DETERMINANTS OF SKILLED BIRTH ATTENDANTS USE AMONG MOTHERS WITH CHILDREN UNDER ONE YEAR OF AGE IN THE NKWANTA SOUTH MUNICIPALITY OF THE OTI REGION, GHANA

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ABSTRACT

Background: Labour and delivery are the shortest and most critical periods of the pregnancy-childbirth continuum because most maternal deaths arise from complications during delivery. The proportion of births attended by skilled health personnel is one of the key indicators for monitoring progress towards the attainment of the United Nations Sustainable Development Goals (SDG 3), which seeks to reduce the global maternal mortality ratio to less than 70 per 100,000 live births by the year 2030. This study investigated the determinants of skilled birth attendants use among women with children under one (1) year of age in the Nkwanta South Municipality of the Oti region, Ghana, using the Health Belief Model (HBM) as the conceptual framework.

Methods: This is an analytical epidemiological study based on a cross-sectional survey design conducted in 2021. A sample size of 258 was used. Data was entered using SPSS version 20 and analyzed using both SPSS version 20 and STATA version 16. Descriptive statistics analysis was employed to determine outcome of interest in the sample. Background characteristics of respondents such as age, marital status, education, tribe, residence, occupation, religion, distance to health facility and four or more Antenatal Clinic (ANC) visits were all highly associated with births attended by skilled birth attendants (SBAs) ($p<0.001$). It was also found that in the HBM, strong association and high probability exist between perceptions on risk of delivery complications and none use of SBAs (aOR = 0.332; 95% CI = 0.141-0.780; $p = 0.011$). However, lack of knowledge on skilled birth was observed as one of the critical barriers to skilled birth attendant (SBA) use (aOR = 0.31; 95% CI [0.119-0.806]; $p = 0.016$).

Conclusion: The proportion of births attended by skilled births attendants was high (77.5%). Nevertheless, 22.5% of women in the study area still patronize unskilled birth attendants. Concerted measures to improve utilization of SBAs should be targeted at the barriers to this intervention and strengthen its determinants.

Keywords: Pregnancy-childbirth, Health Belief Model, Labour, Delivery, skilled birth, SBAs.

I.   BACKGROUND

Evidence shows that "labour and delivery are the shortest and most critical periods of the pregnancy-childbirth continuum because most maternal deaths arise from complications during delivery. Even with the best possible antenatal care, any delivery can become a complicated one and, therefore, skilled assistance is essential to safe delivery care" (Ghana Statistical Service [GSS], 2015, p. 114).

Skilled birth attendance is defined as the process by which a woman is provided with adequate care during labour, delivery and the early postpartum period by skilled birth attendants (Safe Motherhood Interagency Group, 2000).

The World Health Organization (WHO), the United Nations Population Fund (UNFPA), the United Nations International Children's Emergency Fund (UNICEF), the International Confederation of Midwives (ICM), the International Council of Nurses (ICN), the International Federation of Gynaecology and Obstetrics (FIGO) and the International Paediatric Association (IPA) (2018, p. 1) describe Skilled Birth Attendants (SBAs) as "competent maternal and new-born health (MNH) professionals who are educated, trained and regulated to national and international standards and are competent to: (i) provide and promote evidence-based, human-rights-based, quality, socio-culturally sensitive and dignified care to women and new-borns; (ii) facilitate physiological processes during labour and delivery to ensure a clean and positive childbirth experience; and (iii) identify and manage or refer women and/or new-borns with complications".

These skilled health personnel such as Doctors, Midwives and Nurses, perform all critical functions of maternal and new-born care emergency to optimize the health and well-being of women and new-borns; however, in an enabling environment, midwives are able to provide nearly all of the essential care needed for women and new-borns although this is an integrated teamwork (UNFPA, 2014).

Globally, estimates by the WHO (2015) show that Maternal Mortality Ratio (MMR) was 216/100,000 live births (LB) whereas that of developing countries was higher with 239/100,000 LB with only 12/100,000 LB recorded in developed countries. In Ghana, the situation of MMR was much higher at 319/100,000 LB (WHO, 2015). Evidence shows that in Ghana, haemorrhage (postpartum and ante partum), abortion, miscarriage, sepsis, obstructed labour, ectopic pregnancy, (Pre-) eclampsia and embolism have been identified as direct causes of maternal mortality (Maternal Health Survey, 2007; Asamoah et al., 2011). However, infectious and non-infectious diseases such as malaria, HIV/AIDS, hepatitis, respiratory infections, anaemia, sickle cell disease, meningitis, cerebrovascular diseases have been indicated as indirect causes of maternal mortality (Maternal Health Survey, 2007; Asamoah et al., 2011).

The WHO acknowledges that access and timely utilization of skilled birth care provided by SBAs is one of the critical interventions needed for saving the lives of pregnant women and neonates (Council for International Development (CID), 2015). Utilization of skilled birth care is a critical indicator for measuring progress in the reduction of maternal and neonatal mortality as indicated in the United Nations Sustainable Development Goal (SDG) number three (3) (CID, 2015). A study by Choulagai et al (2013) indicated that low utilization of skilled birth attendance was a major reason for high maternal deaths in developing countries. Improving key maternal health indicators such as antenatal care coverage, proportion of deliveries attended by skilled personnel (skilled delivery coverage), maternal mortality ratio, stillbirth rate and neonatal mortality rate requires competent skilled personnel in the continuum of reproductive, maternal and child health care (Adegoke & Van Den Broek, 2009). In Ghana, the Community-based Health Planning and Services (CHPS) strategy is being implemented across the country including the Nkwanta South Municipality as part of increasing and improving skilled care at birth at the door step of the people (GSS, 2015; Ghana Health Service – Family Health Division (GHS-FHD) Annual Report, 2016). CHPS is a national strategy to deliver essential community-based health services or primary health care such as maternal, neonatal, child, adolescent and reproductive health services –family planning, antenatal, delivery, postnatal, immunization, nutrition, growth monitoring and promotion services - involving planning and service delivery with communities (Nyonator et al., 2005).

Evidence has it that several factors such as age, region of residence, poor road network, household wealth, education, distance to a health facility, religion, parity, mother's and partner's education, socio-economic status have been identified as determinants of skilled delivery (Sakyi and Amu, 2017). At the time of planning and executing this study, the rate of births attended by Traditional Birth Attendants (TBAs) – *unskilled community birth*

attendants in the Nkwanta South Municipality was 41.5% although 20 health facilities comprising 2 hospitals, 1 health centre and 17 CHPS zones where pregnant women in labour can get access to SBAs to deliver them safely were available (GHS DHIMS-2 Report, 2020).

In relation to the United Nations' SDG 3 target of 70/100,000 LB to be achieved by the year 2030, the WHO's estimates of MMR (2015) remains high (319/100,000 LB) in Ghana just as in the Nkwanta South Municipality with 136.3/100,000 LB (GHS DHIMS-2 Report, 2019). This worrying situation threatens the achievement of SDG 3 locally and globally by 2030 (CID, 2015). Using the Health Belief Model (HBM) as the conceptual framework, the purpose and conduct of this study into the determinants of skilled birth attendance in the Nkwanta South Municipality from the perspective of mothers with children under one (1) year of age was worth it. Findings from the study should inform public health actions/decision makers in designing specific interventions and policies towards improving and sustaining quality utilization of skilled delivery services to enhance socio-economic development.

II.   METHODS

2.1 Study design and setting

This was a cross-sectional analytical study design conducted from 25th October – 26th November, 2021 in the Nkwanta South Municipality of the Oti region of Ghana. The Municipality is one of the eight (8) administrative Districts located in the central part of the Oti region and lies between latitudes 7º 30' and 8º 45' North and longitude 0º 10' and 0º 45'East and bounded to the North by Nkwanta North District, to the South by Kadjebi District, to the East by the Republic of Togo and to the West by Krachi East Municipality (GSS, 2014). It covers a land area of 2,733 km2, making it the largest district with six (6) sub-municipalities in the region with a population of 149,296 in which males constitute 49.6% and that of females being 50.4% with General Fertility Rate of 121.4 births per 1000 women aged 15-49 years (GSS, 2014).

2.2 Study population

The study population were mothers with children under one year of age in their reproductive age (15-49 years) who attended Child Welfare Clinic (CWC) in the study area and consented to participate in the study.

2.3 Sample size and sampling procedures

A sample size of 258 was used for the study. This was determined using Fisher et al, (1998) formula [$n=z^2xpq/d^2$]. The study employed a multistage sampling technique with stratified sampling method based on probability proportionate to size (PPS) and simple random sampling method. The setting was stratified into six (6) strata with respect to the 2021 population of expected deliveries of each of the six (6) sub-municipalities. Proportionate sampling method was used to determine the number of eligible subjects needed from each stratum (sub-municipality) as elaborated by Trochim (2006). Based on the sample size of eligible participants per each stratum, convenient sampling method was employed to select health facilities with expected participants after which simple random sampling was used to select eligible participants for the study

2.4 Data collection tool and procedure

A modified structured questionnaire adapted from Mwinyikione et al (2016) consisting of open and closed-ended questions was used to collect data such as socio-demographic characteristics, knowledge and utilization of maternal health services such as ANC and delivery services. In addition, there were questions relating to constructs of the HBM such as perceived susceptibility, severity, barriers, benefits, cues to action and self-efficacy to go through skilled delivery services as the framework of the study. The data collection tool was prepared in the English Language but was translated by the researcher to the Asante Twi (Akan) Language which is the common local language spoken by the people of the study area. The data collection was done by the researcher through a mobile phone interview. Participants who did not have a mobile phone was offered one by the health care providers at the CWC sites or health facilities for the period of the data collection as part of reducing risk associated with COVID-19 pandemic spread at the time of the study.

2.5 Data Analysis

Raw data of the study were entered using Statistical Package for the Social Sciences, Inc., IL, USA (SPSS) version 20. After data entry, data cleaning and validation were done to ensure data quality before analysis. However, data

analysis was performed with both SPSS 20 and STATA 16 statistical tools where appropriate. Descriptive statistics was done to determine proportions, mean, standard deviation and frequencies of interest from the data. Cross tabulations were generated to describe the frequencies and confidence intervals of utilization of skilled birth attendance (outcome variable) across selected independent variables.

Bivariate analysis including Chi-Square test at a significance level 0.05 was carried out to determine the association between dependent and independent variables (Salkind, 2014). Logistic regression analysis was applied to determine the factors influencing utilization of skilled birth services at 0.05 level of significance *(p-value).* Inferential statistics was used to investigate and determine relationships as well as patterns in the data between sub-populations and variables - dependent and independent (Salkind, 2014). This helped to make inferences about the sample data as an estimate of the population characteristics (Coolican, 2014; Holcomb, 2017). A p-value ≤0.05 was considered statistically significant.

2.5.1 Dependent and independent variables

The dependent variable for the study was utilization of SBAs services by study participants whereas the independent variables for the study included perceived susceptibility and severity, structural variables such as knowledge on skilled delivery, perceived barriers, perceived benefits, socio-demographic factors such as age, educational level and religion, cues to action and perceived self-efficacy (Constructs of the HBM).

To determine factors influencing utilization of skilled birth attendance based on the constructs of the HBM, the outcome variable was expressed in a binary form, that is, category 0 for the 'NO' responses and category 1 for the 'YES' responses. In the univariate and bivariate logistic regression, which were adjusted for the effects of the sampling design and weighted, the odds ratios with 95% confidence intervals were calculated to determine the unadjusted risk of independent variables. Multiple logistic regression was used to determine the adjusted risk of independent variables with factors significantly associated with the dependent variable. Independent variables that showed statistical significance of $p < 0.05$ were considered to have more influence on the dependent variable whereas those that showed statistical significance of $p > 0.05$ were considered to have less influence on the dependent variable.

2.6 Ethical Issues

Ethical approval for the study was obtained from the Research Ethics Committee (REC) of the University of Health and Allied Sciences (UHAS) and Leeds Beckett University (LBU), UK.

Permission from eligible participants was also taken accordingly using Informed consent, child assent and parental consent forms as part of the ethical considerations.

2.7 Limitations

The use of convenient sampling method as part of the multistage sampling technique and the use of only mothers with live births or children under one year of age as study participants could be limitations of the study.

III.   RESULTS AND DISCUSSION

3.1 RESULTS

In all, 258 respondents (mothers with children under one year) were used for the study. Table 1 indicates socio-demographic characteristics of all the respondents who participated in the study. The mean (± SD) age of the 258 respondents was 28.4 (± 7.3) years. Majority (48.1%) of the participants were between the age group of 20-24 years whereas the least group (≥ 35 years) was 0.8%. However, teenagers (< 20 years) formed 10.9% of the sample. The results showed that most (79.5%) of the respondents were married. Most of them (90.3%) were living in rural areas of the Municipality. The study found out that the dominant tribe was Kokomba, representing 36.4% of the sample. More than two thirds (83.7%) of the respondents were Christians. Majority (78.7%) of the participants had average monthly Income less than Two Hundred Ghana Cedis (GH₵ 200.00). Most (42.2%) of the participants and that of their partners (39.5%) had no formal education. The study revealed that 83.3% of respondents' access to nearest health facilities within the Municipality was about 30 minutes from their residence. The results show that although respondents' main vehicle for transportation is the motor cycle (25.6%). Majority (66.7%) of them access the

nearest health facilities for maternal health services by walking about 30 minutes. The main occupation of respondents and their partners was farming representing 62.8% and 67.8% respectively.

Table 1 Socio-demographic characteristics of mothers with children under one year (N = 258)

Variable	N	%
Age group		
15-19 years	28	10.9
20-24 years	124	48.1
25-29 years	84	32.6
30-34 years	20	7.8
≥ 35 years	2	0.8
Married	205	79.5
Single	30	11.6
Divorced	1	0.4
Cohabiting	22	8.5
Mother's level of Education		
None	109	42.2
Primary	41	15.9
JHS	63	24.4
SHS	32	12.4
Tertiary	13	5.0
Partners level of Education		
None	102	39.5
Primary	23	8.9
JHS	61	23.6
SHS	45	17.4
Tertiary	27	10.5
Tribe		
Kokomba	94	36.4
Ewe	42	16.3
Guan	40	15.5
Akan	16	6.2
Basare	14	5.4
Atsode	9	3.5
Chorkosi	8	3.1
Adele	7	2.7
Other Tribes	28	10.9
Religion		
Christian	216	83.7
Islamic	19	7.4
Traditional	17	6.6
No Religion	6	2.3
Residence *(Where respondents live)*		
Rural setting	233	90.3
Peri-urban setting	13	5.0
Urban setting	12	4.7
Mother's Occupation		
Government work	15	5.8
Private enterprise	8	3.1
Farming	162	62.8
Trading	43	16.7
Others	30	11.6
Partner's Occupation		
Government work	22	8.5
Private enterprise	4	1.6
Farming	175	67.8
Trading	34	13.2
Others	23	8.9
Mother's monthly Income - Ghana Cedis (GH₵)		
≤200	203	78.7

≤200	44	17.1
201-1000	11	4.3
Residence to the nearest health facility -(*Time*)		
Less than 30 minutes	215	83.3
Within 1hr	35	13.6
Within 2hrs	8	3.1
Means of transport for maternal care		
Foot	172	66.7
Bicycle	13	5.0
Motor bicycle	66	25.6
Car	7	2.7

Further analysis of the sample showed that utilization of SBAs (Nurse/midwife/Doctor) at birth among respondents was high (77.5%) as shown in Table 2. Most of the respondents (77.5%) gave birth to their last child prior to the study at a health facility such as Hospital, Health Centre and CHPS compounds or zones.

Table 2 Proportion of mothers with children under one year delivered by skilled birth attendants and place of delivery of last child (N = 258)

Variable	N	%
Person who delivered mother (last pregnancy)		
Nurse/midwife/Doctor (SBAs)	200	77.5
TBA	38	14.7
Family member	20	7.8
Place where mother gave birth (last pregnancy)		
Health facility	200	77.5
Home	54	20.9
On the way	4	1.6

A cross-tabulation chi-square test analysis for knowledge and utilization of key ANC and delivery services among respondents shows that most of the respondents, 248 (96.1%) attended ANC during their last pregnancy prior to the study as indicated in table 3. This practice was highly significant (p < 0.001). Almost all the respondents who attended ANC during their last pregnancy subsequently used SBAs. The analysis also revealed that out of 199 (77.1%) of the respondents who had four or more ANC visits, 159 (79.9%) of them utilized skilled delivery services. The chi-square test indicates strong association between ANC visits and SBA use (p < 0.001). Most of the respondents (72.9%) registered for ANC services within the first three months (1st trimester) of their last pregnancy. However, the period they booked for ANC services did not have significant association with utilization of skilled birth attendance (*p-value* = 0.066). Results of the study also show that the number of times mothers delivered (number of children) did not have significant association (*p-value* = 0.146) with utilization of skilled birth attendance. The study revealed that out of 233 (90.3%) respondents who were informed about their expected date of delivery (EDD) in their last pregnancy, 186 (79.8%) of them utilized skilled birth attendance services. Thus, information on EDD given to mothers at ANC was statistically associated with SBA use (*p-value* = 0.025). Majority of the respondents, 243 (94.2%) made advance preparations for birth in their last pregnancy out of which 192 (79.0%) subsequently used SBAs (*p-value* = 0.054).

Table 3 Cross tabulation of selected ANC indicators and utilization of skilled delivery service *(dependent variable)*

Variables	N (%)	Skilled delivery (n) %	Unskilled delivery (n) %	P - value (<0.05) for x^2 test
ANC during last pregnancy				
Yes	248 (96.1)	197 (98.5)	51 (87.9)	<0.001
No	10 (3.9)	3 (1.5)	7 (12.1)	
ANC Visits				
None	7 (2.7)	1 (0.5)	6 (10.3)	
One	2 (0.8)	2 (1.0)	0 (0.0)	
Two	17 (6.8)	11 (5.5)	6 (10.3)	<0.001
Three	33 (12.8)	27 (13.5)	6 (10.3)	
Four	70 (27.1)	50 (25.0)	20 (34.5)	

5 or more	129 (50.0)	109 (54.5)	20 (34.5)	
Months (Trimester) ANC started				
0-3 months	188 (72.9)	153 (76.5)	35 (60.3)	
4-6 months	45 (17.4)	32 (16.0)	13 (22.4)	0.066
7-9 months	3 (1.2)	1 (0.5)	2 (3.4)	
Don't know	22 (8.5)	14 (7.0)	8 (13.8)	
Frequency of health facility childbirth				
One	101 (39.1)	78 (39.4)	23 (39.7)	
Two	87 (33.7)	66 (33.3)	21 (36.2)	
Three	36 (14.0)	30 (15.2)	6 (10.3)	0.146
Four	20 (7.8)	19 (9.5)	1 (1.7)	
More than four	14 (5.4)	7 (3.5)	7 (12.1)	
Informed about EDD of last child				
Yes	233 (90.3)	186 (93.0)	47 (81.0)	
No	25 (9.7)	14 (9.7)	11 (19.0)	0.025
Advance preparations for birth				
Yes	243 (94.2)	192 (96.0)	51 (87.9)	
No	15 (5.8)	8 (4.0)	7 (12.1)	0.054

P- value < 0.05 was considered significant at 95% confidence interval

Table 4 represents a cross-tabulation of socio-demographic characteristics of respondents and utilization of skilled and unskilled birth attendants. The chi-square test analysis revealed that background characteristics of respondents such as age, marital status, education, tribe, residence (rural or urban), occupation, religion, distance to health facility and four or more ANC visits in last pregnancy were all highly associated with SBA use (*p<0.001*). However, monthly income of respondents did not show significant association with the dependent variable (*p-value = 0.284*).

Table 4 Cross-tabulation of socio-demographic characteristics of mothers with children under one year and utilization of skilled (Outcome) and unskilled birth attendants

Independent Variables	N (%)	(Outcome) Skilled birth (n) %	Unskilled birth (n) %	P - value (<0.05) for x^2 test
Age				
15-19 years	42 (16.3)	35 (17.1)	7 (13.2)	
20-24 years	74 (28.7)	65 (31.7)	9 (17.0)	
25-30 years	66 (25.6)	53 (25.9)	13 (24.5)	<0.001
31-34 years	50 (19.4)	33 (16.1)	17 (32.1)	
≥ 35 years	26 (10.1)	19 (9.3)	7 (13.2)	
Location				
Rural setting	232(89.9)	184 (89.8)	48 (90.6)	<0.001
Urban setting	26 (10.1)	21 (10.2)	5 (9.4)	
Tribe				
Kokomba	94 (36.4)	70 (34.1)	24 (45.3)	
Ewe	42 (16.3)	37 (18.0)	5 (9.4)	
Guan	40 (15.5)	34 (16.6)	6 (11.3)	
Akan	16 (6.2)	13 (6.3)	3 (5.7)	
Basare	14 (5.4)	11 (5.4)	3 (5.7)	
Atsode	9 (3.5)	7 (3.4)	2 (3.8)	
Chorkosi	8 (3.1)	8 (3.9)	0 (0.0)	<0.001
Adele	7 (2.7)	3 (1.5)	4 (7.5)	
Kotokoli	5 (1.9)	2 (1.0)	3 (5.7)	
Chala	5 (1.9)	3 (1.5)	2 (3.8)	
Ntrobo	4 (1.6)	4 (2.0)	0 (0.0)	
Ga	3 (1.2)	3 (1.5)	0 (0.0)	
Other Tribes	11 (4.3)	10 (4.9)	1 (1.9)	
Education				
No Formal Education	109(42.2)	77 (37.6)	32 (60.4)	<0.001
Formal Education	149(57.8)	128 (62.4)	21 (39.6)	
Marital Status				

Married	227(88.0)	205 (89.1)	22 (78.6)	<0.001
Single	31 (12.0)	25 (10.9)	6 (21.4)	
Occupation				
Employed	242(93.8)	190 (92.7)	52 (98.1)	<0.001
Unemployed	16 (6.2)	15 (7.3)	1 (1.9)	
Average Monthly Income				
≤200	203(78.7)	153 (76.5)	50 (86.2)	
201-1000	44 (17.1)	36 (18.0)	8 (13.8)	0.284
>1000	11 (4.2)	11 (5.5)	0 (0.0)	
Religion				
Christian	216(83.7)	175 (84.5)	45 (81.8)	
Islamic	19 (7.4)	15 (7.2)	4 (7.2)	
Traditional	17 (6.6)	14 (6.8)	3 (5.5)	<0.001
No Religion	6 (2.3)	3 (1.4)	3 (5.5)	
Distance				
Less than 30mins	216(83.7)	171 (83.4)	45 (84.9)	
Within 1hr	34 (13.2)	28 (13.7)	6 (11.3)	<0.001
Within 2hrs	8 (3.1)	6 (2.9)	2 (3.8)	
ANC Visits				
None	7 (2.7)	1 (0.5)	6 (11.3)	
One	2 (0.8)	2 (1.0)	0 (0.0)	
Two	17 (6.6)	12 (5.9)	5 (9.4)	
Three	33 (12.8)	29 (14.1)	4 (7.5)	<0.001
Four	70 (27.1)	53 (25.9)	17 (32.1)	
5 or more	129(50.0)	108 (52.7)	21 (39.6)	
ANC Last Pregnancy				
Yes	249(96.5)	202 (98.5)	47 (88.7)	<0.001
No	9 (3.5)	3 (1.5)	6 (11.3)	
Deliveries per respondents				
One (1)	71 (27.5)	61 (29.8)	10 (18.9)	
Two (2)	62 (24.0)	53 (25.9)	9 (17.0)	0.004
Three (3) and above	125(48.4)	91 (44.4)	34 (64.2)	

P- value < 0.05 was considered significant at 95% confidence interval

Multivariable logistics regression analysis was applied to determine the factors influencing the utilization of skilled birth attendance among the study participants based on the constructs of HBM as shown in table 5. The results showed that strong association and high probability exist between perceptions on risk of delivery complications and none use of SBAs which is under the perceived susceptibility and severity of the HBM model. This was done for both the unadjusted and the adjusted regression tests (unadjusted Odds Ratio [uOR] = 0.273; 95% CI [0.124-0.602]; p = 0.001) and (adjusted Odds Ratio [aOR] = 0.332; 95% CI [0.141-0.780]; p = 0.011). Perception on risk of delivery complications leading to maternal death if not delivered by SBAs as part of perceived susceptibility and severity was also significantly associated with utilization of skilled birth attendance in the study area (uOR = 0.393; 95% CI [0.197-0.785]; p = 0.008). However, the adjusted test revealed weak association and probability (aOR=0.551; 95% CI [0.249-1.220; p = 0.142].

Furthermore, lack of knowledge on skilled birth in relation to perceived barriers under the health belief model showed statistically significant association and probability in the adjusted regression test (aOR = 0.31; 95% CI [0.119-0.806]; p = 0.016).

Similarly, preference of birth attendants indicated strong association and good probability with utilization of skilled birth attendance for both the unadjusted and the adjusted tests (uOR =0.139; 95% CI [0.052-0.373]; p <0.001) and (aOR =0.215; 95% CI [0.068-0.682]; p = 0.009).

Moreover, determinants in relation to the perceived barriers of the HBM namely lack of transport, financial constraints (uOR =2.311; 95% CI [1.029-5.191]; p = 0.042) and lack of time (uOR =2.191; 95% CI [1.156-4.154]; p = 0.016) although not adjusted in the test, indicated strong association with utilization of skilled birth attendance (Table 5). Other unadjusted test results revealed that perception that skilled birth attendance can prevent maternal and neonatal deaths as part of perceived benefits of the HBM was significantly associated with utilization of SBAs among respondents (uOR = 0.272; 95% CI [0.075-0.974]; p = 0.045). Influence on mass media information on

ANC and skilled delivery services leading to SBAs use instead of TBAs was a determining factor among respondents at a high significance level (uOR = 0.227; 95% CI [0.083-0.618]; *p = 0.004*) in line with cues to action of the HBM among respondents but did not show same significance level and probability when adjusted. Likewise, it was not significant when adjusted, but participants' confidence in utilization and sustenance of skilled birth attendance under the perceived self-efficacy of the model showed a strong influence for accessing skilled birth services in the study area (uOR = 0.053; 95% CI [0.006-.0.466]; *p* = 0.008) although it was not significant when adjusted.

Table 5 Multivariable logistic regression by characteristics of mothers with children under one year and factors influencing utilization of skilled birth attendants' use based on the constructs of HBM (N = 258)

Independent variable	Unadjusted OR (95% CI)	P- value (<0.05)	Adjusted OR (95% CI)	P- value (<0.05)
Perceived Susceptibility and Severity				
Knowledge on maternal death caused by pregnancy and birth complications				
No	Reference			
Yes	.4344918 (.1706825-1.106048)	0.080	.7250366 (.2560968-2.052653)	0.545
Risk of delivery complications if not delivered by SBAs				
No	Reference			
Yes	.2732919 (.1241449-.6016232)	**0.001**	.3317161 (.1411978-.7793007)	**0.011**
Perception on cause of some maternal death if not delivered by SBAs				
No	Reference			
Yes	.3926129 (.1964853-.7845109)	**0.008**	.5509619 (.2487874-1.220154)	0.142
Perception of health facility delivery to be dangerous and fearful				
No	Reference			
Yes	.7777778 (.4271131-1.416342)	0.411	.862113 (.3908848-1.901427)	0.713
Perceived barriers				
Lack of transport				
No	Reference			
Yes	2.057143 (.9761937-4.335038)	0.058	1.21799 (.3071461-4.829949)	0.779
Financial constraints				
No	Reference			
Yes	2.311643 (1.029395-5.191102)	**0.042**	2.23117 (.5747254-8.661731)	0.246
Lack of time				
No	Reference			
Yes	2.191514 (1.156101-4.154251)	**0.016**	1.770978 (.7232191-4.336668)	0.211
Traditional/religious beliefs				
No	Reference			
Yes	1.713843 (.9020565-3.256179)	0.100	1.612155 (.5409636 - 4.804472)	0.391
Lack of knowledge on skilled birth/delivery prevents utilization of SBAs				
No	Reference			
Yes	.8796992 (.4702977-1.645491)	0.688	0.3102096 (.1194366-.8056992)	**0.016**
Negative attitudes of health care workers prevent utilization of SBAs				
No	Reference			
Yes	1.88806 (.937246-3.803451)	0.075	1.325692 (.4575912-3.840677)	0.603
Fear of undergoing a Caesarean Section at a health facility				
No	Reference			

Yes	1.02439 (.5610575-1.870353)	0.937	0.4921783 (.214629-1.128643)	0.094
Birth attendants' preference				
TBAs	Reference			
SBAs	.1390328 (.0518653-.3726988)	**<0.001**	0.2154479 (.0679896-.6827188)	**0.009**
Perceived benefit				
Perception that SBAs have the capacity to make pregnant women have safe delivery				
No	Reference			
Yes	.7638889 (.195994 -2.977267)	0.698	1.690111 (.1811398-15.76946)	0.645
Perception that skilled birth attendance can prevent maternal and neonatal deaths				
No	Reference			
Yes	.2717949 (.0758545 -.9738701)	**0.045**	.4123313 (.0740291 -2.296625)	0.312
Cues to action				
Experience of danger sign during last pregnancy?				
No	Reference			
Yes	1.021672 (.5521184 - 1.890561)	0.946	0.7440417 (.3212344 -1.723346)	0.49
Influence of danger sign on choice of place of birth				
No	Reference			
Yes	1.602485 (.7566269 - 3.393954)	0.218	2.870172 (.9884295-8.334321)	0.053
Heard of a TBA delivery that resulted in a maternal death				
No	Reference			
Yes	.8044361 (.4463505-1.449797)	0.469	0.8801442 (.4079161-1.899052)	0.745
Access to information on ANC and skilled delivery				
Interpersonal communication	Reference			
Mass media	1.057728 (.9243909-1.210298)	0.414	1.071644 (.9159248-1.253837)	0.388
Influence on mass media information regarding ANC and skilled delivery to use SBAs instead of TBAs				
No	Reference			
Yes	.2268519 (.0832288-.6183171)	**0.004**	0.3885315 (.108941-1.385674)	0.145
Perceived self – efficacy				
Confidence in utilization and sustenance of skilled birth attendance				
No	Reference			
Yes	.0532663 (.0060922-.4657303)	**0.008**	0.5646796 (.0190966 -16.69739)	0.741

P- value < 0.05 was considered significant at 95% confidence interval

3.2 DISCUSSION

Utilization of skilled birth care is a critical indicator for measuring progress in the reduction of maternal and neonatal mortality as indicated in the United Nations Sustainable Development Goal (SDG) number three (3) (CID, 2015). This study found that proportion of births attended by skilled birth attendants in the study area was high (77.5%). This result is higher than the current national (Ghana) average of 74%, sub-Saharan Africa average of 63% and almost at par with the WHO's minimum expected coverage of skilled birth attendance rate of 80% among

nations and sub-population groups (Apanga & Awoonor-Williams, 2017; Dickson et al., 2017). This high SBA use in the study area could be attributed to a mixture of health system improvements and community participation as well as engagements in the area of community durbars, outpatient department maternal health education at ANC, CWC and implementation of CHPS strategies in many zones and sub-municipalities of the area. It was also noted that the Nkwanta south municipality was beneficiary of the 'CHPS Plus programme' funded by the Doris Duke Charitable Foundation, which is an enhanced form of the CHPS strategy. As part of the programme, a lot of community engagement was done including health system strengthening such as infrastructure development and medical equipment supply towards enhancing health seeking behaviour of the people especially vulnerable groups such as pregnant women, lactating mothers with children under five years of age. It was also observed that the pregnant women who have valid Ghana National Health Insurance Card benefitted from free or sometimes-reduced cost of maternal health services including skilled delivery. So, this initiative has also reduced healthcare financial barrier for most of the pregnant women and mothers with children under one year that go for growth monitoring and promotion – *weighing and counselling,* of children under five years in the study area (GHS DHIMS-2 Report, 2019).

The study also found that 4 or more ANC visits was associated with utilization of skilled birth attendance which corroborates findings of other studies conducted in other countries such as Afghanistan, India, Uganda, Nigeria, Ethiopia, Tanzania and Kenya (WHO, 2014; 2015; 2019; Damian et al., 2020).

It has been proven in previous studies and in this study that attending WHO's recommended 8 ANC visits, affords women with a chance to receive more counseling and key maternal health interventions and subsequently increases pregnant women's chance and confidence to use SBA during childbirth (Kabakyenga et al., 2012; Adewemimo, 2013; Kihulya & Mmbaga 2015).

Furthermore, results of the study revealed that most of the background characteristics such as age, marital status, education, tribe, residence, occupation, religion, distance to health facility and ANC attendance in last pregnancy determine utilization of skilled birth attendance. This gives credence to evidence of other studies that predisposing factors such as age, religion, education, attitudes, and values are significant in informing people's decisions to utilize health care services and in this case skilled birth personnel (Anderson & Newman, 1973; Sekyi & Amu, 2017). For instance, previous studies have identified that educated women with formal education are significantly more likely to use SBAs at birth compared to women with no formal education as have been revealed in this study (Stekelenburg et al., 2004; Amoako-Coleman et al., 2015; Damian et al., 2020).

Similarly, as indicated in many studies, the level of education of respondents' partners was significantly associated with SBA use since they are heads of families and communities who determine most of the decisions and actions of their spouses such as healthcare and well-being practices. With formal education, they are better informed and empowered to support their wives, daughters and sisters very well in reproductive and maternal health services like ANC and skilled birth attendance (Gitmu et al., 2015: Amoako-Coleman et al., 2015; Damian et al., 2020). Location of respondents' residence in terms of distance to the health facility was another significant predictor of skilled birth attendance in this study. It was realized that most mothers who were staying within 30 minutes walking distance to access the nearest health facility (83.4%) utilized SBA during childbirth than those spending one (1) hour or more to access same services (16.6%). This finding is in line with a study conducted in Northern parts of Ghana by Sekyi & Amu (2017).

Indeed, results of this study have emphasized the fact that in the health belief model being the conceptual framework of this research, people's perception and behaviour play major role in the decision they make in seeking health from all settings. It was found that modifying the underlying factors in the HBM may influence mothers' and their families' preference to access skilled birth services or not. Again, perception of susceptibility to and severity of experiencing pregnancy and childbirth complications from the patronage of unskilled birth attendants such as TBAs had influence on mothers' decision to use skilled delivery services (Tarkang & Zotor, 2015). Hence, encouraging and empowering women, their family and the community will improve the perception and the drive in them to use services of SBAs. This initiative can also reduce the perceived barriers that may prevent them from using safe motherhood interventions including skilled delivery.

IV.   CONCLUSION AND RECOMMENDATIONS

This study investigated the proportion of mothers with children under one (1) year of age who were delivered by SBAs and the determinants of skilled birth attendance in the Nkwanta South Municipality of the Oti region, Ghana, using the HBM. Results of the study indicated that the prevalence of births attended by skilled birth attendants was high (77.5%) in the study area. Factors such as mothers and their partners having at least senior high school

education, living relatively close to a health facility, attending ANC 4 or more times were associated with SBAs use. Additionally, mothers' perception and health seeking behaviour play a big role in utilization of SBAs or not in line with the health belief model. Thus, being informed of expected date of delivery, perception of preference of SBAs to unskilled birth attendants and influence of mass media communication about maternal and child health information positively determine utilization of skilled birth attendance. However, the study also revealed factors that militate against utilization of skilled birth attendance. These include lack of transport especially during labour at night, long distance in accessing health facility services, inadequate knowledge on skilled birth and financial constraints. Therefore, women who are less likely to use SBAs at birth can be identified early at antenatal care sessions through their background information relating to place of residence, education status, marital status, socio-economic level and history of labour or birth complications. These vulnerable women of reproductive age and their families must be targeted with appropriate interventions and strategies to improve skilled attendance at birth. Based on the findings of the study, the following actions are recommended for public health policy and practice.

Firstly, healthcare providers led by the Nkwanta south Municipal Health Directorate need to encourage women to attend the recommended ANC visits regularly through community and facility engagements to improve maternal and new-born outcomes. Therefore, efforts beyond the health system are needed to reach all women of the reproductive age and their families.

Secondly, the need to educate women on their expected date of delivery is important and that innovative technologies of measuring expected date of delivery are required in this setting. This will improve preparedness and avoid the patronage of unskilled birth attendants even if labour sets in late in the night.

Thirdly, continuous professional development (CPD) programmes as part of in-service training for SBAs are needed from time to time to improve the quality of maternal and child health services such as ANC and skilled delivery. This capacity strengthening exercise is also necessary for improvement in maternal and new-born health outcomes in the municipality.

Additionally, the Central government should enhance at least basic and secondary education among both females and males in the area. The free Senior High School policy being implemented in Ghana including the Nkwanta South Municipality should be improved to cover a lot of adolescents to empower them for improved decision making in future.

Furthermore, government agencies such as the Municipal Assembly of the area should always collaborate with Health Authorities when it comes to siting and constructing health facilities.

To reduce delays and transport issues, local transport system and referral linkages should be enhanced across the municipality.

Finally, public health interventions aimed at improving health education and behaviour change communication (SBCC) on safe motherhood services such as ANC and skilled birth attendance and child welfare clinics need to be enhanced to increase demand towards improving maternal and child health outcomes.

Further study through qualitative approach is needed to explore reasons for the choice of using unskilled birth attendants by some women and their families in the municipality.

It is expected that if most of the above actions are implemented well, it will enhance and sustain the drive and the global call to reduce the maternal mortality ratio to less than 70 maternal deaths per 100,000 live births by the year 2030 as part of ensuring the attainment of the Sustainable Development Goals.

AUTHORS' CONTRIBUTIONS

Charles Duodu being the principal investigator, conceived the study and collected data, entered data, analysed data and wrote report; Anne-Marie Bagnall provided guidance and supervision (LBU, UK) and Francis Bruno Zotor (UHAS, Ghana) provided technical assistance and motivation for the study.

COMPETING INTEREST
The authors declare no conflicts of interest.

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