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# Correlates of maternal health services utilization among adolescent mothers in Ghana: analysis of Ghana maternal health survey 2017

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## Abstract

**Background** The prevalence of adolescent pregnancy is high in developing countries and poses a public health threat. This study aimed to assess the coverage and correlates of optimal ANC visits, early initiation of ANC visits, assisted delivery and health facility delivery among adolescent mothers.

**Methods** We analysed data from the 2017 Ghana Maternal Health Survey (GMHS), using a sample of 567 (weighted) and 527 (unweighted) adolescent mothers with at least one live birth or stillbirth in the five (5) years preceding the survey.

**Results** Most participants obtained four or more ANC visits, accessed health facility delivery and assisted delivery. Half (50%) of the participants initiated ANC visits in the first trimester. Less than half (39%) of the participants utilized all four maternal health services optimally. Utilization of maternal health services was associated with predisposing factors (age and parity) and enabling factors (wealth index, health insurance, permission to seek care). For instance, adolescent mothers aged 18–19 years (AOR = 1.65, 95% CI: 1.01–2.70) had increased odds of early initiation compared to those aged 15–17 years. Adolescent mothers who were uninsured (AOR = 0.30, 95% CI: 0.15–0.63) were less likely to obtain optimal ANC visits than insured mothers. Adolescent mothers in the middle wealth index (AOR = 1.97, 95% CI: 1.06–3.63) were about twice more likely to utilize all the four maternal health services compared to those in the lowest wealth index.

**Conclusion** This study has demonstrated that adolescent utilization of ANC visits, health facility delivery and skilled delivery were satisfactory. However, ANC initiation and optimal utilization of the recommended maternal health services were unsatisfactory. Utilization of the maternal health services was determined by predisposing factors such as age and parity as well as enabling factors including health insurance coverage, permission for treatment and wealth index.

**Keywords** Adolescent mothers, Maternal health services, Antenatal care, Delivery services, Maternal health survey, Ghana

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## Background

It is anticipated that by 2030, there will be an increase in the number of adolescent pregnancies, with Africa accounting for the largest share. Reducing maternal and neonatal mortalities are global health priorities as well as targets of the Sustainable Development Goals (SDGs). For instance, SDG 3 aims to eliminate preventable newborn deaths by 2030 and reduce maternal deaths to less than 70 per 100,000 live births [1]. However, due to the low utilization of maternal health services among adolescent mothers, achieving these targets may be difficult in developing countries [2]. Adolescents have a higher risk of dying during pregnancy than their older counterparts because they are more likely to have serious pregnancy complications [3]. Additionally, babies born to mothers under the age of 20 have a higher risk of being underweight at birth, having preterm deliveries and dying [4]. Consequently, adolescent mothers require special attention and access to quality prenatal care and skilled delivery services. Optimal utilization of antenatal care (ANC) and skilled delivery services can aid in reducing maternal and infant mortality [2]. Antenatal care affords pregnant women the opportunity to interact with the health care system for monitoring, prevention, early detection and treatment of any pregnancy-related complications. In addition, it provides pregnant women with access to information on skilled attendance, postnatal care, breastfeeding, HIV counselling and testing, and family planning [5]. In addition, women who utilize skilled delivery services receive adequate care and services from trained professionals in well-equipped health facilities.

However, available data indicate that adolescents' utilization of maternal health services in low- and middle-income countries remains low. For instance, a study in Nigeria revealed that 35% of adolescent mothers obtained optimal ANC visits, 25% accessed safe delivery services, and 32% received postnatal care [6]. A study in Bangladesh demonstrated that adolescents' utilization of skilled maternal health services was associated with higher educational status, high socio-economic status, residing in an urban area, autonomy and birth history [5]. In addition, a systematic review of literature in low- and middle-income countries found wealth, media exposure, partner education, place of residence, and the mother's education influenced maternal health service utilization among adolescent mothers [7].

In Ghana, adolescent pregnancy is prevalent and poses a threat to public health. In 2020 alone, the country recorded 109,888 adolescent pregnancies, including 2,865 girls aged 10–14 years and 107,025 girls aged 15–19 years [8]. However, there is a dearth of literature on adolescents' utilisation of maternal health services in Ghana [9]. Existing studies in Ghana have focused on usage among women in specific districts [10, 11] and women

aged 15 to 24 [12]. In addition, previous studies were insufficiently exhaustive and focused on specific maternal health services [13, 14]. To the best of the authors' knowledge, this is the maiden study in Ghana to investigate adolescents' utilization of multiple maternal health services. This study aimed to assess correlates of optimal ANC visits, early initiation of ANC visits, assisted delivery and health facility delivery among adolescent mothers across all the administrative regions of Ghana by analysing data from the Maternal Health Survey, 2017. The findings of this study would be applicable to maternal health policies, programmes and future research.

## Conceptual framework

This study was underpinned by Andersen's Behavioral Model (BM) of healthcare utilization to explain the correlates of MHS utilization among adolescent mothers in Ghana. The proponent of the BM argues that an individual's decision to seek health care is a function of three main factors, including predisposing, enabling and need factors. However, each component is conceived of as making an independent contribution to predicting use. Predisposing factors comprise demographic and social characteristics of individuals, including age, educational status, knowledge and beliefs about health services. Enabling factors refer to factors that facilitate or impede use. These are personal or community resources that make it possible for people to access healthcare. Examples include socio-economic status, health insurance coverage and transportation issues. Need factors comprise perceived and evaluated need for health services. Perceived need refers to how the individual views their health status and wellbeing, while evaluated need refers to professional assessment of an individual's health status [15]. For this study, the authors assess the influence of some predisposing and enabling factors on the use of MHS among adolescent mothers in Ghana. Predisposing factors comprise age, educational status, parity and place of residence of the respondents. Enabling factors include wealth index, health insurance coverage, money for treatment, permission for treatment and distance to health facility (Fig. 1). These factors have been adopted by similar studies using national demographic and health data [16–18].

## Methods

### Study design and source of data

This study was a secondary analysis of data from the 2017 Ghana Maternal Health Survey (GMHS). The design for the 2017 GMHS was a cross-sectional survey conducted at the household level. The 2017 GMHS aimed to produce nationally representative data on key maternal health indicators for urban and rural areas, as well as for three zonal levels (Coastal, Middle, and Northern)



**Fig. 1** Conceptual framework adapted from Andersen's behavioral model of healthcare utilization

and each of the 10 administrative regions in Ghana. The survey, conducted by the Ghana Statistical Service (GSS) and partners, was a nationally representative household survey carried out from June 15 to September 12, 2017 [19].

### Population and sampling

The 2017 GMHS focused on women of reproductive age (15–49 years) residing in the former ten administrative regions of Ghana. Using a two-stage sampling technique, a fixed number of 30 households were selected from each of the 900 Enumeration Areas (EAs), resulting in a total sample size of 27,000 households across the country. Allocation of the sample was not proportional to the different regions and there was no replacement of non-responding households [19]. A total of 25,062 women of reproductive age were interviewed during the 2017 GMHS, corresponding to a response rate of 99.0%. This study focused on adolescent mothers aged 15–19, therefore participants older than 19 years ( $n=20153$ ) were deleted from the dataset prior to the final analysis. Moreover, adolescents who had never given birth ( $n=4382$ ) were also deleted from the data. We analysed data from a sample of 567 (weighted) and 527 (unweighted) adolescent mothers with at least one live birth or stillbirth in the five (5) years preceding the survey. There was no available data in the GMHS for women who were currently pregnant at the time of the survey and had not yet delivered.

### Study variables

This study was based on data collected with a structured questionnaire for women used during the survey. All variables in the analysis were from the Individual recode file of the 2017 GMHS. There were four (4) dependent variables in this study, including ANC attendance, initiation of ANC, facility delivery and assisted delivery. ANC attendance and ANC initiation were originally continuous variables. They were recoded into categorical variables for this study. ANC attendance was recoded as ( $<4$  ANC visits = 0;  $\geq 4$  ANC visits = 1) and ANC initiation as ( $<4$  months = 1;  $\geq 4$  months = 0). Facility delivery and assisted delivery were categorical variables coded as (1 = health facility and 0 = home) and (1 = professional and 0 = non-professional), respectively. A composite outcome comprising the four dependent variables was generated and coded as (no = 0 '0–3 services'; yes = 1 'all 4 services').

The independent variables were selected from the literature, based on their availability in the dataset for this analysis and guided by Andersen's behavioral model of healthcare utilization [3, 9, 12]. These were mainly predisposing and enabling factors. Predisposing factors comprised respondent's age (a continuous variable), educational status (1 = no education, 2 = primary, 3 = JHS, 4 = Secondary/Higher), parity (1 = one birth, 2 = two to three births), and place of residence (1 = urban, 2 = rural). Variables such as wealth index, health insurance coverage and barriers to accessing health services were used as enabling factors. Wealth index was coded (1 = lowest, 2 = second, 3 = middle, 4 = fourth, 5 = highest).

Health insurance coverage was coded as 1 = insured and 2 = non-insured. Barriers to accessing health services were measured using three items: money for treatment, permission to seek treatment and distance to the health facility, which were coded as (1 = a big problem, 2 = not a big problem).

**Table 1** Characteristics of participants and utilization of maternal health services among adolescent mothers in Ghana

Response	n (%)
Wealth index	141(24.9)
Lowest	185(32.6)
Second	141(24.9)
Middle	70(12.3)
Fourth	30(5.3)
Highest	
Type of place of residence	222(39)
Urban	345(61)
Rural	
<b>Age groups (years)</b>	179(32)
15–17	389(68)
18–19	
<b>Educational level completed</b>	44 (8)
No education	163(29)
Primary	323(57)
Junior high	36(6)
Senior high	
<b>Health insurance coverage</b>	480(85)
Yes	87 (15)
No	
<b>Parity</b>	502(89)
1	65(11)
2–3	
<b>Money for treatment</b>	305(54)
Big problem	262(46)
Not a big problem	
<b>Permission for treatment</b>	39(7)
Big problem	528(93)
Not a big problem	
<b>Distance to a health facility</b>	167(29)
Big problem	400(71)
Not a big problem	
<b>ANC visits</b>	101(18)
< 4 ANC visits	449(82)
≥ 4 ANC visits	
<b>ANC initiation</b>	273(50)
Early (< 4 months)	277(50)
Late (≥ 4 months)	
<b>Place of delivery</b>	105(19)
Home	461(81)
Health facility	
<b>Assisted delivery</b>	112(20)
Non-professional	454(80)
Professional	
<b>Utilized all the four MH services</b>	338(61)
No	212(39)
Yes	

## Data analysis

Data management and analyses were conducted using STATA/SE version 16.0 (Stata-Corp, College Station, Texas, USA). The data were analysed in three levels: the uni-variable, bi-variable and multi-variable. Frequencies and percentages were computed at the uni-variable level, crude analysis at the bi-variable level to check for associations and adjusted multiple logistic regression was computed at the multi-variable level to identify the salient predictors of the outcome variables. In the crude analysis, the individual predictors were regressed against the outcome variables without controlling for other predictors. While, in the adjusted analysis, all the predictors that were significant in the crude analysis were included in the regression model simultaneously. The “svyset” feature in STATA 13 was used, with the weighting, cluster and strata variables. Statistical significance was reported at the 0.05 significance level and odds ratios with a 95% confidence interval.

## Ethical issues

Appropriate permission was sought for and received from the Demographic and Health Survey Program to download and use the relevant datasets. The data is confidential and was therefore shared only with the study team, as required by the DHS Program. Besides this, no further ethical approval was required; this study used solely secondary data from a publicly available dataset that does not contain any identifiers with respect to the study participants for its analysis.

## Results

### Utilization of maternal health services

The majority (82%) of the participants obtained four or more ANC visits (optimal ANC visits), exactly half (50%) initiated ANC visits in the first trimester of pregnancy (early ANC initiation), 81% gave birth in a health facility, and 80% were assisted by a health professional during delivery. Less than half (39%) of the participants accessed all the four maternal health services (Table 1).

### Participant characteristics

The results showed that the majority of the participants resided in rural areas (61%), were aged 18–19 years (68%), and had obtained junior high school education (57%). About nine in ten participants had one child. Moreover, 85% of the participants had health insurance coverage. Regarding barriers to accessing health services, a majority (54%) of the participants indicated that access to money for treatment was a big problem. However, most of the participants did not perceive the following as a big problem in accessing health services: distance to a health facility (71%), and permission to seek treatment

(93%). About a quarter (24.9%) of the participants were in the lowest wealth index (Table 1).

#### Factors influencing utilization of maternal health services among adolescent mothers

At the crude analysis level, we found some predisposing and enabling factors associated with ANC visits. For instance, adolescent mothers who had two or three births had lesser odds of obtaining optimal ANC visits (COR: 0.28, 95% CI: 0.10–0.76) compared to those who had one birth. Adolescent mothers who were not covered by health insurance (COR: 0.25, 95% CI: 0.11–0.57) were less likely to obtain optimal ANC visits compared to those covered by health insurance. Additionally, adolescent mothers who had no problem seeking permission for treatment were three times more likely to obtain optimal ANC visits compared to their counterparts (COR: 3.04, 95% CI: 1.24–7.42). Early ANC initiation was significantly associated with predisposing factors, including age of respondent. Adolescent mothers aged 18–19 (COR: 1.65, 95% CI: 1.01–2.70) were about two times more likely to initiate early ANC visits compared with those aged 15–17.

Health facility delivery was significantly associated with demographic characteristics of respondents including wealth index, place of residence, educational status and other enabling factors such as distance to a health facility. Rural adolescent mothers (COR: 0.40, 95% CI: 0.22–0.73) were less likely to give birth in a health facility compared with urban participants. Adolescent mothers with secondary school education (COR: 6.92, 95% CI: 1.37–34.89) were about seven times more likely to give birth in a health facility compared to those with no formal education. Adolescents who did not have distance problem (COR: 1.77, 95% CI: 1.14–2.74) had increased odds of delivering in a health facility compared to their counterparts. Mothers in the fourth wealth index (COR=3.31, 95% CI: 1.27–8.59) had increased odds of health facility delivery compared to those in the lowest wealth index.

Utilization of assisted delivery services was influenced by predisposing factors, such as educational status and place of residence. For example, adolescents with secondary education (COR: 6.75, 95% CI: 1.15–39.42) were more likely to be assisted by a health professional during delivery compared with their counterparts. However, adolescents in rural areas (COR: 0.43, 95% CI: 0.23–0.81) had reduced odds of accessing assisted delivery compared to those in urban areas. Enabling factors, such as wealth index, health insurance coverage and distance to a health facility were significantly associated with utilization of assisted delivery. For example, participants who did not perceive distance as a big problem (COR:1.92, 95% CI:1.18–3.11) were more likely to be assisted by a health professional during delivery compared with their

counterparts. Also, participants without health insurance coverage (COR: 0.44, 95% CI: 0.20–0.96) and those in the middle wealth index (COR: 8.25, 95% CI: 3.18–21.39) had increased odds of accessing assisted delivery compared to their counterparts. Also, adolescent mothers in the middle wealth index (COR: 1.97, 95% CI:1.06–3.63) were about twice more likely to utilize all the four services compared to those in the lowest wealth index (Table 2).

In the adjusted analysis, utilization of ANC and delivery services were significantly associated with age, parity, health insurance coverage, permission for treatment and wealth index. Participants with parity of two or three (AOR=0.25, 95% CI: 0.11–0.57) were less likely to obtain four or more ANC visits compared to those with parity of one. Adolescent mothers who were uninsured (AOR=0.28, 95% CI: 0.13–0.60) were less likely to obtain optimal ANC visits compared with insured mothers. Moreover, mothers who did not have difficulties seeking permission (AOR=2.93, 95% CI: 1.14–7.52) were about three times more likely to obtain optimal ANC visits compared to their counterparts. Regarding ANC initiation, adolescent mothers aged 18–19 years (AOR=1.65, 95% CI: 1.01–2.70) had increased odds of early initiation compared to those aged 15–17 years. Participants residing in middle wealth index (AOR=4.98, 95% CI: 1.88–13.19) were about five times more likely to deliver in a health facility compared to those in the lowest wealth index. Again, adolescents in the middle wealth index (AOR=5.18, 95% CI: 1.87–14.32) were more likely to access assisted delivery compared to those in lowest wealth index (Table 3).

#### Discussion

It was found that eight in ten adolescent mothers obtained four or more ANC visits, gave birth in a health facility and were assisted by professional health workers during delivery. These findings are higher than the findings of similar studies in Africa. For instance, a similar study in Nigeria revealed that 35% and 25% of adolescent mothers obtained at least four ANC visits and safe delivery services, respectively [6]. Another study in Kenya demonstrated that 51% of adolescent mothers obtained four or more ANC visits, while 65% accessed skilled delivery services [20]. The differences in findings may be attributed to the Free Maternal Health Policy (FMHP) in Ghana. Through the FMHP, pregnant women who have registered with the National Health Insurance Scheme (NHIS) can have access to free ANC, delivery, and postnatal care for the mother and child [21]. This implies that a majority of adolescent mothers in Ghana are probably less likely to experience negative pregnancy outcomes and complications during delivery, which can help reduce the incidence of newborn and maternal deaths.

**Table 2** Crude logistic regression of factors associated with utilization of antenatal care and delivery services among adolescent mothers in Ghana

Response	ANC visits COR 95% CI	ANC initiation COR 95% CI	Place of delivery COR 95% CI	Assisted delivery COR 95% CI	All four services COR 95% CI
Predisposing factors					
<b>Place of residence</b>	1(ref)	1(ref)	1(ref)	1(ref)	1(ref)
Urban	0.88(0.44–1.76)	1.13(0.68–1.87)	0.40(0.22–0.73) *	0.43(0.23–0.81) *	0.91(0.57–1.47)
Rural					
<b>Age (years)</b>	1(ref)	1(ref)	1(ref)	1(ref)	1(ref)
15–17	1.49(0.85–2.59)	1.65(1.01–2.70)*	1.10(0.64–1.91)	1.25(0.71–2.21)	1.62(0.99–2.65)
18–19					
<b>Educational level</b>	1(ref)	1(ref)	1(ref)	1(ref)	1(ref)
No education	0.39(0.13–1.12)	0.68(0.31–1.50)	1.26(0.58–2.75)	1.40(0.59–3.35)	0.61(0.27–1.40)
Primary	0.62(0.24–1.61)	0.98(0.43–2.21)	1.63(0.79–3.34)	1.98(0.84–4.62)	1.08(0.51–2.31)
Junior high	0.68(0.14–3.29)	1.25(0.41–3.79)	6.92(1.37–34.89) *	6.75(1.15–39.42) *	1.74(0.59–5.14)
Senior high					
<b>Parity</b>	1(ref)	1(ref)	1(ref)	1(ref)	1(ref)
1	0.28(0.10–0.76) *	1.07(0.55–2.09)	0.53(0.27–1.04)	0.75(0.35–1.60)	0.64(0.27–1.47)
2–3					
<b>Enabling factors</b>					
<b>Health insurance</b>	1(ref)	1(ref)	1(ref)	1(ref)	1(ref)
Yes	0.25(0.11–0.57) *	0.64(0.31–1.33)	0.52(0.25–1.09)	0.44(0.20–0.96) *	1.08(0.71–1.64)
No					
<b>Wealth index</b>	1(ref)	1(ref)	1(ref)	1(ref)	1(ref)
Lowest	2.49(1.19–5.19)*	1.70(0.99–2.90)	1.70(0.95–3.05)	1.81(1.00–3.27)*	1.67(0.96–2.92)
Second	1.42(0.64–3.13)	1.61(0.88–2.93)	7.02(2.81–17.56)*	8.25(3.18–21.39)*	1.97(1.06–3.63)*
Middle	2.03(0.75–5.49)	0.79(0.36–1.69)	3.31(1.27–8.59)*	3.65(1.40–9.48)*	1.07(0.48–2.38)
Fourth	6.79(0.84–54.98)	2.25(0.69–7.29)	3.29(0.70–15.50)	1.37(0.40–4.68)	1.39(0.46–4.16)
Highest					
<b>Permission for treatment</b>	1(ref)	1(ref)	1(ref)	1(ref)	1(ref)
Big problem	3.04(1.24–7.42) *	0.90(0.39–2.08)	1.78(0.77–4.10)	1.63(0.70–3.77)	2.07(0.96–4.46)
Not a big problem					
<b>Distance to health facility</b>	1(ref)	1(ref)	1(ref)	1(ref)	1(ref)
Big problem	1.40(0.81–2.44)	0.79(0.45–1.39)	1.77(1.14–2.74) *	1.92(1.18–3.11) *	1.01(0.60–1.69)
Not a big problem					
<b>Money for treatment</b>	1(ref)	1(ref)	1(ref)	1(ref)	1(ref)
Big problem	1.19(0.65–2.16)	0.84(0.54–1.29)	1.07(0.65–1.78)	1.11(0.67–1.84)	0.69(0.15–1.25)
Not a big problem					

\*p-value &lt; 0.05

However, five in ten adolescent mothers made late ANC visit, and less than half utilized all the four maternal health services. Thus, obtained four or more ANC visits, initiated early ANC visit, delivered in a health facility and had assisted delivery. Studies in low and middle-income countries have confirmed that most adolescent mothers initiate ANC visits after three months of pregnancy. For example, Banke-Thomas, Kivuvani, and Ameh [20] found that more than six in ten adolescent mothers in Kenya initiated ANC visits in the second trimester. A plausible explanation is that adolescent mothers may be less knowledgeable of the signs of pregnancy, hence they may be unable to detect pregnancy earlier. Late detection of pregnancy may lead to late initiation of ANC visits. Moreover, adolescent girls may conceal their pregnancy in the first trimester to avoid stigma and shame. Lack of money, inadequate knowledge about the importance of ANC and the appropriate time to initiate ANC visits

may also explain the late initiation of ANC visits among adolescents. Sub-optimal utilization of maternal health services may expose adolescent mothers to pregnancy-related complications and negative pregnancy outcomes. Hence, it is necessary for stakeholders, including the Ministry of Health, Ghana Health Service, and non-governmental organizations, to strengthen efforts through policies and programmes that address barriers to accessing maternal health services.

Adolescent mothers' utilization of antenatal and delivery services was determined by predisposing and enabling factors. For example, optimal ANC visits was significantly associated with parity, insurance status and permission for treatment. Early initiation of ANC was associated with age of the respondent. Wealth index was associated with health facility delivery, assisted delivery and utilization of all the four maternal health services

**Table 3** Adjusted logistic regression of factors associated with utilization of antenatal and delivery care among adolescent mothers in Ghana

Response	ANC visits AOR 95% CI	ANC initiation AOR 95% CI	Place of delivery AOR 95% CI	Assisted delivery AOR 95% CI	All four services AOR 95% CI
Predisposing factors					
<b>Place of residence</b>	n/s	n/s	1(ref)	1(ref)	n/s
Urban			0.61(0.33–1.15)	0.58(0.31–1.08)	
Rural					
<b>Age (years)</b>	n/s	1(ref)	n/s	n/s	n/s
15–17		1.65(1.01–2.70) *			
18–19					
<b>Educational level</b>	n/s	n/s	1(ref)	1(ref)	n/s
No education			0.85(0.36–1.98)	0.96(0.42–2.29)	
Primary			1.18(0.53–2.64)	1.43(0.63–3.23)	
Junior high			3.76(0.66–21.33)	4.03(0.72–22.57)	
Senior high					
<b>Parity</b>	1(ref)	n/s	n/s	n/s	n/s
1	0.25(0.11–0.57)*				
2–3					
<b>Enabling factors</b>					
<b>Health insurance</b>	1(ref)	n/s	n/s	1(ref)	n/s
Yes	0.28(0.13–0.60) *			0.49(0.23–1.03)	
No					
<b>Wealth index</b>	1(ref)	n/s	1(ref)	1(ref)	1(ref)
Lowest	2.08(0.97–4.47)		1.33(0.68–2.60)	1.16(0.59–2.27)	1.67(0.96–2.92)
Second	1.41(0.67–2.98)		4.98(1.88–13.19) *	5.18(1.87–14.32)*	1.97(1.06–3.63)*
Middle	1.64(0.53–5.03)		1.94(0.69–5.45)	1.76(0.62–4.99)	1.07(0.48–2.38)
Fourth	5.13(0.57–445.75)		1.72(0.33–8.92)	0.56(0.14–2.16)	1.39(0.46–4.16)
Highest					
<b>Money for treatment</b>	n/s	n/s	n/s	n/s	n/s
Big problem					
Not a big problem					
<b>Permission for treatment</b>	1(ref)	n/s	n/s	n/s	n/s
Big problem	2.93(1.14–7.52) *				
Not a big problem					
<b>Distance to health facility</b>	n/s	n/s	1(ref)	1(ref)	n/s
Big problem			1.36(0.76–2.45)	1.50(0.84–2.70)	
Not a big problem					

\*p-value < 0.05, n/s: not significant at the univariable level

[22–24]. These findings are confirmed by prior studies across the African region [13, 20].

These findings may be explained by several factors. For instance, adolescent mothers who have given birth to two or three children may have more pregnancy-related experiences, which may influence their decisions to access sub-optimal ANC. On the other hand, those who have given birth to one child may be less experienced and more anxious, hence they are less likely to miss ANC visits. Adolescent mothers may require permission and financial support from their parents or partners to access ANC services. Therefore, pregnant adolescents who lack adequate parental or partner support may be unable to obtain adequate ANC visits. Adolescent mothers aged 18–19 years were more likely to initiate early ANC visits compared to those aged 15–17 years. Older adolescents are eligible to engage in economic activities and marital relationships. Therefore, they may have partner support

and can afford transportation and other fees during ANC visits. Also, they may be less uncomfortable to disclose pregnancy compared to minors or young adolescents. Similarly, mothers from well-to-do households can afford maternal health services charges. Additionally, lack of money for transportation may pose a serious challenge to accessing maternal health services.

Adolescent mothers without health insurance coverage were less likely to obtain four or more ANC visits compared to those insured. In Ghana, maternal health services are included in the benefit package of the National Health Insurance Scheme (NHIS) and free of charge under the Free Maternal Health Policy (FMHP). There is substantial evidence to show that Ghana's FMHP under the NHIS has contributed significantly to increasing financial access to maternal health services [25–27]. The public health implications of these findings are that adolescent mothers who are not insured, multiparous,

aged 15–17 years, and those in the lowest wealth index, might be at a higher risk of negative pregnancy outcomes, including maternal and newborn deaths. Therefore, the Ministry of Health, Ghana Health Service and non-governmental organizations can leverage the information in this study to develop guidelines and interventions to help improve adolescents' utilization of maternal health services. Based on the findings, it is recommended that interventions should focus on promoting early initiation of ANC visits and comprehensive utilization of recommended maternal healthcare services. Addressing barriers to accessing maternal health services among adolescent mothers could help Ghana to achieve the Sustainable Development Goal target 3.7.1, which aims at ensuring universal access to reproductive health services by 2030.

### Study strengths and limitations

This study provides information on the use of maternal health services among adolescent mothers in Ghana. To the best of the authors' knowledge, this is the first study in Ghana to investigate the utilization of multiple maternal health services among adolescent mothers using nationally representative data and Andersen's behavioral model of utilization of health services. Hence, study findings can be generalised to adolescent mothers in Ghana. However, this study is limited in making a causal inference to relationships found in the study, which is a weakness of the study design. Again, this study could not reveal the underlying factors explaining the health-seeking behaviours of adolescent mothers. Therefore, future studies should adopt qualitative designs to help generate in-depth information regarding adolescent mothers' health-seeking behaviours.

### Conclusions

This study has demonstrated that adolescent utilization of ANC visits and skilled delivery services were satisfactory. However, ANC initiation and full utilization of maternal health services were unsatisfactory. Utilization of maternal health services were associated with predisposing factors (mother's age and parity) and enabling factors (wealth index, health insurance coverage and seeking permission for treatment). The findings of this study provide relevant information for maternal health policies and programmes in Ghana.

### Abbreviations

ANC	Antenatal care
DHS	Demographic and health survey
FMHP	Free maternal healthcare policy
GMHS	Ghana maternal health survey
GSS	Ghana statistical service
HIV	Human immunodeficiency virus
NHIS	National health insurance scheme
SDG	Sustainable development goal

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### Author contributions

A.A.D.: Conceptualization, writing of original draft, supervision, reviewing and editing. E.A.A.: Writing of original draft, analysis of data and preparation of tables, reviewing and editing. O.E.A.N.: Data acquisition, analysis of data and preparation of tables, reviewing and editing. All authors read and approved the final manuscript.

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### Data availability

The authors cannot share the data used in this study because it is owned by The DHS Program. Interested persons may however contact The DHS Program for access to the data (<https://dhsprogram.com/data/available-datasets.cfm>).

### Declarations

#### Ethics approval and consent to participate

The Ghana Health Service Ethics Review Committee approved the protocols for the 2017 Ghana Demographic and Health Survey. Informed consent was obtained from all adult participants and for participants aged 15–17 years, informed consent was obtained from their parents or legal guardians. A formal request to use the raw data was made to The DHS Program through their website (<https://dhsprogram.com/data/available-datasets.cfm>). The study was performed in accordance with relevant regulations and guidelines. Data used in this study were anonymised before use.

#### Consent for publication

Not applicable.

#### Competing interests

The authors declare no competing interests.

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