

Factors Associated with Antenatal Care Service Utilization Under the Eight-Contact Visit Model in Zanzibar

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Research Article

Keywords: Antenatal care, eight-contact model, male involvement, utilization, Zanzibar, Tanzania

Posted Date: March 2nd, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-8216138/v1>

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Additional Declarations: No competing interests reported.

Abstract

Background

The World Health Organization (WHO) introduced the eight-contact model of antenatal care (ANC) in 2016 to enhance maternal and perinatal outcomes. Despite widespread implementation, adherence to all eight visits remains suboptimal in many low- and middle-income settings, including Zanzibar.

Objective

To assess factors associated with utilization of ANC services under the eight-contact model among pregnant women in Zanzibar.

Methods

A cross-sectional analytical study was conducted among 852 postnatal women attending 18 health facilities across Unguja and Pemba. A structured questionnaire was administered via Open Data Kit (ODK). Data were analyzed using Stata 17. Descriptive statistics summarized participants' characteristics, while chi-square and logistic regression identified factors independently associated with completing eight or more ANC visits. A p-value < 0.05 was considered statistically significant.

Results

Only 23.0% of women completed ≥ 8 ANC contacts. Early ANC booking before 16 weeks was strongly associated with optimal utilization (AOR = 28.89, 95% CI: 11.02–75.76; $p = 0.001$). Primigravida women had higher odds of completing eight contacts compared to those with more than four pregnancies (AOR = 24.31, 95% CI: 4.09–144.50; $p = 0.001$). Higher household income (> 1,000,000 TZS/month) was also associated with optimal utilization (AOR = 1.79, 95% CI: 1.02–3.14; $p = 0.042$). Partner involvement (AOR = 2.07, 95% CI: 1.26–3.42; $p = 0.004$) and perception of male-friendly clinic environments (AOR = 2.44, 95% CI: 1.38–4.32; $p = 0.002$) significantly increased the likelihood of completing eight ANC contacts.

Conclusion

Completion of the eight-contact ANC model remains low in Zanzibar. Key determinants include timing of ANC initiation, parity, household income, partner support, and clinic environments. Strengthening community awareness on early booking, reducing financial barriers, and promoting male-friendly health services could improve ANC utilization and maternal health outcomes.

Background

Antenatal care (ANC) is essential for safeguarding maternal and newborn health through early identification and management of pregnancy-related complications. The 2016 WHO recommendation of eight ANC contacts was introduced to strengthen continuity of care, improve the quality of maternal experience, and reduce preventable adverse outcomes (1). Evidence from global implementation shows that increased contact frequency is associated with reduced perinatal mortality and enhanced pregnancy outcomes (2, 3).

However, translating these global recommendations into improved outcomes depends on contextual health system realities. In Zanzibar, maternal and newborn health indicators continue to reflect areas of concern. While ANC initiation is high, completion rates remain low. Recent reports indicate that only about 31% of pregnant women complete four or more ANC visits under the previous Focused ANC (FANC) model, and early booking before the first 12–16 weeks of gestation remains below one-third of pregnant women (Zanzibar Health Bulletin 2018). Neonatal mortality in Tanzania stands at approximately 24 deaths per 1,000 live births, and the maternal mortality ratio in Zanzibar is estimated at around 260 per 100,000 live births (4, 5). These patterns highlight persistent gaps in continuous maternal care, suggesting barriers beyond mere service availability.

Although previous studies in Tanzania and other low- and middle-income countries have identified key determinants of ANC utilization such as education level, socioeconomic status, distance to health facilities, parity, and male partner involvement, most of these studies were conducted within the four-visit model (6, 7). As a result, they do not adequately capture behavioral, cultural, and health system factors influencing adherence to the eight-contact ANC schedule, particularly within Zanzibar's unique sociocultural and health system context. Evidence on what drives or hinders completion of eight contacts in Zanzibar is therefore limited, representing a critical knowledge gap.

This study addresses that gap by examining the determinants of ANC service utilization under the eight-contact model in Zanzibar. Specifically, the study assesses how socio-demographic characteristics, geographic accessibility, gestational age at booking, and partner involvement influence completion of recommended ANC contacts. The findings are intended to guide policymakers, maternal health program managers, and development partners in designing targeted, context-appropriate strategies to strengthen ANC uptake, thereby contributing to ongoing RMNCAH priorities and advancing progress toward **SDG 3.1**, which seeks to reduce maternal mortality.

Methods

Study Design and Setting

A facility-based cross-sectional study was conducted between July and November 2024 in 18 selected health facilities across Unguja and Pemba Islands. The facilities represented urban and rural settings and both public and private sectors.

Study Population and Sampling

Participants were postnatal women who had delivered within the past 12 months and attended for child immunization. A multistage stratified random sampling method ensured district-level representation, yielding a total of 852 respondents. We first computed a prevalence-based minimum sample ($n = 422$) using the single-proportion formula (95% CI, $d = 5\%$); then, to ensure representation across 18 facilities, we set ≥ 40 participants per site (target $n = 720$). Consecutive enrollment through the study period yielded $n = 852$, exceeding the minimum and enhancing precision/power for the planned analyses.

Data Collection

A structured questionnaire adapted from WHO ANC assessment tools was administered via ODK. The tool captured demographic characteristics, partner information, geographic accessibility, and facility-related factors. All items in the ODK questionnaire were programmed as mandatory fields; therefore, the final dataset contained no missing values for the variables used in this analysis, and a complete-case analysis approach was applied.

Variables

The dependent variable was ANC utilization (< 8 vs ≥ 8 visits). Independent variables included demographic, Husband/partner-information, geographic, and health facility factors.

Partner involvement was assessed using four individual items: whether the woman contacted or informed her partner before attending ANC (Yes/No); the perceived importance of involving the partner before ANC (Yes/No); partner employment status (Employed/Not employed); and perceived partner support toward ANC attendance (Yes/No). These items were analyzed separately and not combined into a composite score.

Perception of a male-friendly clinic setting was assessed using a single item asking whether the antenatal clinic environment was perceived as welcoming to men (Yes/No).

Data Analysis

Data were analyzed using STATA version 17. Descriptive statistics were used to summarize categorical variables using frequencies and percentages. Bivariate associations between independent variables and ANC utilization were assessed using the chi-square test. Variables with $p < 0.05$ in the bivariate analysis were included in the multivariable logistic regression model. Adjusted odds ratios (AOR) with 95% confidence intervals (CI) were reported to determine the strength and direction of associations. For all categorical independent variables, one category was designated as the reference group for comparison in the regression analysis.

Ethical Considerations

Ethical approval

was obtained from the MUHAS IRB. Permission was granted by the Zanzibar Ministry of Health, and informed consent was obtained from all participants.

Results

Most respondents were aged 20–24 years, married, and had secondary school education. 28.5% were employed, Majority (60.5%) of women had a house hold income less than 500,000 TZS per month, Urban residence accounted for 32.3% of participants.

Overall, 23.0% of women completed eight or more ANC contacts. Early booking before 16 weeks occurred in 47.3%. **See** Table 1

Table 1
Socio-Demographic Characteristics and ANC Attendance among Participants (N = 852)

Variable	Category	Frequency (n)	Percentage (%)
Age Group (years)	18–24	272	31.0
	25–29	227	26.6
	30–34	189	22.2
	≥ 35	164	19.3
Marital Status	Married	810	95.1
	Not married	42	4.9
Education Level	No formal education	59	6.9
	Primary	211	24.8
	Secondary	516	60.6
	College/University	66	7.7
Employment Status	Employed	243	28.5
	Not employed	609	71.5
Household Monthly Income (TZS)	< 500,000	515	60.5
	500,000–1,000,000	267	31.3
	> 1,000,000	70	8.2
Place of Residence	Urban	275	32.3
	Rural	577	67.7
Parity (Number of Pregnancies)	< 2	196	23.0
	2–4	480	56.3
	> 4	176	20.7
Gestational Age at First ANC Visit	< 16 weeks (Early booking)	402	47.3
	16–27 weeks	301	35.3
	> 27weeks	149	17.5
ANC Contact Completion	≥ 8 contacts (Optimal utilization)	196	23.0
	< 8 contacts	656	77.0

Variable	Category	Frequency (n)	Percentage (%)
Partner Involvement in ANC	Involved	779	91.4
	Not involved	73	8.6
Perception of Clinic Setting	Male-friendly	691	81.1
	Not male-friendly	161	18.9

Women residing in Northern A and Western A districts had significantly higher odds of completing ≥ 8 ANC contacts compared to those from Chakechake district (AOR = 5.48, $p = 0.003$ and AOR = 4.54, $p = 0.001$, respectively). Women from households earning more than 1,000,000 TZS per month also had increased odds of optimal ANC utilization compared to those earning less than 500,000 TZS (AOR = 1.79, $p = 0.042$). Although women living in Unguja showed greater ANC utilization in crude analysis, this association was not significant after adjustment (AOR = 1.67, $p = 0.086$). **See** Table 2.

Table 2
District-Level Predictors of ANC Utilization

Variable	Category	Crude OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
District	Chakechake (Ref)	-	-	-	-
	Northern A	4.90 (1.87–12.82)	0.001	5.48 (1.82–16.50)	0.003
	Northern B	1.09 (0.28–4.16)	0.900	1.02 (0.23–4.30)	0.979
	Western A	4.60 (1.69–12.47)	0.003	4.54 (1.45–14.20)	0.001

Obstetric characteristics also demonstrated significant associations. Women with fewer than two pregnancies had markedly higher odds of completing eight ANC contacts compared to those with ≥ 5 pregnancies (AOR = 24.31, $p = 0.001$), and those with 2–4 pregnancies had higher odds as well (AOR = 8.44, $p = 0.015$). Early ANC booking before 16 weeks was a strong predictor of optimal utilization. Women initiating ANC between 16–27 weeks (AOR = 28.89, $p = 0.001$) and those booking ≥ 28 weeks (AOR = 4.52, $p = 0.003$) were significantly less likely to complete the recommended eight visits. Mode of delivery and number of living children were not independent predictors in the adjusted model. **See** Table 3.

Table 3
Obstetric Predictors of ANC Utilization

Variable	Category	Crude OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
Mode of Delivery	Normal (Ref)	-	-	-	-
	Caesarean section	1.71 (1.08–2.71)	0.023	1.62 (0.96–2.74)	0.069
Parity (> 4 pregnancies Ref)	< 2 pregnancies	4.41 (1.98–9.81)	0.001	24.31 (4.09–144.50)	0.001
	2–4 pregnancies	1.35 (0.61–3.01)	0.468	8.44 (1.50–47.43)	0.015
Gestational Age at Booking	< 16 weeks (Ref)	-	-	-	-
	16–27 weeks	28.21 (11.72–67.92)	0.001	28.89 (11.02–75.76)	0.001
	≥ 28 weeks	4.68 (1.86–11.82)	0.001	4.52 (1.69–12.08)	0.003

Partner-related factors further influenced ANC utilization. Women who perceived contacting their partner before clinic attendance as important had twice the odds of completing ≥ 8 ANC contacts (AOR = 2.07, $p = 0.004$). Partner employment was also positively associated with optimal utilization (AOR = 1.97, $p = 0.042$). Additionally, perceiving the ANC clinic environment as male-friendly significantly increased the likelihood of completing eight contacts (AOR = 2.44, $p = 0.002$). However, simply contacting the partner prior to the visit was borderline and did not reach statistical significance in the adjusted model (AOR = 1.97, $p = 0.052$). **See** Table 4.

Table 4
Partner Involvement Predictors of ANC Utilization

Variable	Category	Crude OR (95% CI)	p-value	Adjusted OR (95% CI)	p-value
Contacted Partner	No (Ref)	-	-	-	-
	Yes	1.97 (0.90–3.60)	0.098	1.97 (0.99–3.92)	0.052
Importance of Contacting Partner	No (Ref)	-	-	-	-
	Yes	2.23 (1.41–3.78)	0.001	2.07 (1.26–3.42)	0.004
Partner Employment	Not employed (Ref)	-	-	-	-
	Employed	2.05 (1.08–3.89)	0.028	1.97 (1.03–3.77)	0.042
Male-Friendly Clinic	No (Ref)	-	-	-	-
	Yes	3.19 (1.85–5.50)	0.001	2.44 (1.38–4.32)	0.002

Discussion

Level of utilization and timing of booking

The overall **23.0%** completion rate for eight or more visits demonstrates limited adherence to the eight-contact model, similar to patterns observed in other sub-Saharan African countries after the WHO's 2016 recommendation (1, 6, 7). Early initiation of ANC before 16 weeks was observed among **47.3%** of women and was strongly associated with completing eight contacts (AOR = 28.89; $p = 0.001$). Early booking allows adequate time for subsequent scheduled visits and continuous follow-up.

Economic and Obstetric factors

Household income above 1,000,000 TZS significantly increased the likelihood of completing eight visits (AOR = 1.79; $p = 0.042$). Economic stability enhances the ability to meet indirect costs such as transportation, opportunity costs of time, and additional medical expenses (8–10). Similarly, women with fewer than two pregnancies were more likely to complete optimal ANC visits (AOR = 24.31; $p = 0.001$). Primigravida women often demonstrate higher motivation and health-seeking behavior due to novelty and perceived risk of first pregnancy, findings also noted in Tanzania mainland and Ethiopia (11, 12).

Partner involvement and male-friendly environments

Partner involvement showed a positive association with ANC utilization (AOR = 2.07; $p = 0.004$). Women whose partners were employed (AOR = 1.97; $p = 0.042$) and those who perceived ANC clinics as male-

friendly (AOR = 2.44; $p = 0.002$) had higher odds of completing the eight visits. These findings underscore the role of male participation in promoting maternal health utilization. Supportive partners can provide financial, emotional, and logistical support, and their engagement enhances joint decision-making on maternal care. Similar conclusions have been reported in studies conducted in Tanzania, Ethiopia, Nigeria and Kenya, which highlighted male involvement as a determinant of adherence to ANC schedules (13–16).

As a cross-sectional study, causality cannot be inferred. The facility-based sampling may limit generalizability to women who do not attend postnatal or ANC services. Self-reported responses may also be subject to recall or social desirability bias.

Conclusion

This study demonstrates that ANC utilization under the eight-contact model remains suboptimal in Zanzibar, with notable socioeconomic and behavioral disparities. Early ANC booking, lower parity, higher household income, and male involvement were key determinants of completing eight or more ANC contacts. Strengthening systems that encourage early ANC initiation and addressing structural barriers faced by low-income and rural populations are essential to improving uptake. Additionally, incorporating male-friendly approaches within ANC services can enhance partner engagement, continuity of care, and overall maternal health outcomes, supporting national progress toward achieving the WHO-recommended eight-contact standard.

Policy Implications

The Ministry of Health, in collaboration with Council Health Management Teams (CHMTs), should strengthen community health education emphasizing early ANC booking before 16 weeks and consistent follow-up throughout pregnancy. Primary health facilities should adopt structured male-involvement strategies such as couple-focused ANC sessions, partner invitation messages, flexible clinic hours for working partners, and creation of male-friendly waiting spaces. Expanding community-based health insurance and addressing transport and access barriers in rural areas may further improve ANC completion rates.

Recommendations for Practice

- Strengthen early pregnancy detection and referral pathways through Community Health Volunteers, TBAs, and RCH educators.
- Integrate partner engagement and counseling into routine ANC service delivery at facility level.
- Train healthcare providers on gender-sensitive communication and partner-inclusive counseling techniques.
- Implement follow-up mechanisms such as appointment books, SMS reminders, or digital tracking systems to support women who book late or miss scheduled contacts.

Future Research

- Conduct qualitative studies to explore sociocultural norms, household power dynamics, and partner decision-making roles influencing ANC attendance.
- Evaluate the effectiveness of male-inclusive ANC models and partner education interventions on adherence to the eight-contact schedule.
- Assess health system-level factors—including staffing capacity, clinic workflow, and waiting time—and their influence on ANC continuity and patient experience.

List of Abbreviation

ANC Antenatal Care

HF Healthcare Facilities

LMICs Low- and Middle-Income Countries

MUHAS Muhimbili University of Health and Allied Science

NHIF National Health Insurance Fund

PH Public Health

PHCC Primary Health Care Center

PHCU Primary Health Care Unit

PHCU + Primary Health Care Units plus

RCH Reproductive and Child health

SPHSS School of Public Health and Social Sciences

Tsh Tanzanian Shillings

WHO World Health Organization

ZHSF Zanzibar Health Service Fund

Declarations

Ethical Approval and Consent to Participate

Ethical approval for this study was obtained from the Institutional Review Board of the Muhimbili University of Health and Allied Sciences (Ref: DA.282/298/01.C/2258). Permission to conduct the study and collect data was granted by the Zanzibar Health Research Institute (Ref:

ZAHREC/02/ST/JULY/2024/155). All participants provided informed consent prior to participation. The study was conducted **in accordance with the Declaration of Helsinki and all relevant guidelines and regulations.**

Consent Process

Each participant provided verbal consent after being briefed on the study's purpose before the interview. All information obtained from the participant were handled with utmost confidentiality.

Consent to publication

"Not applicable"

Competing Interest

The authors confirm, that they have no competing interests.

Funding

This study received no external funding, and all operational costs were covered by the author.

Availability of Data Materials

The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request.

Authors' Contributions

BK: Study concept and design, manuscript drafting, statistical analysis and data interpretation.

DU: Study Supervision

HM: Study Supervision

All authors have reviewed and approved the final version of this manuscript, including authorship

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