explain this unexpected finding. It was discovered that rapid progression of labor with very little time to reach a facility was reported as the most common reason that led women to give birth at home (Lule & Mtitimila, 1993; Das et al., 2010). Under similar circumstances, those perceiving the distance to get to health facility as a big problem may be prepared to attend a facility early before they go into labor, especially when a regular ANC history forecasts the delivery time. This may also justify the present study's finding. However, more research, especially qualitative ones, may be needed to assess health facility accessibility and delivery process. Elsewhere, a comparative

study revealed that the emergency labor results in home births only in urban areas while in rural areas, distance to health facility was among the key deterrents (Shehu et al., 2016).

The present study also reported on ethnicity and religious differences as influencing choice of place for birth (Shehu et al., 2016). There is a need to address cultural barriers to health service use in Benin by strengthening health education and communication policies in this context. Christian and Muslim women had a higher probability to deliver in a health facility relative to their counterparts from the endogenous religion. Customarily, Christian religion is considered as an imported religion (from the West) based on Western culture (Nganawara, 2016) while Islamic religion provides Muslims with a code of conduct and behavior (Shehu et al., 2016) which support access to health service and use. Findings revealed to a lesser extent, Christian women had a higher probability to deliver in a private health facility. Religious health centers were among the top private health centers providing health care in Benin. There is also a considerable evidence pointing to the variation in health status, especially among children, based on religious membership (Chiswick & Mirtcheva, 2010). In terms of ethnicity, there is a lower probability of accessing health facility among some ethnic groups living in the Northern part of the country (the dominant ethnic groups are Bariba, Peuhl, Yoa). The Northern part is the least developed region with high spatial dispersion of the population rending health challenges difficult to meet. The present study also reported that women from the Northern region had a very low probability of giving birth at the private health centers, which are few and far between in that region.

The present study reported no significant relationship between exposure to mass media such as radio and newspaper and giving birth at a health facility. However, television programs related to healthcare had a positive impact on influencing women to choose delivery at a facility. Perhaps radio listeners were those of lower socioeconomic groups and less educated. Additionally, current health education as well as advertisements related to health care facilities are broadcast on the TV. Visual images impact us more than simply listening – "what you hear, you forget, what you see, you remember …" (Eker, 2005). This suggests the need to support population especially the poor in getting access to and use of TV. A possible starting point could be that of solving the issues of power supply in remote areas where most women live in poverty. Afterward, interventions may be directed to allow them to own a TV.

There is vital to address regional differences if facility delivery rates are to be improved to reduce maternal and early neonatal mortality in sub-Saharan Africa, as suggested by past studies (Moyer et al., 2013). The present study showed high spatial variation in the odds of facility-based delivery, especially in terms of private vs public health facility delivery. Relative to Littoral (Cotonou), the odds of a private health facility delivery were lower in most areas. In addition, women living in urban area had a higher probability to deliver in a health facility as previously reported (Amano et al., 2012; Mazalale et al., 2015; Shehu et al., 2016). The present study has shown that urban women had a higher chance of giving birth at a private health facility. This may be attributed to the concentration of health centers including private ones in urban areas.

Conclusion

The present study examined factors behind institutional delivery preference using data from BDHS conducted between 2011 and 2012. Binomial logistic regression and multinomial regression analyses were performed. A total of 13 variables were identified using a stepwise algorithm which were introduced in the multinomial regression. The study, somehow, clarified differences and similitudes between a private vs a public health facility delivery. It was discovered that woman's education and household wealth index were the most

important factors for institutional delivery preference. Well educated and economically well-off women were more likely to have institutional delivery, especially at private health facility. The ANC frequency visits during pregnancy were also an important deterrent for institutional delivery. There is a need to encourage ANC visits during pregnancy to ensure health facility delivery. However, the frequency of ANC visits combined with the effect of socioeconomic status on the use of facility based delivery suggest that the mere provision of services free of charge in case of caesarean section at point of use (in practice since 2009 in Benin Republic) is not sufficient to bring about the greatest impact.

Policy Recommendations

Given the positive impact of ANC frequency combined with the role of socioeconomic status on the use of facility based delivery, interventions (financial support to pregnant women and their family during pregnancy and delivery times or cancelling user fees) should ensure pregnant women have regular ANC visits. Additionally, educational policies must be strengthened and enforced to ensure girls complete at least secondary school education.

Study Limitations

In addition, to memory issues affecting data collected retrospectively as DHS ones, subjectivity of some questions constitutes limitations of the study. The study was limited to only the variables collected in BDHS and recorded in the data set. Factors that may affect or clarify institutional delivery preference but are not available in BDHS could not be examined. For instance, we do not know whether geographical barriers for a facility delivery were in terms of practicability of routes or distance separating health facility from households. Indeed, data on the actual distance to health facility or time to reach the health facility was not available. Due to cross-sectional nature of the survey, it was not possible to infer causality in the associations between the covariates and the outcomes assessed.

Suggestions for Further Research

Even though this study has clarified the underlying risk factors for institutional delivery preference, more research may be needed to:

- Understand reasons behind the preference of health facility for reproductive health services including birth.

- Understand whether counselling on the importance and benefits of facility delivery is provided during ANC visits in order to ensure continuity of care.

- Assess the level of satisfaction of women using a health facility for delivery.

- Assess health facility accessibility and delivery process in order to understand why mothers view distance to health facility as a big problem and how they prepare for delivery.

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