Determinants of Optimal Antenatal Care Services Uptake among Adolescent Mothers in Bomachoge Borabu Subcounty, Kisii County

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Abstract

Background: Pregnancy and childbirth complications are leading causes of death among adolescent girls. Due to the high number of teenage pregnancies in Bomachoge Borabu Sub-County, this study aimed to determine adherence levels and factors associated with the uptake of antenatal care services among adolescent mothers in Bomachoge Borabu Sub-County, Kisii County, Kenya.

Methods: This study employed a quantitative cross-sectional design. Five government health facilities were purposively selected, and 293 adolescent mothers aged between 15 and 19 years randomly sampled. Structured questionnaires were used in the study. Fisher's exact test of association and multivariable analysis were carried out to determine the association between adherence and various variables.

Results: A majority of the sampled adolescent mothers (88.3 %) had access to at least one Antenatal Care (ANC) visit during their pregnancy. Their mean age was 17.4 (STD± 1.38) years. The majority (96.1 %) did not adhere to optimal ANC uptake, with 25.2 % and 48.8% adhering to the scheduled visits in the 1st and 2nd trimester, respectively. None came for the 3rd trimester. Gestational age at 1st ANC, knowledge of recommended number of ANC visits and mode of reminders to attend scheduled ANC visits were significantly associated in univariable analysis (p <.001). Mothers who sought ANC between 8-12 weeks and 16 weeks, respectively, were 24.5% (p<.00425) and 18.75 % (p<.0228) times more likely to adhere, respectively, compared to those who sought ANC at 4 weeks. Similarly, mothers without knowledge of the recommended number of ANC visits were 89% (p<.006) more likely to adhere compared to those who had the knowledge.

Conclusion: Most adolescent women were at risk of maternal morbidity and mortality due to high levels of non-adherence to optimal ANC uptake, despite having knowledge of the ANC recommendations. Early ANC contact initiation and use of ANC reminders boost adherence to optimal ANC uptake among adolescent mothers.

***Keywords**: Antenatal Care, Optimal ANC Uptake, Determinants of ANC, Adolescent Mothers*

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Introduction

Utilisation of Antenatal Care (ANC) services is a significant public health concern as pregnancy in adolescence is associated with adverse maternal and perinatal outcomes (1). ANC plays an essential role in promoting favourable pregnancy outcomes and optimal maternal health (2). To reduce perinatal mortality and improve women's experience of care, a minimum of eight contacts with the ANC facility is recommended. Globally, about 65% of women attend at least four ANC visits, yet 13% of women in Sub-Saharan Africa do

not attend ANC services at all, and only about 52% attend adequately (3, 4).

A study in Bangladesh revealed that knowledge is key for enlightening adolescent mothers on their health status and that about 42.6% of adolescent mothers give birth to their first babies unexpectedly without preparation, planning or ANC services (5). The study further revealed that 74.3% of participants reported utilising traditional birth attendants (TBA), with 36.3% indicating a preference for TBA delivery, which underscores their continued influence despite the dangers involved. In Indonesia, negative experiences during health examinations, such as perceived judgmental attitudes from healthcare professionals, deterred ANC uptake (6).

In Ghana, approximately 76% of adolescents did not complete the recommended eight ANC contacts (7). Similarly, in Uganda, although ANC uptake mitigates the adverse outcomes of adolescent pregnancies, only 41.1% achieved the recommended eight visits (8). Additionally, evidence indicates that socioeconomic factors strongly influence optimal ANC utilisation, highlighting the need to address these barriers to improve adherence (9,10).

In Kenya, 15% of adolescents aged between 15 and 19 years had begun childbearing (11). In 2019, Kisii County ranked 9th in adolescent pregnancies in Kenya, with 13% 15 and 19-year-olds having at least one child (12). It was posited that adolescent mothers had lower ANC attendance and poorer uptake of antiretroviral therapy (ARVs) for the prevention of mother-to-child transmission (PMTCT) of HIV, compared to older women (13). Similarly, low levels of sexual reproductive health (SRH) utilisation among adolescent girls were established in Homa Bay and Narok Counties (14). Further, despite the rise in the number of adolescents with improved knowledge of ASRH, a rise in health workers' partiality towards adolescents was noted (15).

The complexity of recurrent adolescent pregnancies has been identified in Kenya, emphasising education, contraception and gender equity (16). Adolescent pregnancy results in girls' social exclusion with implications on their health and economic (dis) empowerment (17). Despite the high numbers of teenage pregnancies in Kenya, the Ministry of Health (MoH) has no specific guidelines on quality obstetrics and perinatal care specific to this population. Most studies on ANC uptake among adolescent mother's compare ANC uptake among the younger population with older women of reproductive age without investigating specific experiences of adolescent mothers. This study aimed to bridge this gap by establishing factors associated with optimal Antenatal Care service uptake among adolescent mothers aged between 15 and 19 years in Bomachoge Borabu subcounty, Kisii county.

Methodology

Study design, site and population

This study adopted a cross-sectional study design. It targeted adolescent mothers who delivered within one year preceding the data collection period. Eligible participants were those aged between 15 and 19 years who had sought child immunisation or postnatal services from the selected study sites.

This study was carried out in sampled government health facilities in Bomachoge Borabu subcounty, Kisii county. Out of the 47 Counties in Kenya, Kisii county was ranked ninth in reported adolescent pregnancy cases with Bomachoge Borabu subcounty leading with776 adolescent mothers which translated to 26% among all pregnant women in 2022. Although this figure was a decline from the 52% reported in 2021, it remains the highest number of teenage pregnancies in the County (12).

Sampling techniques

Bomachoge Borabu was purposively sampled for this study, given the high number of adolescent pregnancies (19). Five health facilities were selected using cluster sampling based on their ranking and strategic location. The 30% rule was applied to determine the number of facilities required for sampling from

the 12 in the Sub-county (20). Random sampling from the immunisation register was used to select eligible respondents.

Sample size determination

The study considered approximately 776 adolescent mothers (N) aged 15 to 19 in Bomachoge Borabu Sub-County. Yamane's formula was used to determine the sample size (21):

$$n = N/[1 + N(e)^2],$$

Where:

n = required sample size,

N = target population size (776)

e = margin of error (0.05); this sets the confidence interval at 5% and confidence level at 95%.

Therefore, sample size, $n = 776/(1 + (776 * 0.05^2)) \approx 264$. An additional 10% was added to the calculated sample size to account for potential non-response, resulting in a final sample of 291 respondents.

Sample distribution by health facility

Proportionate stratified random sampling was used to distribute the sample among all the selected facilities (strata) to ensure proportionate representation based on workload, giving a final sample size of 293 due to the sampling factor, viz; $ni = nii * f$,

Where:

ni = stratum sample size; nii = stratum sample frame; f = sampling factor (n/N); N = population of targeted adolescent mothers in Bomachoge Borabu, and n = population of targeted adolescent mothers in each of the selected facilities. Table 1 represents the sample size allocation of the 293 respondents per facility.

Data collection

A structured questionnaire was developed for the study and pretested at the Itembo dispensary to ascertain reliability. The pilot test yielded a reliability coefficient of 0.70, indicating a strong internal consistency, which confirmed that the questionnaire was reliable for use in the study (22). Research assistants were trained on the electronic data collection tool before data collection. Responses were verified against entries in the mother-child booklet to minimise recall bias.

Data management and analysis

Data were checked for errors and cleaned before exporting to R statistical software, version 4.3.2, for analysis (23). Results were tabulated, summarised, and reported using frequencies and percentages, means and standard deviations. The number of visits was categorised to form the binary outcome variable (adherence), whereby fewer than eight visits were categorised as non-adherent, while eight or more visits were categorised as adherent.

Chi-square tests (where frequencies were more than 5) and Fisher's exact tests (where frequencies were less than 5) measures of association were carried out in R statistical software to determine the association between the outcome variable (ANC adherence) and various categorical variables like socio-demographic characteristics (such as mode of reminder, time taken to facility, main reason for choosing facility), perceptions and maternal factors (such as gestational age at 1st ANC). Where the independent variable was ordinal, such as perceptions towards ANC, the Cochran-Armitage test for trend was used.

Table 1:
Sample Size Allocation

Health Facility	Target Population	Desired Sample Size
Kenyanya level IV hospital	216	81
Magenche Health Centre	194	73
Eberege Health Centre	116	44
Magena Health Centre	220	83
Omobera Dispensary	30	12
Total	776	293

Predictor variables with a p-value of less than 0.2 in the bivariate analyses were entered into a multivariate regression model. Multivariate logistic regression for rare events (using Firth's bias reduction method, *logistf* function in R) was fitted to examine which predictor variables best predict adherence to ANC visits. Fitting a logistic regression model using Firth's bias reduction method, equivalent to penalisation of the log-likelihood, solved the problem of separation (a situation that arises when the outcome has too low, or too high, prevalence) in logistic regression. Confidence intervals for regression coefficients were computed by penalised profile likelihood. The regression results were reported as adjusted odds ratios with their 95% confidence intervals and p-values. A p-value of less than 0.05 was considered significant.

Ethical considerations

Ethical approval was obtained from the University of Eastern Africa, Baraton (UEAB) Ethical Review Committee (UEAB/ISERC/11/04/2023), Kisii Teaching and Referral Hospital Institutional Scientific Ethical and Review Committee (ISERC) (ISERC/KTRH/033/23) and a research license from the National Commission for Science, Technology, and Innovation (NACOSTI) (NACOSTI/P/23/27094). Approval to conduct the study was sought from Jomo Kenyatta University of Agriculture and Technology and the Kisii County Department of Health. Informed consent was obtained from all adult respondents and assent from participants younger than 18 years. Information obtained from respondents was handled with confidentiality, and the privacy of participants was protected.

Results

A total of 282 participants took part in the study with a response rate of 96.2%. The mean age of the respondents was 17.4 years, with nearly half (51.1%) aged between 18 and 19 years, of which 72.3% (n=204) had attained a secondary level of education. The majority (n = 137, 95.1%) did not adhere to optimal ANC uptake.

Proportion of adolescent mothers attending at least one ANC visit

The majority of the respondents (88.3 %) attended at least one ANC visit during their pregnancy, as shown in Figure 1.

Adherence to the recommended ANC schedule

Figure 2 shows that most respondents (96.1%) did not adhere to the eight visits for optimal ANC uptake, with a very small number (3.9%) adhering.

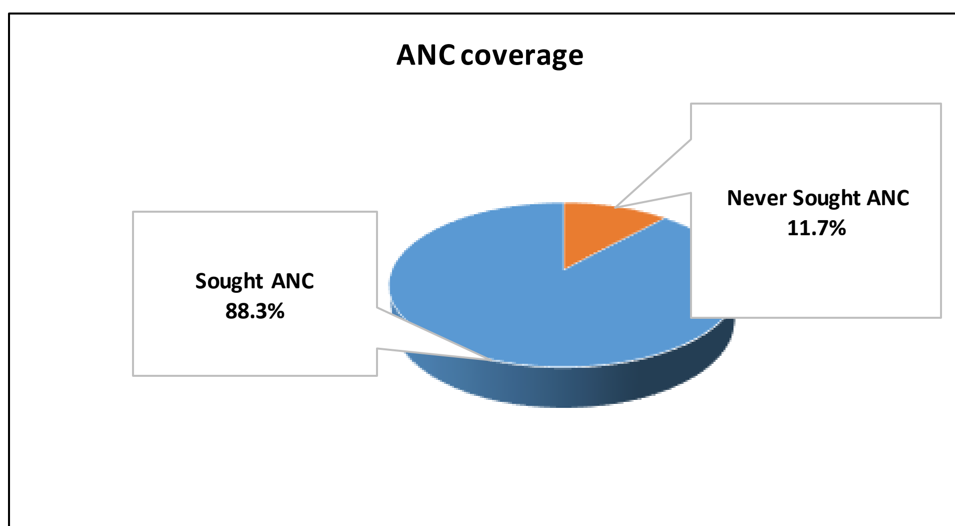

Figure 1
Proportion of Adolescent Mothers attending atleast 1 ANC Visit

Adherence per trimester

WHO recommends at least one visit in the first trimester, two visits in the second trimester and five visits in the third trimester, for a positive pregnancy experience (24). The majority of the respondents (74.8%) were non-adherent to one visit in the first trimester. Nearly half of the respondents (48.8%) adhered to two visits in the second trimester, and none of the respondents adhered to five visits in the third trimester. Table 2 and Figure 3.

Maternal factors associated with optimal ANC uptake

Bivariate analysis indicated gestational age at 1st ANC, knowledge on ANC visits and mode of reminder to attend scheduled ANC visits were significant at 5% level of significance ($p<.05$) as highlighted in Table 2.

A multivariable logistic regression model for rare events was fitted using a $p<0.2$ model-fitting cut-off point as shown in Table 3.

Respondents who were reminded of ANC by Community Health Promoters (CHPs) were 2.74 times more likely to adhere compared to those reminded by their mothers. Similarly, participants with good ANC experience were 78.1 times more likely to adhere to optimal ANC uptake compared to those who had a poor ANC experience.

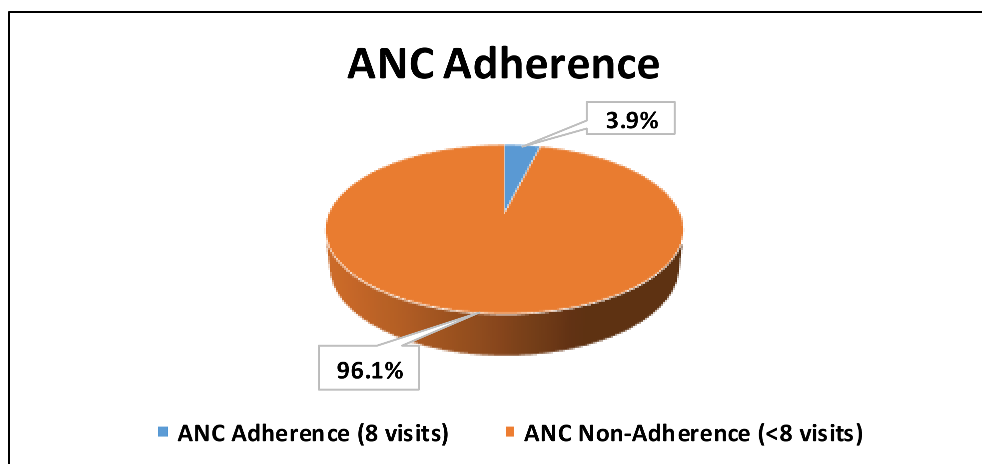

Figure 2
Proportion of Adolescent Mothers that Attended the Recommended 8 ANC Visits

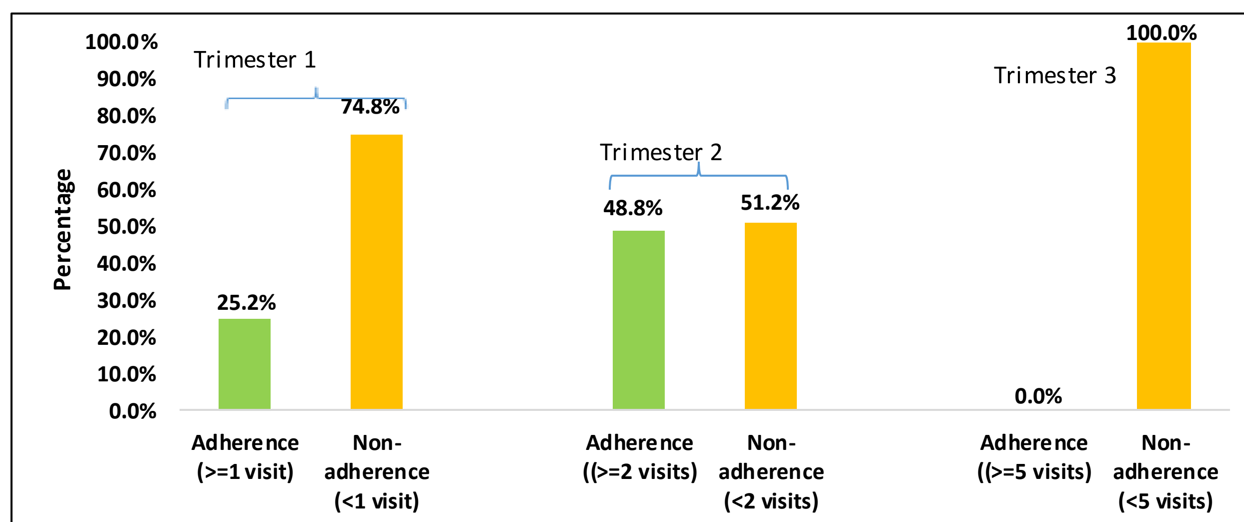

Figure 3
Distribution of ANC visits attendance per trimester among adolescent mothers

Participants who sought ANC between 8 -12 weeks of gestational age were 24.5 times more likely to adhere (p=0.00424, p=0.0228), while those with knowledge of the recommended number of ANC visits were 89% less likely to adhere to optimal ANC uptake (p=0.006).

Table 2
Factors associated with ANC adherence (Bivariate analysis)

Characteristic	ANC Adherence (N=11)	ANC non-adherence (N=271)	Overall (N=282)	Fisher's Exact Test P-value
Knowledge on recommended No. of ANC visits				<.001*
No Knowledge	2 (18.2%)	249 (91.9%)	251 (89.0%)	
With Knowledge	9 (81.8%)	22 (8.1%)	31 (11.0%)	
Gestational Age at 1st ANC	(N=11)	(N=238)	(N=249)	<.001*
4 weeks				
8 to 12 weeks	0 (0%)	65 (27.3%)	65 (26.1%)	
16 weeks	0 (0%)	74 (31.1%)	74 (29.7%)	
24 weeks	0 (0%)	44 (18.5%)	44 (17.7%)	
32 weeks	0 (0%)	23 (9.7%)	23 (9.2%)	
Mode of reminder	(N=11)	(N=238)	(N=249)	<.001*
My mother	1 (9.1%)	49 (20.6%)	50 (20.1%)	
CHP	0 (0%)	116 (48.7%)	116 (46.6%)	
Phone reminder	0 (0%)	4 (1.7%)	4 (1.6%)	
Reference to Mother Child Booklet	10 (90.9%)	68 (28.6%)	78 (31.3%)	
Teacher	0 (0%)	1 (0.4%)	1 (0.4%)	
Time taken to facility	(N=11)	(N=238)	(N=249)	.9875
<30 mins	5 (45.5%)	111 (46.6%)	116 (46.6%)	
30 mins -1 hr	5 (45.5%)	103 (43.3%)	108 (43.4%)	
>1 hr	1 (9.1%)	24 (10.1%)	25 (10.0%)	
Main reason for choosing facility	(N=11)	(N=238)	(N=249)	.9777
HWs were polite	2 (18.2%)	45 (18.9%)	47 (18.9%)	
It was near	6 (54.5%)	98 (41.2%)	104 (41.8%)	
It had commodities	1 (9.1%)	43 (18.1%)	44 (17.7%)	
It was adolescent-friendly	2 (18.2%)	45 (18.9%)	47 (18.9%)	
Others (Desire to go far from home, Escorted by mother, Few clients, Linda mama registration)	0 (0%)	7 (2.94%)	7 (2.94%)	
Experienced maternal or perinatal complications				.3033
Yes	0 (0%)	13 (4.8%)	13 (4.6%)	
No	11 (100%)	258 (95.2%)	269 (95.4%)	
Maternal complications experienced	(N=0)	(N=13)	(N=13)	-
Bleeding		3 (23.1%)	3 (23.1%)	
Infections		5 (38.5%)	5 (38.5%)	
Anaemia		2 (15.4%)	2 (15.4%)	
Other		3 (23.1%)	3 (23.1%)	
Illness experienced when pregnant?				.09743
Yes	2 (18.2%)	12 (4.4%)	14 (5.0%)	
No	9 (81.8%)	259 (95.6%)	268 (95.0%)	
Type of illnesses experienced when pregnant	(N=2	(N=12)	(N=14)	-
Anaemia	1 (50.0%)	0 (0%)	1 (7.1%)	
UTI	1 (50.0%)	3 (25.0%)	4 (28.6%)	
Abdominal pain	0 (0%)	1 (8.3%)	1 (7.1%)	
Developed TB at 1month, child had adenoids	0 (0%)	1 (8.3%)	1 (7.1%)	
Hyperemesis gravidarum	0 (0%)	1 (8.3%)	1 (7.1%)	
Intermittent LAPS	0 (0%)	1 (8.3%)	1 (7.1%)	
Vomiting	0 (0%)	5 (41.7%)	5 (35.7%)	

Participants experiencing any illness during pregnancy were 6.22 times more likely to adhere. Those who had an excellent perception of ANC services were 11.5 times more likely to seek ANC services optimally.

Discussion

The findings revealed consistent deficiencies across all the categories of the demographic characteristics explored. On the contrary, studies comparing the level of antenatal care (ANC) visits indicate that pregnant women from rural, poor, less educated, unmarried and less experienced backgrounds always showed better compliance, compared to women from rich, urban, highly educated, married and more experienced populations (25,26).

Table 3:
Determinants of ANC attendance

Variable		Multivariate Odds ratio	95% CI	P-value
Gestational age at 1st ANC	4 weeks	Ref		
	8 – 12 weeks	24.51	-	0.00425*
	16 weeks	18.75	-	0.0228*
	24 weeks	4.94	-	0.264
	32 weeks	1.17	-	0.931
Type of reminder	My mother	Ref		
	CHP	2.74	-	0.579
	Phone reminder	0.06	(0.0001,20.17)	0.298
	Reference to Mother Child Booklet	0.85	(0.024,18.47)	0.918
	Teacher	0.006	-	0.125
ANC services sought	Counselling Nutritional Interventions			
	No	Ref		
	Yes	2.66	-	0.577
Maternal Assessment	No	Ref		
	Yes	0.23	(0.0011,7.38)	0.381
Foetal assessment	No	Ref		
	Yes	1.15	(0.08,13.37)	0.905
Preventive measures	No	Ref		
	Yes	1.95	-	0.682
Interventions for common physiological symptoms	No	Ref		
	Yes	0.35	(0.04,2.69)	0.294
Perception of ANC experience	Poor	Ref		
	Moderate	78.09	-	0.159
	Good	35.94	-	0.201
	Excellent	11.50	-	0.389
Illness experienced during pregnancy	No	Ref		
	Yes	6.22	-	0.271
	Perception on whether most expectant mothers have complications with their pregnancy before seeking ANC services			
	Disagree	Ref		
	Agree	0.60	(0.05,3.28)	0.559
Knowledge on recommended number visits	No Knowledge	Ref		
	With Knowledge	0.11	(0.0079,0.55)	0.006 *

Earlier studies concluded that demographic factors such as age, marital status, educational level, employment status, wealth quantile, and experience of childbirth have a significant impact on the optimal uptake of recommended ANC visits (27,28). The current study made unique and differing discoveries by exploring the distinguishing situations of the respondents and analysing their levels of adherence.

Adolescent mothers who sought at least one ANC visit

The majority of the respondents were aware of ANC services, as 88.3% sought ANC services. The remaining 11.7% were either not aware of the services or did not have access to them. That 11.7% managed without the support of ANC services does not imply they faced no challenges, as approximately 303,000 adolescent girls die from pregnancy and childbirth-related complications in a year, about 2.6 million babies are stillborn and 60% of the stillbirths (1.46 million) occur during the antepartum period, due to untreated maternal infection, hypertension, and poor foetal growth (24). This confirms that maternal deaths could be prevented if adolescent girls had access to quality antenatal care. This discovery points to the need for awareness creation campaigns to address the remaining 11.7%.

Level of compliance to recommended ANC schedule

It was observed that none of the respondents adhered to the recommended five visits in the third trimester. This gap exposes adolescent girls to death from preventable birth complications, thereby confirming that the WHO ANC target of eight ANC contacts is yet to be met by the majority of the respondents (24,29). The findings were consistent with other empirical studies, which reported that only about 18% of mothers meet this WHO recommendation (30). This low adherence is worrying as adolescent mothers (15–19) constitute 8% of the annual global births, but account for 10% of annual maternal deaths (31). Similarly, more evidence out of Uganda concurs with this finding that most adolescent mothers attend their first visit later than the recommended period, and only about 47% have timely ANC visits (32).

The findings revealed that group antenatal care can be effective for adolescents aged 15–19. However, since staff attitude contributes to or deters adolescents from ANC uptake, the success of educational campaigns depends on positive staff attitude and availability of healthcare providers (33,34).

Maternal factors associated with adherence to optimal uptake of ANC services

The study revealed that early first ANC visit is more likely to lead to adherence, affirming that most adolescent mothers do not attend ANC as required within the first 12 weeks of pregnancy (5, 35). These findings support previous studies that noted cultural stigma around adolescent pregnancy deterred respondents from attending ANC services (36). Those who attended ANC for counselling and nutritional interventions were 2.66 times more likely to adhere; thus, the need to provide culturally based support, protection from stigma and respect for privacy (6,8,37).

Those who had good ANC experience were 78.1 times more likely to adhere; thus, positive experience in confidential settings can boost adherence (37,38). Respondents who had knowledge of the recommended number of ANC visits were 89% less likely to adhere to optimal ANC uptake after adjusting for gestational age at 1st ANC visit. This indicates that knowledge of ANC services alone is not sufficient to ensure adherence; thus, the need for effective services and a professional approach by the service providers (1,5,39).

Study Limitations

Adolescents are typically between 10 and 19 years, but this study was limited to those between 15 and 19 years, leaving out those between 10 and 14 years (24). The study was also limited to sampled government health facilities, leaving out private facilities. The study design was quantitative in nature, thus

omitting qualitative perceptions of adolescent mothers.

Conclusion

Most adolescent mothers and their babies in Bomachoge Borabu Sub-County were at risk of maternal morbidity/mortality because of high levels of non-adherence to optimal ANC uptake. Early ANC contact initiation within the first trimester and use of ANC reminders were associated with optimal ANC uptake. Knowledge on the recommended numbers of ANC visits alone was not enough to motivate adolescent mothers to adhere to the recommended ANC visits. Therefore, interventions geared towards initiating ANC contact early within 8-12 weeks can enhance adherence to optimal ANC uptake among adolescent mothers.

Recommendations

The County Government of Kisii should consider promoting optimal ANC uptake among pregnant adolescents by advocating for frequent tests among students for early detection of pregnancy and early initiation into ANC. They should also consider offering ANC services in school clinics and set up youth-friendly clinics in strategic places [such as?]. There is a need for further research using quasi-experimental or longitudinal study designs to establish causality among the variables.

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