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Original Research Article

Knowledge, attitude, and practice of antenatal care among pregnant women: a community-based cross-sectional study in Bosaso, Puntland, Somalia

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ABSTRACT

Background: Antenatal care (ANC) is a crucial component of maternal health services, aiming to ensure the health of both the mother and the newborn during pregnancy. It serves as a comprehensive health service designed to detect, prevent, and manage complications during pregnancy, ultimately promoting positive maternal and neonatal outcomes.
Methods: A community-based cross-sectional study, conducted from February to May 2024 in Bosaso, Somalia, aimed to assess the knowledge, attitudes, and practices regarding ANC among pregnant women. A total of 384 participants were selected using clustered and systematic sampling from four villages in Bosaso. Data was collected through a structured pre-tested questionnaire and analyzed using statistical package for the social sciences (SPSS) version 21. Descriptive statistics, frequencies, and percentages were computed to assess ANC knowledge, attitude, and practice levels and correlation tests were conducted to explore associations between them.
Results: Most respondents were aware of ANC services (86.5%), with healthcare providers as the primary information source (46.4%). While many recognized the importance of ANC checkups (89.3%) and followed recommended practices, only 17% adhered to the ideal frequency of four or more visits. Statistically significant correlations were found between knowledge, attitude, and practice ($p<0.01$), indicating that awareness positively influences ANC practices.
Conclusion: This study highlights that the adherence to recommended visits remains low. A significant gap exists between ANC initiation and completion, with barriers to access and awareness. Strengthening knowledge, attitudes, and targeted interventions, such as community support and mobile reminders, could improve ANC utilization and maternal health outcomes.

Keywords: Antenatal care, Pregnant, ANC utilization, Bosaso, Somalia

INTRODUCTION

Antenatal care (ANC) is a crucial component of maternal health services, aiming to ensure the health of both the mother and the newborn during pregnancy. It serves as a comprehensive health service designed to detect, prevent, and manage complications during pregnancy, ultimately promoting positive maternal and neonatal outcomes. The primary objectives of ANC include promoting, protecting, and maintaining maternal health, thereby addressing key risk factors that contribute to maternal mortality. The importance of ANC cannot be overstated, as it plays a pivotal role in reducing maternal and neonatal morbidity and mortality worldwide.[1] Globally, approximately 213 to 220 million pregnancies occur each year, with around 140 million resulting in live births. The remaining pregnancies

result in outcomes such as miscarriages, stillbirths, and abortions.[2] These statistics underscore the necessity of ANC in ensuring safe pregnancies and healthy deliveries. Adequate utilization of prenatal healthcare services is linked to improved health outcomes for mothers and infants.[2] Despite its significance, an estimated 810 women die daily from preventable causes related to pregnancy and childbirth, amounting to approximately 295,000 maternal deaths globally each year.[3-5] Alarmingly, 94% of these deaths could have been avoided, with the majority occurring in low-resource settings, particularly in Sub-Saharan Africa, where nearly two-thirds of global maternal deaths are recorded.[5]

The utilization of ANC services is hindered by various factors, including low maternal education, teenage pregnancies, multi-parity, unplanned pregnancies, and cultural influences. Studies have shown that the awareness and knowledge of pregnant women significantly impact their utilization of ANC services.[6] Initiatives aimed at increasing ANC access have included training healthcare providers, enhanced maternal health education, and improved healthcare infrastructure. However, despite these efforts, the usage of ANC services remains low in many regions, especially in low-income and conflict-affected areas.[7,8] Such challenges highlight the urgent need to strengthen maternal healthcare systems and address barriers that limit women's access to vital ANC services.

ANC provides a range of essential health interventions designed to safeguard the well-being of mothers and their unborn children. It aims to prevent congenital disabilities, preterm labor, neural tube defects, anemia, and other pregnancy-related complications.[9] Through routine check-ups, healthcare providers can assess the health of pregnant women, monitor fetal growth, and detect potential health issues early.[9] ANC services also include counseling on proper nutrition, fluid intake, and treatment for pregnancy-related complications. By equipping mothers with knowledge and support, ANC empowers them to make informed decisions about their health and that of their babies.[9]

Globally, the utilization of ANC services has seen notable improvements, but significant disparities persist. According to the World Health Organization (WHO), 86% of pregnant women have at least one ANC visit with a skilled health worker. However, only 62% of pregnant women receive the WHO-recommended minimum of four ANC visits.[10,11] This discrepancy is even more pronounced in regions with the highest maternal mortality rates, such as Sub-Saharan Africa, where only 52% of women meet the recommended number of ANC visits. Additionally, the initiation rates for ANC visits reveal a stark divide. Globally, 58.6% of pregnant women initiate ANC visits during the first trimester. In high-income countries, this figure rises to 84.8%, while in low-income countries, it drops to 48.1%. In Sub-Saharan Africa, only 38% of pregnant women begin ANC in their first trimester, indicating a significant delay in seeking care.[12]

Somalia exemplifies the dire need for improved ANC services, as it faces one of the highest maternal and child mortality rates in the world. The maternal mortality ratio (MMR) in Somalia stands at 692 maternal deaths per 100,000 live births.[13] The high MMR is a direct consequence of the country's prolonged civil war, which severely disrupted its health infrastructure. As a result, access to ANC services is limited, with only 32% of pregnant women receiving ANC services.[13,14] Efforts by international and national health organizations to restore Somalia's health system have faced significant challenges, as financial constraints, insecurity, and weak health systems continue to hinder progress.[14]

In 2023, 16,224 pregnant mothers in Bosaso, a major city in Somalia, sought ANC services. Despite this figure, a study revealed that while 84.1% of women utilized ANC services during their last pregnancy, only 28% completed the recommended number of ANC visits.[14,15] This significant drop-off highlights the challenges in sustaining maternal healthcare engagement throughout pregnancy. Several barriers to ANC utilization in Bosaso have been identified, including long distances to health facilities, high transportation costs, financial constraints, and inadequate knowledge and attitudes among both mothers and healthcare providers. Addressing these barriers is essential to improving ANC uptake and ensuring better health outcomes for mothers and infants.[14]

The study aims to assess knowledge, attitude, and practice of ANC service utilization among pregnant mothers in Bosaso to bridge the knowledge gap in maternal healthcare and identify context-specific barriers and facilitators to ANC access. By understanding the knowledge, attitudes, and practices of mothers, health authorities can design effective interventions to address the root causes of low ANC utilization. The findings from this study will provide evidence-based insights to inform policy, guide program implementation, and promote maternal health in Bosaso and other similar low-resource settings.

METHODS

Study design and study setting

Community based cross-sectional study was conducted to evaluate the knowledge, attitudes, and practices regarding antenatal care services among pregnant women from February to May 2024 in Bosaso. Bosaso is a coastal town located in the Gulf of Aden and is the capital of the northeastern region of Bari, Somalia.

Study population, sample size determination and sampling methods

The study population was pregnant women in Bosaso. The study participants were chosen from four villages in Bosaso city.

$$Sample\ size, n = Z^2P(1-P)/D^2$$

Where, P=estimated population proportion (0.5), Z=standard value for a 95% confidence level (1.96), and D=margin of error (0.05).

$$n = (1.96)^2 \times \frac{(0.5)(1-0.5)}{(0.05)^2} = 384$$

Thus, the study aimed to include 384 pregnant women. The sample population was selected from four villages using a clustered sampling method. Research participants were selected from each village using systematic sampling technique.

Inclusion criteria

Pregnant women aged 15–49 years who had resided in Bosaso for at least six months and willingly provided informed consent were included in the study.

Exclusion criteria

While exclusion criteria included those who were severely ill, unable to communicate effectively, temporary visitors to the area, or who declined to participate.

Data collection and analysis methods

A structured pre-tested questionnaire was used for data collection. The questionnaire, developed after a thorough literature review of KAP surveys on ANC. The questionnaire was initially prepared in English by the principal investigator. It was then translated into the local language (Somali) and subsequently translated back into English to ensure consistency. The questionnaire contained four sections, including socio-demographic, knowledge, attitude and practice, and 22 questions. All participants responded. The data was entered into statistical package for the social sciences (SPSS), where the variables were previously identified in English for data entry and analysis. It was cross-checked the questionnaire data entered into SPSS against the collected paper questionnaires for completeness, consistency, and correctness before conducting the analysis.

The data were analyzed using SPSS version 21. Descriptive analysis was conducted, and frequencies and percentages of the variables were computed and correlation test was computed to find out the association between knowledge, attitude and practice. Respondents who correctly answered 4 or more questions were considered to have above average knowledge of ANC, and those with fewer than 4 correct answers were considered to have below average knowledge of ANC, on the other hand respondents who correctly answered 3 or more questions were considered to have positive attitude on ANC, and those with fewer than 3 correct answers were considered to have negative attitude on ANC, and lastly respondents who correctly answered 2 or more questions were considered to have good practice on ANC, and those with fewer than 4 correct answers were considered to have poor practice on ANC. Finally, the data quality was regularly checked throughout the study.

RESULTS

Socio-demographic characteristics of the respondents

Table 1 states the socio-demographic characteristics of the respondents' reveal insights into their age distribution, education level, occupation, marital status, income, gravidity, and parity.

Table 1: Socio-demographic characteristics of the respondents, n=384.

Variables	Frequency	Percent
Age of the respondents (years)		
15-25	158	41.1
26-35	172	44.8
36-45	52	13.5
>45	2	0.5
Education of respondents		
Illiterate	153	39.8
Non formal education	96	25.0
Primary	69	18.0
Secondary	37	9.6
University level and above	29	7.6
Occupation of respondents		
House wife	243	63.3
Business woman	83	21.6
Government	13	3.4
Student	17	4.4
Others	28	7.3
Marital status		
Married	283	73.7
Divorced	81	21.1
Widowed	20	5.2
Monthly income (USD)		
<100	156	40.6
100-200	146	38.0
201-300	53	13.8
301-400	26	6.8
>400	3	0.8
Gravidity of respondents		
One	95	24.7
Two	118	30.7
Three	74	19.3
Four	39	10.2
More than four	58	15.1
Parity of respondents		
Zero child	95	24.7
One child	117	30.5
Two children	75	19.5
Three children	39	10.2
Four children	21	5.5
More than four children	37	9.6

The majority of respondents (44.8%) were aged 26–35, followed by those aged 15–25 (41.1%). Only a small proportion were over 45 years old (0.5%). Regarding education, a significant portion of respondents were illiterate (39.8%), while others had non-formal education (25%) or completed primary school (18%). Only 7.6% had attained a university-level education or higher, highlighting limited access to higher education among the population.

In terms of occupation, most respondents (63.3%) were housewives, followed by businesswomen (21.6%). Government employees, students, and others collectively accounted for about 15% of the sample. The majority were married (73.7%), with smaller proportions being divorced (21.1%) or widowed (5.2%). Monthly income levels were predominantly low, with 40.6% earning less than $100, and only 6.8% earning $301–400. Gravidity and parity trends showed that nearly one-third of respondents had been pregnant twice (30.7%) and had one child (30.5%), while smaller proportions had higher numbers of pregnancies or children, indicating moderate levels of reproductive activity in this population.

Knowledge level of respondents on ANC

The data in Table 2 provides insights into the knowledge level of respondents regarding ANC. A significant majority (86.5%) of respondents were aware of ANC services, indicating a high general awareness within the community.

However, the sources of information varied: nearly half (46.4%) learned about ANC from healthcare providers at health centers, while others relied on traditional birth attendants (21.4%) or informal sources such as husbands (10.4%) and media (7.8%). Interestingly, 14.1% reported having no knowledge source, reflecting a gap in information dissemination.

Regarding the timing of ANC visits, the majority (58.9%) stated ANC should be initiated within the first three months of pregnancy, which aligns with global recommendations. However, a notable proportion stated that visits continue until after three months (24.5%) or even until delivery (5.2%), while 11.5% were unsure of the appropriate timing.

Similarly, knowledge of the recommended number of ANC visits was mixed: while a considerable proportion (34.9%) believed one visit was sufficient, only 12.2% recognized the recommendation for four or more visits, highlighting a need for awareness on adequate ANC frequency.

On pregnancy-related risks, 82.6% of respondents acknowledged the presence of infections during pregnancy that could harm the unborn child. Most respondents preferred health facility deliveries (73.7%), though 26.3% still opted for home deliveries, indicating potential barriers to institutional deliveries. Awareness of pregnancy danger signs varied; vaginal bleeding was the most recognized (66%), followed by convulsions (52.4%) and excessive bleeding (44.4%). However, persistent swelling (27.8%) and weak fetal movement (36.1%) were less commonly identified. When danger signs were observed, the majority (73.2%) chose to report to health centers, while 26.6% relied on home remedies.

Table 2: Knowledge level of respondents on ANC.

Variables	Frequency	Percent
Respondent awareness		
Yes	332	86.5
No	52	13.5
Information source		
Healthcare providers at health centers	178	46.4
Traditional birth attendant	82	21.4
My husband	40	10.4
Radio and television	30	7.8
I do not know	54	14.1
ANC visit start time		
First 3 months	226	58.9
After 3 months	94	24.5
At delivery	20	5.2
Do not know	44	11.5
Recommended ANC check-ups for pregnant women		
One time	134	34.9
Two times	124	32.3
Three times	63	16.4
Four and more than	47	12.2
I don't know	16	4.2
Pregnancy infections affecting the unborn child		
Yes	317	82.6
No	56	14.6
Do not know	11	2.9
Preferred delivery place		
Health facility	283	73.7
Home	101	26.3
Pregnancy danger signs (multiple responses)		
Convulsion respondent	196	52.4
Vaginal bleeding respondent	247	66.0
Excessive bleeding respondent	166	44.4
Persistent of swelling respondent	104	27.8
Weak fetal movement of respondent	135	36.1
Actions to take when observing danger signs		
Report health center	281	73.2
Home remedies	102	26.6

Attitude level of ANC among pregnant women in Bosaso

The attitude data from Table 3 highlights pregnant women's perspectives on various aspects of ANC in

Bosaso. A significant majority of respondents (53.9% strongly agree and 35.4% agree) recognize ANC checkups as essential, with only 1.8% disagreeing. Similarly, follow-up during ANC visits is largely viewed as beneficial, with 39.1% strongly agreeing and 39.8% agreeing. However, 16.4% remain neutral, and 4.7% express disagreement, indicating some variation in perceptions regarding follow-up care.

Table 3: Respondents' attitude level on ANC, n=384.

Variables	Frequency	Percent
ANC check-up is essential		
Strongly agree	207	53.9
Agree	136	35.4
Neutral	34	8.9
Disagree	7	1.8
Follow-up during ANC is beneficial		
Strongly agree	150	39.1
Agree	153	39.8
Neutral	63	16.4
Disagree	18	4.7
HIV and HBV screening during ANC is necessary		
Strongly	145	37.8
Agree	139	36.2
Neutral	86	22.4
Disagree	12	3.1
strongly disagree	2	0.5
Blood pressure screening during ANC is necessary		
Strongly agree	197	51.3
Agree	135	35.2
Neutral	46	12.0
Disagree	4	1.0
Strongly disagree	2	0.6
Iron and folic acid supplementation benefits mother and fetus		
Strongly agree	116	30.2
Agree	156	40.6
Neutral	84	21.9
Disagree	25	6.5
Strongly disagree	3	0.8
Preference for home delivery over hospital delivery		
Strongly agree	68	17.7
Agree	60	15.6
Neutral	33	8.6
Disagree	148	38.5
Strongly disagree	75	19.5

Regarding specific screening practices, attitudes are generally positive. For HIV and HBV screening during ANC, 37.8% strongly agree, and 36.2% agree, though 22.4% are neutral, suggesting a need for awareness on its importance. Blood pressure screening during ANC visits, 51.3% strongly agreeing and 35.2% agreeing, while only 1.6% express any level of disagreement, though 12% are neutral. The supplementation of iron and folic acid for maternal and fetal health also has high acceptance, with 30.2% strongly agreeing and 40.6% agreeing, though a notable minority of 21.9% are neutral, and 7.3% disagree to some extent.

In contrast, attitudes toward delivery location diverge. A substantial proportion (38.5% disagree and 19.5% strongly disagree) oppose the preference for home delivery over hospital delivery, reflecting a general inclination toward institutionalized care. However, 17.7% strongly agree and 15.6% agree with the preference for home delivery, which could stem from cultural or logistical factors.

Practice level of the respondents on antenatal care

Table 4 illustrates that the practice level of respondents regarding ANC highlights a high level of participation, with 87.2% (335 out of 384) reporting they had attended at least one ANC visit. This indicates a positive trend in awareness and utilization of maternal healthcare services, with only a small proportion (12.8%) not engaging in any ANC visits. However, while the majority of respondents recognize the importance of ANC, the frequency of visits varies significantly, reflecting potential gaps in adherence to recommended ANC schedules.

Table 4: Practice level of the respondents on antenatal care, n=384.

Variables	Frequency	Percent
ANC visit of respondent		
Yes	335	87.2
No	49	12.8
Number of ANC of respondent (n=335)		
One time	133	40
Two times	107	32
Three times	39	12
Four times and more	56	17

Among those who attended ANC (n=335), 40% reported attending only one visit, which is below the globally recommended minimum of four visits during pregnancy. Another 32% attended two visits, and 12% attended three visits, which collectively indicate that nearly three-quarters of the respondents (72%) did not meet the recommended frequency. Only 17% of the respondents attended ANC four times or more, aligning with standard guidelines.

Correlation between pregnant women's knowledge, attitude, and practice scores

Table 5 indicates that knowledge has a moderate positive correlation with practice ($r=0.4$, $p<0.01$), showing that increased knowledge among pregnant women is significantly associated with better practices. The correlation between knowledge and attitude is weaker ($r=0.2$, $p<0.01$), indicating a less pronounced yet statistically significant relationship.

The weakest correlation is observed between attitude and practice (r=0.1, p<0.05), suggesting that attitude has minimal influence on practice, despite the relationship being statistically significant. Overall, knowledge appears to play a more critical role in shaping practice than attitude.

Table 5: Correlation between pregnant women's knowledge, attitude, and practice scores.

Correlation	r	P value
Knowledge versus practice	0.4*	<0.01
Knowledge versus attitude	0.2*	<0.01
Attitude versus practice	0.1*	<0.05

r: Pearson's coefficient, *statistically significant at p value ≤0.05

DISCUSSION

The socio-demographic characteristics of the respondents provide critical insights into the population under study, revealing potential areas for targeted intervention. Most respondents were aged 26–35 years (44.8%), followed closely by those aged 15–25 years (41.1%), indicating that the majority of respondents were in their prime reproductive years. This is consistent with other studies that highlight the reproductive age group as the most active in seeking ANC services.[16] The educational attainment of respondents reveals significant challenges, with 39.8% being illiterate and only 7.6% having attained university-level education or higher. This educational disparity may influence health literacy and access to essential health information, which aligns with findings from previous research that emphasize the role of education in improving maternal health outcomes.[17,18] Furthermore, the occupational distribution shows that the majority of respondents (63.3%) are housewives, suggesting economic dependency, which may impact access to healthcare services. This is further underscored by the low-income levels reported, with 40.6% earning less than USD 100 per month, potentially restricting access to health services due to financial constraints.[17,18]

The findings on respondents' knowledge of ANC are promising, as 86.5% reported being aware of ANC services. Similarly, a study conducted in Nigeria stated that there was a high level of awareness of antenatal care services.[19] This awareness can be attributed to the efforts of healthcare providers, who were cited as the primary source of information (46.4%). Another study conducted in Mogadishu explored that about 38% of respondents received information from healthcare providers at health centers.[20] However, 14.1% of respondents reported having no knowledge source, which indicates the need for broader community-based health education initiatives. The timing of ANC initiation is crucial for ensuring positive pregnancy outcomes, and 58.9% of respondents correctly stated that ANC should begin within the first three months of pregnancy. This is consistent with another study, which found that about two-thirds of the respondents knew that ANC checkups start during the first trimester.[7] Nevertheless, 24.5% believed it should start after three months, and 11.5% were unsure, pointing to gaps in knowledge that could affect maternal and neonatal health outcomes. The knowledge on the recommended number of ANC visits further highlights this gap, as only 12.2% of respondents identified the global recommendation of four or more visits. The majority believed that one (34.9%) or two visits (32.3%) were sufficient. Similarly, another study conducted in Bosaso found that only 21.9% of respondents knew that the recommended number of ANC visits is four or more.[14] These findings underscore the need for intensified health education and community sensitization to promote adherence to ANC guidelines.

The attitudes of respondents toward ANC were largely positive, with 53.9% strongly agreeing and 35.4% agreeing that ANC checkups are essential. A similar study conducted in Nigeria found that 88.7% of respondents agreed on the importance of ANC checkups, while a study in Somalia reported 80% agreement.[20,21] Similarly, a large proportion of respondents supported follow-up visits, with 39.1% strongly agreeing and 39.8% agreeing. This is consistent with a study conducted in Lahore, which found that 83.1% of respondents agreed on the importance of ANC follow-up during pregnancy. These attitudes reflect an appreciation for ANC services, which could be leveraged to encourage more consistent attendance. However, the neutral stance observed among some respondents (16.4% on follow-up and 22.4% on HIV/HBV screening) suggests that some women remain unconvinced about the full benefits of certain ANC services. This highlights the importance of tailored health education to address misconceptions and reinforce positive health behaviors. Additionally, attitudes toward delivery location were split, with 38.5% disagreeing and 19.5% strongly disagreeing with the preference for home delivery, while a combined 33.3% either agreed or strongly agreed. In contrast, a study conducted in Ethiopia stated that 90.6% of respondents preferred health facility delivery.[22] This divide could be influenced by cultural norms, fear of healthcare facilities, or logistical barriers, which have been cited in other studies as critical factors affecting delivery location preferences.

The practices related to ANC highlight both achievements and areas for improvement. A total of 87.2% of respondents reported attending at least one ANC visit, demonstrating relatively high utilization of ANC services. However, further analysis of the frequency of visits reveals that only 17% of those who started ANC visits met the global recommendation of four or more visits. This is consistent with a study conducted in Ethiopia, which indicated that only 9.9% of respondents completed the recommended number of ANC visits with the recommended time schedule.[23] Most respondents (40%) attended only one visit, while 32% attended two visits. This suggests the need for sustained engagement throughout pregnancy. This pattern is consistent with findings from other studies in low-income settings, where early engagement with ANC services is often followed by reduced attendance in subsequent visits due to financial,

logistical, or cultural barriers. Strategies to sustain attendance through the fourth visit should be prioritized, as it is critical for improving maternal and neonatal outcomes. This may include providing financial incentives, addressing transportation barriers, and enhancing community-level education about the importance of multiple ANC visits.

Finally, the results revealed a positive correlation between the knowledge and attitude of pregnant women and ANC practice. The correlation coefficients ($r=0.4$, $r=0.2$, $p<0.05$) suggest that higher knowledge and a positive attitude are significantly associated with better ANC practice. This finding is also supported by a study conducted in Lahore.[7] These results indicate that strengthening knowledge and fostering positive attitudes could enhance the utilization and completion of ANC services. However, the study's cross-sectional design, its reliance on self-reported information that may be affected by recall bias, and its limited geographic coverage should be considered as key limitations of the study.

CONCLUSION

The findings highlight significant insights into the KAP of pregnant women regarding ANC utilization. The majority of pregnant women (73%) demonstrated good knowledge, while 27% had poor knowledge. Attitudes towards ANC were generally positive, with 75.8% holding a positive attitude, 7% showing a neutral attitude, and 17.2% having a negative attitude. In terms of practice, 87% of pregnant women-initiated ANC utilization; however, only 17% of these women completed at least four recommended ANC visits, underscoring a significant gap in ANC adherence. On the other hand, 13% of pregnant women did not start ANC utilization at all, reflecting barriers to access, awareness, or other contextual factors. The analysis revealed a positive correlation between the knowledge and attitude of pregnant women and their ANC practice. The correlation coefficients ($r=0.4$, $r=0.2$, $p<0.05$).

In conclusion, pregnant women generally possess good knowledge and positive attitudes toward ANC, but barriers to completing visits persist. Addressing these gaps requires targeted interventions, including health education, community support, and mobile-based reminders for appointments. Engaging community health workers for home visits and outreach is vital. Healthcare providers should offer culturally appropriate education during initial visits, highlighting the importance of timely follow-ups to enhance maternal and child health outcomes.

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