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Research Article

Factors associated with choice of place of delivery and number of children born at home among husbands in the health districts of Anié and Kéran in Togo

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Abstract

Introduction : A woman dies every two minutes from causes related to pregnancy or childbirth. One of the well-documented factors associated with maternal mortality is home delivery. Husbands play a significant role in determining the place of delivery for their spouses, and several factors influence this decision.

Objective : The aim of this study was to examine the factors associated with husbands' choice of place of delivery and those related to the number of children born at home under their responsibility in the health districts of Anié (Plateaux Region) and Kéran (Kara Region) in Togo.

Methodology : This was a cross-sectional study using a three-stage systematic sampling method.

Result : The results showed that the average age of the husbands was 32.18 ± 0.58 years, with the average age at marriage being 23.20 ± 0.24 years, and respective medians of 32 years and 23 years. Husbands aged between 22 and 40 years were the most frequently surveyed. The typical age range at which these male partners marry was between 19 and 28 years. The results of the linear analysis on the average number of home births by socio-professional characteristics showed that male partners with no formal education had the highest average number of home births (3.68±0.41), followed by those who had a religious marriage (3.66±0.66). The analysis revealed a correlation between the number of home births and the husband's age (p-value = 0.001) as well as between the number of home births and the age at marriage (p-value = 0.015), with a significance threshold set at 5%. The logistic regression results showed that a woman whose husbands decides on a home delivery is 382.23 times more likely to deliver at home rather than in a healthcare facility (p = 0.040; OR = 382.23; CI [1.32 – 110368.89]).

Conclusion : The husband's age, age at marriage, education level, and the choice of delivery location for his spouse were statistically significant factors associated with the number of home births and the decision to deliver either at home or in a healthcare facility.

Keywords : Husband, Home Birth, Number of children, Factors, EmONC Maternities, Anié, Kéran, Togo

INTRODUCTION

Maternal and neonatal mortality remain a major global health issue, particularly in sub-Saharan Africa [1, 2]. A woman dies every two minutes from causes related to pregnancy or childbirth [3]. The Sustainable Development Goals (SDGs) aim to reduce maternal mortality to 70 per 100,000 live births and neonatal mortality to 12 per 1,000 live births by 2030. To achieve these global targets, it is imperative to improve access to facility-based deliveries with skilled personnel, qualified postnatal care services, and effective obstetric referrals [4, 5]. One proven factor associated with maternal mortality is home delivery [6]. In 2023, the WHO estimated that approximately 87% of maternal deaths (225,000) globally occurred in sub-Saharan Africa and South Asia, with 70% (182,000 maternal deaths) and 17% (43,000 maternal deaths), respectively, in these two regions [2]. In high-income or upper-middle-income countries, around 99% of births occur with the presence of a midwife, doctor, or qualified nursing staff, whereas this rate is only 73% in low-income countries and 84% in lower-middle-income countries [7]. Poor women living in remote areas are the least likely to receive adequate healthcare [7]. Home delivery increases the risk of maternal and neonatal mortality and morbidity when conducted without qualified personnel [8]. In sub-Saharan Africa, over 50% of births occur at home [9]. Some countries in the region have made progress, but much remains to be done. A study showed that in East Africa, the weighted prevalence of home delivery was 23.68% (95% CI: [23.45, 23.92]); for Ethiopian women, it was 72.5%,

while the rates for Kenyan and Tanzanian women were 37.5% and 34.7%, respectively. However, in contrast, Mozambique, Rwanda, and Malawi had lower rates of 2.8%, 6.9%, and 7.1%, respectively [10]. Home delivery presents risks not only for the mother but especially for the fetus and newborn. Studies have shown that planned deliveries outside healthcare facilities were associated with unassisted vaginal deliveries, higher perinatal death rates compared to hospital deliveries, an increased likelihood of neonatal seizures, and higher obstetric risks [11-13].

The decision to deliver at home or in a healthcare facility is influenced by several factors, including the education level of both parents, lack of prenatal care, absence of exposure to radio or TV messages, parity of six or more births, difficulties in reaching health facilities due to distance, rural communities, pastoral communities, and high poverty levels. These factors have been identified in research as key causes of home births [14]. Considering the role of both parents in the choice of home delivery, studies have shown that the education and occupation of the husband are associated with the place of delivery chosen for his spouse [8]. Other studies have also indicated that single mothers, separated women, widows, and divorcees tend to hide their pregnancies and do not seek prenatal care, resulting in fewer deliveries in modern health facilities compared to married women [9]. A study conducted in Ivory Coast found a significant link between the husband's income type and the place of delivery [15]. Thus, the husband's role becomes crucial in the decision regarding home births. However, few studies on interventions aimed at involving men in maternal and neonatal health have directly measured outcomes in terms of knowledge or behavior among men [16, 17].

In Togo, according to the fifth general population and housing census of 2022, the maternal mortality ratio is 366 per 100,000 live births. According to the 2017 Multiple Indicator Cluster Survey (MICS), the neonatal mortality rate is 27 per 1,000 live births. The rate of home deliveries in rural areas is 30%, compared to 1.9% in urban areas. At the national level, 69.4% of births are assisted by qualified health personnel (51.8% in rural areas ; 96.2% in urban areas), with regional disparities. In the Plateaux region, this rate is 57.5%, while in the Kara region, it is 50.1% [18]. The purpose of this study was to investigate the factors associated with husband's choice of delivery location and those associated with the number of home births in relation to these partners in the health districts of Anié in the Plateaux region and Kéran in the Kara region of Togo.

METHODOLOGY

Study area

This study was conducted in two health regions of Togo, specifically in the Plateaux region, particularly in the health area of the BEmONC of Anié and its network of peripheral health facilities, and in the Kara region, more specifically in the health area of the BEmONC of Kanté (Kéran) and its network. Togo's population is estimated at 8095498, according to the fifth general population and housing census (RGPH-5) for 2022. According to this RGPH-5, the Plateaux region has 1635946 inhabitants and the Kara region 985512. The population of Anié is estimated at 180158, and that of Kéran at 128687. Women of childbearing age accounted for 43238 and 30885 for Anié and Kéran respectively [19].

Study Type, Period and Population

This is a cross-sectional study conducted in the health areas of the BEmONC maternity facilities in Anié and Kantè (Kéran). The study was carried out from December 2023 to February 2024. It is part of a broader research framework focusing on women of reproductive age who have given birth at home within the past five years, as well as their husbands, residing in the study area.

Sampling

The sample size was calculated using the COCHRAN formula, as outlined below, which was applied to determine the required sample size [18]. This calculation initially identified a sample of n = 300 (295.57) women who had delivered at home, which was expected to be the same number of husbands to be surveyed. During the survey period, 303 women were included. Ideally, the sample size for husband should match that of their wives (303), but due to various reasons such as travel, death, absences, polygamy, and divorce, a target of 139 husbands was achieved. The questionnaire designed for husbands differed from that for women due to specific characteristics unique to female respondents.

Survey Methodology

It was a three-stage systematic sampling process. For the selection of study subjects, the various health areas of the two BEmONC were considered as clusters, and within these clusters, localities with a high rate of home births over the past five years prior to the survey were included. Based on the percentage proportion of home births within each specific health area of each BEmONC and each peripheral care unit (PCU) included in the study, neighborhoods were identified based on the predominance of home births in those areas. Households have finally been identified.

Data Collection Tools, Methods, and Procedures for Data Collection

The questionnaire was developed based on lessons learned from the implementation of maternal and neonatal health programs, particularly from quality EmONC. Individual interviews were conducted in person with the spouses of the women targeted, who had given birth at home at least once in the five years preceding the survey. The data collection tool was digitized to facilitate the transmission of the collected data to a server (Google Forms).

Training of Data Collectors

A total of twelve data collectors with various profiles, involved in maternal and child health from the study communities, as well as an anthropologist, were trained on the questionnaire, with practical field sessions

Authorization and Ethical Approval

Authorization and consent to collect the necessary information from individuals forming the sample were sought and obtained. Based on the authorization from the Togo Health Research Bioethics Committee (CBRS), the relevant prefectural authorities involved in the survey were informed to obtain their agreement. Authorization from community leaders, such as the traditional chiefs of the localities, was also sought and obtained. The consent of the husbands was also sought and obtained.

Selection of husbands

The husbands selected were those of women who had been previously targeted based on household identification by health facility staff from the relevant maternity hospitals, community health workers, traditional midwives, and community leaders, including village and neighborhood chiefs from the various localities involved. Within the households, the inclusion criteria for the primary target were the spouses of women who had given birth at home at least once in the five years preceding the survey, whether or not they had attended prenatal care (ANC), whether or not they had delivered at a health facility, and whose age ranged from 15 to 49 years, and who were able to respond freely to the questionnaire. Husbands of women who gave birth on the road on their way to the maternity hospital were excluded.

Collected Data

Two dependent variables were selected for this study: the number of children born at home and the place of delivery of the spouse. The independent variables were related to the socio-professional factors, the obstetric characteristics of the women, the husband's knowledge of quality EmONC and danger signs, the attitudes of the husbands and their families towards referral, and the preparation for childbirth.

Statistical Analysis

The data were exported from Google Forms to Excel for cleaning, then transferred to SPSS and R (Version 4.5.0) for statistical analyses. In this study, three types of statistical analyses were performed : bivariate analysis, two-level linear regression (simple and multiple), with the dependent variable being the number of children born at home, and binary logistic regression, with the dependent variable being the place of delivery. The variables were categorized into quantitative and qualitative variables, either dichotomous or multiple. For the linear regression, Pearson's test, ANOVA, and Student's t-test were performed at a 5% threshold to check if the number of children born at home was influenced by the considered variables. For the multiple linear regression, seven (07) explanatory variables were selected based on their significance level obtained from the bivariate analysis, with the number of children born at home as the dependent variable. The significance threshold was set at 25%. All of these variables were subjected to multiple linear regression analysis using the FORWARD method via the SPSS software.

To perform the logistic regression, the variables of interest were imported into the SPSS software. For constructing the odds ratio graph for significant variables, these variables, their odds ratios, and confidence intervals were analyzed using R software.

Characteristics of the Dependent Variable

The total number of children born at home for the 139 husbands was 411 ± 0.17, and those born in health facilities was 57 ± 0.08.
The place of delivery was defined based on home births and births in health facilities.

Description of the Forward Method in Multiple Linear Regression Analysis

It is a method that is part of the broad toolbox of multiple linear regression and is statistically used to build models by interactively adding the most statistically significant predictive variables. The process begins with an empty model and progresses by sequentially introducing variables that contribute the most to explaining the variance of the dependent variable. The advantage of this method, chosen here, lies in its progressive approach, where variables are added one by one based on their impact.

RESULTS

Socio-Professional Factors of husbands

The mean age of the husbands was 32.18 ± 0.58 years, and the mean age at marriage was 23.20 ± 0.24 years, with respective medians of 32 and 23 years. The majority of respondents were aged between 22 and 40 years. The most common age range at which husbands married was between 19 and 28 years.

Distribution of the Number of Children Born at Home According to the Socio-Professional Characteristics of husbands (n = 139)

The results on the mean number of children born at home by socio-professional characteristics showed that spouses with no formal education had the highest average number of home births (3.68 ± 0.41), followed by those married through religious ceremonies (3.66 ± 0.66). In contrast, the lowest average was observed among spouses identifying as Animist/Christian (2.00 ± 0.00), followed by Muslim spouses (2.25 ± 0.47). These results are summarized in Table 1.

Table 1 : Distribution of the Number of Children Born at Home According to the Socio-Professional Characteristics of husbands (N = 139)

Variables		Mean ± SEM
Education Level	None	3.68 ± 0.41
	Primary	2.8 ± 0.20
	Secondary 1	2.42 ± 0.32
	Secondary 2	2.40 ± 0.67
Profession	Farmer / Herdsman	2.98 ± 0.18
	Artisan / Worker	2.83 ± 0.72
	Merchant / Vendor	2.81 ± 0.46
	Shepherd	3.00 ± 0.00
Residential Area	Rural	2.99 ± 0.17
	Urban	2.28 ± 0.56
Religion	Animism	3.09 ± 0.20
	Animism / Christianity	2.00 ± 0.00
	Muslim	2.25 ± 0.47
	No religion	3.00 ± 2.00
	Christianity	2.64 ± 0.37
	Other	3.00 ± 0.00
Marital Status	Single	0.00 ± 0.00
	Divorced	0.00 ± 0.00
	Married	2.96 ± 0.17
	Separated	0.00 ± 0.00
Marriage Type	Legal	3.00 ± 0.00
	Customary	2.94 ± 0.17
	Religious	3.66 ± 0.66

Socio-cultural factors of husbands (N = 139)

The results regarding the socio-cultural characteristics of the surveyed partners revealed the following: For the variable "husband's opinion on home childbirth," 89.90% of husbands expressed a negative opinion, while 10.10% were in favor of home delivery. Regarding the variable "husband's decision for the woman to give birth at home," in 84.20% of cases, the husband did not choose home childbirth for their spouse, whereas 15.80% did make such a choice (Table 2). Concerning the variable "Final decision of the husband to support the woman's choice to give birth at home," 54.70% of husbands ultimately supported their spouse's decision, while 45.30% maintained their initial position and did not support the choice of home delivery (Table 2). As for the variable "husband's willingness to promote home delivery to future generations," 91.40% of respondents reported being unwilling to do so, compared to 8.60% who were willing (Table 2).

For the variable "Status of women who gave birth at home according to their religion, customs, and culture," results indicated that women who delivered at home were perceived by their partners as strong and courageous in 79.86% of cases, honored in 41.73% of cases, and viewed as role models for other women in the community in 25.18% of cases (Table 2). Regarding the variable "Reasons for the husband's refusal of home childbirth," husbands reported in 77.70% of cases that they felt reassured when women gave birth in a health facility, in 74.10% of cases that health facilities could save the lives of both mother and child through quality care, and in 37.41% of cases that institutional delivery helped avoid delays in the management of maternal or neonatal emergencies (Table 2).

Table 2 : Socio-cultural factors among husbands

Variables		Absolute frequency (n)	Relative frequency (%)
Husband's opinion on home childbirth	No	125	89.90
	Yes	14	10.10
Husband's choice regarding the woman's home childbirth	No	117	84.20
	Yes	22	15.80
Final decision of the husband to support the woman's choice to give birth at home	No	63	45.30
	Yes	76	54.70
Husband's willingness to perpetuate home childbirth among future generations	No	127	91.40
	Yes	12	8.60
Status of the woman who delivered at home according to her religion, customs, and culture	She is strong and courageous	111	79.86
	She is honored	58	41.73
	She is a role model for other women in our community	35	25.18
Reasons for the partner's refusal of home childbirth for the woman	It is reassuring when a woman gives birth in a healthcare facility	108	77.70
	The healthcare facility can save the lives of the mother and child through quality care	103	74.10
	It helps avoid delays in the management of the mother and child in case of an emergency	52	37.41
	We are prepared to bear the costs associated with childbirth in a healthcare facility	19	13.67

Characteristics of the knowledge of surveyed husbands on danger signs related to pregnancy and childbirth in women (N=139)

The results regarding the characteristics of the knowledge of the surveyed husbands on danger signs related to pregnancy and childbirth in their spouses revealed the following: For the variable "husband's knowledge of how their own decision contributes to avoiding complications and maternal or neonatal death," 97.10% of husbands reported having this knowledge, compared to 2.90% who reported not being aware of the consequences of their decision (Table 3). Regarding the variable "husband's knowledge of the importance of birth planning before pregnancy," 75.5% of partners claimed to know this, while 24.50% did not (Table 3). For the variable "husband's knowledge of the birth plan," 58.30% of husbands stated they were aware of the birth plan, while 41.70% reported not knowing about it (Table 3). Considering the variable "Establishment of the birth plan with the wife who gave birth at home in the last five years," 64.00% of husbands claimed to have established a birth plan with their spouse, compared to 36.00% who did not (Table 3). For the variable "husband's willingness to allow their spouse to seek care in a healthcare facility for prenatal visits and childbirth for a future pregnancy," 94.20% of partners said they were willing to allow their spouses to use a healthcare facility for prenatal care and delivery, while 5.80% were not willing to do so (Table 3). The results showed for the variable "husband's willingness to accompany their spouse to antenatal care and for delivery in a healthcare facility" that 97.80% of the surveyed partners expressed their willingness to do so, compared to 2.20% who claimed they could not (Table 3). For the variable "Knowledge of danger situations for the mother and baby requiring delivery in a healthcare facility," 96.40% of husbands reported knowing these situations, compared to 3.60% who did not (Table 3). Regarding the variable "husband's knowledge of delays in care caused by their own decision to have their spouse deliver at home," 97.80% claimed to be aware of this, while 2.20% did not know (Table 3). Finally, for the variable "Knowledge of obstetric fistula," 54.70% of partners reported knowing about obstetric fistula, compared to 45.30% who did not (Table 3).

Table 3 : Knowledge of the surveyed husbands on danger signs related to pregnancy and childbirth in women (N=139)

Variables		Absolute frequency (n)	Relative frequency (%)
Husband's knowledge of how their own decision contributes to avoiding complications and maternal or neonatal death	No	4	2.90
	Yes	135	97.10
Husband's knowledge of the importance of birth planning before pregnancy	No	34	24.50
	Yes	105	75.50
Husband's knowledge of the birth plan	No	58	41.70
	Yes	81	58.30
Establishment of the birth plan with his wife who gave birth at home in the past five years	No	50	36.00
	Yes	89	64.00
Husband's willingness to allow his spouse to seek care in a healthcare facility for prenatal visits and delivery for a future pregnancy	No	8	5.80
	Yes	131	94.20
Husband's willingness to accompany his wife to a healthcare facility for prenatal care and delivery	No	3	2.20
	Yes	136	97.80
Knowledge of danger situations for the mother and baby requiring delivery in a healthcare facility	No	5	3.60
	Yes	134	96.40
Husband's knowledge of the delay in care caused by his own decision to have his spouse deliver at home	No	3	2.20
	Yes	136	97.80
Husband's knowledge of obstetric fistula	No	63	45.30
	Yes	76	54.70

Characteristics of the number of children born at home in the woman's lifetime (dependent variable)

Linear regressions

- **Bivariate analysis**

Number of children born at home and characteristics of the surveyed partners

Correlation between the number of children born at home and the partner's age

The Pearson test (Table 4) shows that there is a correlation between the number of children born at home and the partner's age (p-value = 0.001), as well as between the number of children born at home and his age at the time of marriage (p-value = 0.015).

Table 4: Pearson correlation between the number of children born at home and the husband's age

Variables	Number of children born at home during the woman's lifetime	
	Correlation coefficient (r)	Pi-value
Partner's age	0.640	0.001
Partner's age at marriage	0.207	0.015

- **Multivariate analysis**

Correlation between the profession, religion, marital status, residential area of the partners, and the number of children born at home

Considering Table 5, the results showed a correlation between the number of children born at home and partners with no level of education (p-value = 0.012). The average number of children born at home for this sub-variable was 3.69 ± 0.41.

Table 5 : Correlation between the profession, religion, marital status, residential area of the husbands, and the number of children born at home

Variables		Mean	Standard deviation	Correlation coefficient (r)	Pi value
Education Level	None	3.69	0.41	0,212	0.012
	Primary	2.80	0.20	-	0.285
	Secondary 1	2.42	0.32	-	0.212
	Secondary 2	2.40	0.67	-	0.529
Profession	Farmer / Herdsman	2.98	0.18	-	0.742
	Artisan / Worker	2.83	0.72	-	0.824
	Merchant / Vendor	2.82	0.46	-	0.812
	Shepherd	3.00	0.00	-	0.983
Residential Area	Rural	2.99	0.17	-	0.366
	Urban	2.29	0.56	-	0.366
Religion	Animism	3.09	0.20	-	0.211
	Animism / Christianity	2.00	0.00	-	0.634
	Muslim	2.25	0.47	-	0.477
	No religion	3.00	2.00	-	0.976
	Christianity	2.65	0.37	-	0.328
	Other	3.00	-	-	0.983
Marriage Type	Legal	3.00	-	-	0.983
	Customary	2.94	0.17	-	0.585
	Religious	3.67	0.66	-	0.538

Multiple linear regression

The results of the multivariate analysis for the husbands led to the identification of seven (07) models using the FORWARD method. Based on the significance level set at 5%, one (01) model was statistically significant. This was model 1 (p-value = 0.001), with the only explanatory variable being the husband's age. The p-values for the other models were higher than 5%. However, the variables introduced influenced the number of children born at home in different ways (Table 6).

Considering the R^2 values, the explanatory variables explained the number of children born at home differently. From model 1 to model 2, the variable that induced a lack of correlation was the husband's age at marriage. This variable caused a 0.60% variation in R^2. From model 2 to model 7, the R^2 varied slightly (1.20%), which was statistically insignificant in explaining the number of children born at home (Table 7).

Tableau 6 : Summary of multiple linear regression models for the husbands

Model	R	R^2	Adjusted R^2	Estimated standard error	Change Statistics	
					F Change	Pi-value
1	0.640[a]	0.41	0.406	1.547	95.149	0.001
2	0.645[b]	0.416	0.408	1.544	1.541	0.217
3	0.647[c]	0.419	0.406	1.547	0.506	0.478
4	0.647[d]	0.419	0.402	1.552	0.05	0.823
5	0.649[e]	0.421	0.399	1.556	0.396	0.53
6	0.654[f]	0.428	0.402	1.552	1.651	0.201
7	0.655[g]	0.428	0.398	1.557	0.161	0.689

a. Predictors: (Constant), Husband's age

b. Predictors: (Constant), Husband's age, Husband's age at marriage

c. Predictors: (Constant), Husband's age, Husband's age at marriage, Education level (none)

d. Predictors: (Constant), Husband's age, Husband's age at marriage, Education level (none), Education level (Secondary 1)

e. Predictors: (Constant), Husband's age, Husband's age at marriage, Education level (none), Education level (Secondary 1), Religion (Animism)

f. Predictors: (Constant), Husband's age, Husband's age at marriage, Education level (none), Education level (Secondary 1), Religion (Animism), Status of the woman who gave birth at home according to her religion, customs, and culture (She is strong and courageous)

g. Predictors: (Constant), Husband's age, Husband's age at marriage, Education level (none), Education level (Secondary 1), Religion (Animism), Status of the woman who gave birth at home according to her religion, customs, and culture (She is strong and courageous), Reasons for the 'No' regarding the husband's choice for home delivery (We are prepared to bear the costs associated with delivery in a healthcare facility)

Table 7: Multiple linear regression coefficient among husbands

Model		Unstandardized Coefficients		Standardized Coefficients	t	Pi-value	95,0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	-2.992	0.624		-4.797		-4.226	-1.759
	Husband's age	0.185	0.019	0.64	9.754		0.147	0.222
2	(Constant)	-1.902	1.077		-1.766	0.08	-4.031	0.228
	Husband's age	0.196	0.021	0.68	9.334		0.155	0.238
	Husband's age at marriage	-0.063	0.051	-0.09	-1.241	0.217	-0.163	0.037
3	(Constant)	-1.865	1.08		-1.727	0.086	-4.001	0.271
	Husband's age	0.192	0.022	0.667	8.856		0.149	0.235
	Husband's age at marriage	-0.062	0.051	-0.089	-1.213	0.227	-0.162	0.039
	Education level (none)	0.223	0.313	0.048	0.712	0.478	-0.396	0.841
4	(Constant)	-1.839	1.09		-1.687	0.094	-3.995	0.317
	Husband's age	0.192	0.022	0.665	8.791		0.149	0.235
	Husband's age at marriage	-0.062	0.051	-0.089	-1.209	0.229	-0.162	0.039
	Education level (none)	0.208	0.321	0.045	0.647	0.518	-0.427	0.842
	Education level (Secondary 1)	-0.089	0.395	-0.015	-0.225	0.823	-0.87	0.693

5	(Constant)	-1.637	1.139		-1.438	0.153	-3.89	0.615
	Husband's age	0.195	0.022	0.676	8.708		0.151	0.239
	Husband's age at marriage	-0.068	0.052	-0.098	-1.304	0.195	-0.171	0.035
	Education level (none)	0.215	0.322	0.047	0.667	0.506	-0.422	0.851
	Education level (Secondary 1)	-0.152	0.409	-0.026	-0.373	0.71	-0.961	0.656
	Religion (Animism)	-0.2	0.318	-0.045	-0.629	0.53	-0.828	0.428
6	(Constant)	-1.403	1.151		-1.22	0.225	-3.679	0.873
	Husband's age	0.192	0.023	0.663	8.509		0.147	0.236
	Husband's age at marriage	-0.06	0.052	-0.086	-1.151	0.252	-0.163	0.043
	Education level (none)	0.214	0.321	0.047	0.668	0.505	-0.421	0.849
	Education level (Secondary 1)	-0.167	0.408	-0.029	-0.409	0.683	-0.973	0.64
	Religion (Animism)	-0.137	0.321	-0.03	-0.426	0.671	-0.771	0.498
	Status of the woman who gave birth at home according to her religion, customs, and culture (She is strong and courageous)	-0.43	0.335	-0.086	-1.285	0.201	-1.092	0.232
7	(Constant)	-1.284	1.192		-1.077	0.283	-3.642	1.074
	Husband's age	0.191	0.023	0.661	8.411		0.146	0.236
	Husband's age at marriage	-0.064	0.053	-0.092	-1.198	0.233	-0.169	0.041
	Education level (none)	0.229	0.324	0.05	0.706	0.482	-0.412	0.87
	Education level (Secondary 1)	-0.164	0.409	-0.028	-0.4	0.69	-0.973	0.646
	Religion (Animism)	-0.144	0.322	-0.032	-0.447	0.656	-0.781	0.493
	Status of the woman who gave birth at home according to her religion, customs, and culture (She is strong and courageous)	-0.415	0.338	-0.083	-1.229	0.221	-1.083	0.253
	Reasons for the 'No' regarding the husband's choice for home delivery (We are prepared to bear the costs associated with delivery in a healthcare facility)	-0.16	0.4	-0.028	-0.401	0.689	-0.952	0.631

Logistic regression

The results of the global binary logistic regression between risk factors and the dependent variable (place of delivery) showed, through the Chi-square test, that the selected model was globally significant ($Chi^2 = 115.67$; p-value = 0.007), with 92.80% of the information accounted for by the model. The Cox & Snell R Square and Nagelkerke R Square indices indicated that the model explains between 56.5% and 81.8% of the variance in the dependent variable (Table 8).

The findings revealed that the husband's age at marriage, education level, decision in favor of home delivery, and knowledge of the birth plan were the main risk factors associated with the choice between home and facility-based childbirth. A woman's likelihood of delivering in a healthcare facility increases by a factor of 0.450 for each additional year in her husband's age at marriage (p = 0.014; OR = 0.450; CI [0.237 – 0.853]). A woman married to a partner with primary education is 0.026 times as likely to deliver in a healthcare facility compared to at home (p = 0.022; OR = 0.026; CI [0.001 – 0.588]). Similarly, a woman whose husband has a secondary education is 0.027 times as likely to deliver in a healthcare facility than at home (p = 0.048; OR = 0.027; CI [0.001 – 0.962]). A woman whose husband chooses home delivery is 382.23 times more likely to give birth at home than in a healthcare facility (p = 0.040; OR = 382.23; CI [1.32 – 110368.89]). Finally, a woman whose husband is knowledgeable about the birth plan is 1.852 times more likely to deliver in a healthcare facility than at home (p = 0.037; OR = 0.001; CI [0.001 – 0.49]).

Table 8 : Global logistic regression parameters on risk factors (independent variables) and place of delivery (dependent variable) among husbands

Variables	B	S.E.	Wald	P value	Odd ratio	95,0% Confidence Interval for odd ratio	
						Lower	Upper
Husband's age	0.17	0.093	3.338	0.068	1.185	0.988	1.422
Husband's age at marriage	-0.799	0.327	5.986	0.014	0.45	0.237	0.853
Education level (Primary/None)	-3.641	1.587	5.264	0.022	0.026	0.001	0.588
Education level (Secondary/None)	-3.618	1.826	3.925	0.048	0.027	0.001	0.962
Profession (Artisan/Farmer)	-9.47	6.029	2.467	0.116	0	0	10.455
Profession (Herdsman/Farmer)	32.525	64869.96	0	1	-	0	-
Profession (Merchant/Farmer)	21.356	11665.2	0	0.999	-	0	-
Perception of the spouse on the referral of a woman in labor or in an emergency situation (Demonstrates the woman's limited ability to give birth by herself, It is important to save the life of the mother and fetus or newborn/It is too costly, Other)	-16.203	69616.502	0	1	0	0	-
Perception of the spouse on the referral of a woman in labor or in an emergency situation (The roads are in poor condition, Lack of appropriate transportation means, The distance to the referral site is too far, Lack of financial resources/It is too costly, Other)	-57.766	76880.12	0	0.999	0		
Spouse's perception of the maternity facility in their locality (It is too far from the houses/Good)	-16.876	19455.433	0	0.999	0	0	-16.876
Spouse's perception of the maternity facility in their locality (It does not ensure confidentiality, The premises are not suitable for maternal and neonatal healthcare, It is poorly equipped, It does not have a dedicated waiting area for spouses/Good)	-27.977	19455.433	0	0.999	0	0	
Spouse's perception of men who accompany their wives to the maternity ward (For a better delivery/Good)	-36.656	26183.406	0	0.999	0	0	
Spouse's perception of men who accompany their wives to the maternity ward (Wealthy households/Good)	-47.893	53675.066	0	0.999	0	0	
Place of residence (Rural/Urban)	-31.886	40192.94	0	0.999	0	0	
Religion (Animism/No religion)	38.64	51182.291	0	0.999	0	0	
Religion (Other/No religion)	5.557	76489.062	0	1	259.065	0	
Religion (Christianity/No religion)	35.217	51182.291	0	0.999	0	0	
Religion (Islam/No religion)	3.932	38635.911	0	1	51.007	0	
Type of marriage (Customary/Religious)	28.611	22103.907	0	0.999	0	0	
Type of marriage (Legal/Religious)	47.995	45870.007	0	0.999	0	0	
Number of wives	1.977	1.575	1.577	0.209	7.222	0.33	158.109
Husband's opinion regarding home delivery (Yes/No)	1.604	2.39	0.45	0.502	4.972	0.046	538.541
Husband's knowledge of the importance of birth planning before pregnancy (Yes/No)	-0.901	1.975	0.208	0.648	0.406	0.008	19.498
Husband's choice for home delivery of the wife (Yes/No)	5.946	2.891	4.231	0.04	382.23	1.324	110368.89
Husband's knowledge of the birth plan (Yes/No)	-11.44	5.48	4.363	0.037	0.001	0.001	0.494
Constant	68.701	75809.67	0	0.999	0		

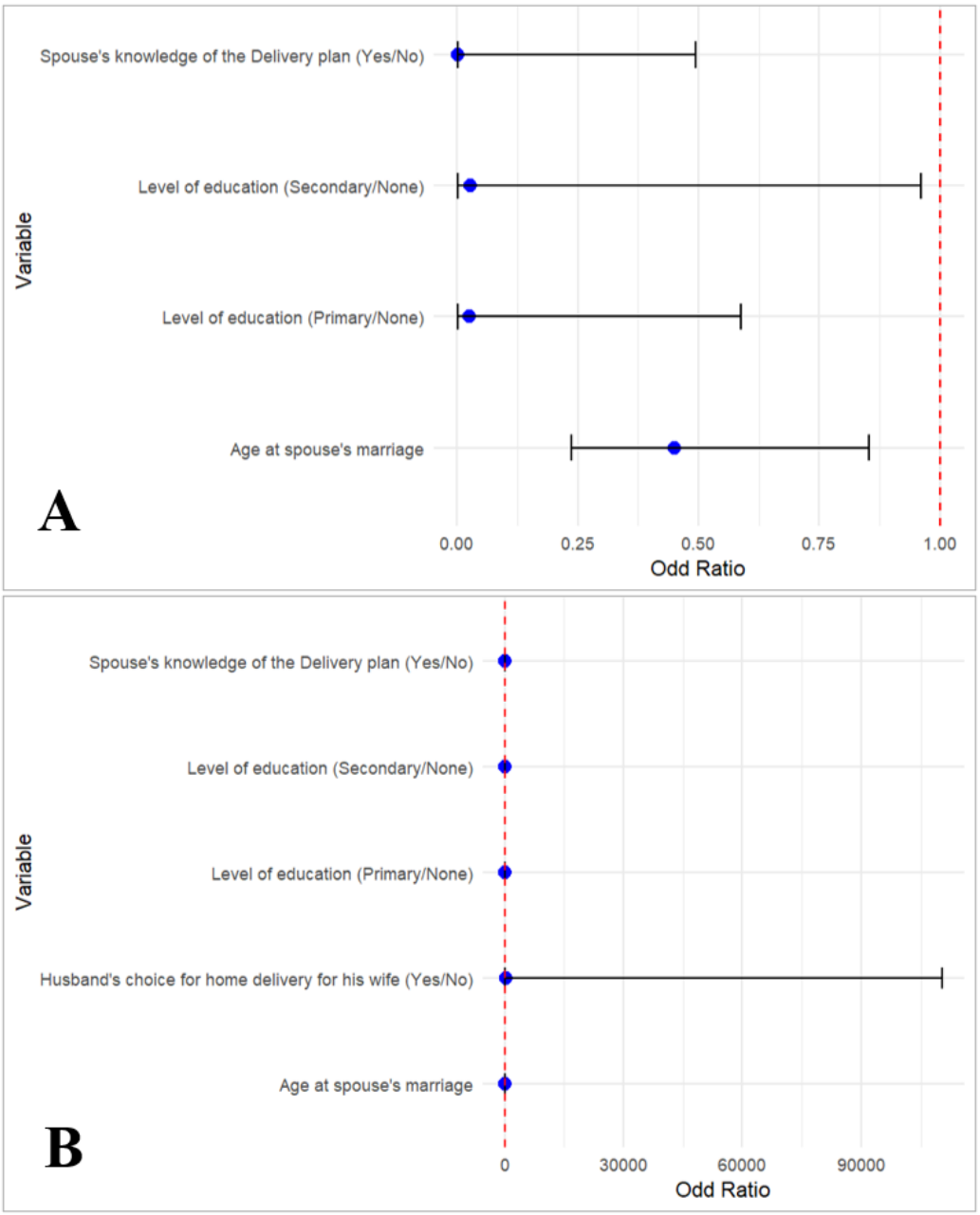


Figure 1 : Odds ratios with confidence intervals for significant variables

The points and error bars in Figure 1.A represent the odds ratios and confidence intervals, respectively, of the significant variables. Moreover, the results showed that the husband's decision in favor of home delivery for his wife was by far the most decisive factor for home childbirth. Indeed, when this variable was combined with the other significant factors, the odds ratios and confidence intervals of the latter were nearly indistinguishable from zero (Figure 1.B).

DISCUSSION

The results of the linear analysis showed a correlation between the husband's age, age at marriage, and education level, while the logistic regression additionally identified the husband's decision regarding home delivery and his knowledge of the birth plan as key contributing factors. Regarding age at marriage, one study demonstrated that the age at which couples marry influences the number of children [21]. Thus, husbands who marry early and choose home delivery for their wives tend to have a greater number of children born at home later on. A study by Mahato PK et al. on factors influencing place of delivery in a district of Nepal revealed that husbands significantly influenced their wives' choice of delivery location [22]. Another study showed that when the husband decides the place of delivery, [AOR: 5.6, 95% CI (2.1–15.2)], this factor was significantly associated with home deliveries [23].

The study by el-Faedy MA and Bean LL on differential paternity in Libya indicated that the age and education level of husbands had an impact on their wives' fertility rates. Specifically, men in traditional occupations such as farming and trade showed a lack of fertility regulation, unlike professionals and administrative workers who married later and exercised some degree of fertility control [24]. Therefore, the age and occupation of the

husbands play an important role in fertility and the number of children, which, in turn, leads to a higher number of home births among husbands who opted for home deliveries for their wives.

Considering the correlation between husband's education level, number of children born at home, and the husband's role in choosing the place of delivery, a study by Zegeye *and al*. using a machine learning algorithm to predict home births and identify their determinants among women aged 15–49 in Sub-Saharan Africa (based on Demographic and Health Survey data from 2016–2023) found that this variable was among the main predictors of home delivery in that region [25]. Similarly, a study by Nigatu on trends and determinants of home delivery based on data from the 2013 and 2020 Demographic and Health Surveys in The Gambia, using multivariate decomposition analysis, found that changes in the effect of husband's education played a significant role in reducing home deliveries [26].

One possible reason proposed in that study was that husbands without formal education may substantially influence maternal health decisions, often favoring home deliveries due to a lack of understanding of the benefits of facility-based deliveries and maternal healthcare. This educational gap could lead to continued reliance on traditional practices. Moreover, a low level of education may also limit decision-making capacity and correlate with lower income, making facility-based deliveries financially unsustainable [25]. The study by Tessema *and al*. on the spatio-temporal distribution and associated factors of home delivery in Ethiopia, based on an in-depth multilevel and spatial analysis of the Ethiopian Demographic and Health Surveys (2005–2016), also found that both women's and their husbands' education levels were statistically significant predictors of home delivery [27].

Strengths and limitations of the study

The availability of husbands to respond to the questionnaire and the large number of localities included in the study contributed to the feasibility of this research. However, the definition of the term "husband" in certain socio-cultural contexts may have caused confusion between the biological father and the household head, although no such cases were reported. The small sample size, combined with the diversity of women's marital statuses and the absence of some husbands from their homes during the survey making them unreachable may have limited the ability to detect certain correlations. The volume of data collected and the complexity of some verification variables may also have introduced confusion in the final results. Therefore, further research is recommended.

CONCLUSION

The husband's age, age at marriage, and level of education were statistically significant factors associated with the number of children born at home. The results also showed that the husband's age at marriage, educational level, decision in favor of home delivery, and knowledge of the birth plan were the main risk factors correlated with the choice between home and facility-based delivery. This study highlighted the scarcity of available research in Togo and elsewhere on the specific factors targeted in this investigation. The limited sample size may explain the restricted range of statistically significant predictors identified. Indeed, since the initial focus of the survey was on women (n=303), it was not possible to reach all their corresponding husbands, due to several factors previously mentioned. Nonetheless, there is a clear need for additional studies to validate and expand upon these findings.

Ethics approval and consent to participate: This study was grounded in the principles of respect for persons, dignity, informed consent, confidentiality, non-maleficence, and justice. The research protocol was submitted to the National Bioethics Committee for Health Research (Comité de Bioéthique pour la Recherche en Santé – CBRS) in Togo and received ethical approval in October 2021. Based on this approval, the relevant prefectural health authorities were informed and their permission was obtained. Authorization and informed consent were also sought and obtained from the participating couples, household heads, and community leaders, including traditional chiefs in the localities concerned by the study.

Consent to publication : All participants in this study provided their informed consent for the publication of the research findings.

Availability of data and material: Data and research materials are available and accessible as needed

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

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Authors' contributions: AG is a doctoral student in public health and the initiator of this scientific manuscript as part of her doctoral research. She developed the research protocol, collected the survey data, carried out the analysis, performed the literature review required for the article, wrote the article and drew the main conclusions.

EM collaborated with Ms AG for quality assurance of survey data used for analysis, statistical analysis.

IAD contributed to the quality assurance of the research methodology, statistical analysis and provided advice on the writing of the article. He proofread and provided inputs to the manuscript.

IS, the thesis director, coordinated the study from beginning to end and ensured the quality of the entire research process until submission. He proofread the manuscript and provided inputs.

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