PESEARCH PAPER

Utilization pattern of antenatal care and determining factors among reproductive-age women in Borama, Somaliland

HAMDA MOHAMED MOUHOUMED, NIMETCAN MEHMET
Ankara Yildirim Beyazit University, Faculty of Medicine, Department of Public Health, Ankara, Turkey

Keywords

Summary

Background. *Antenatal care is essential care given during pregnancy, to diagnose and treat complications that could endanger both the lives of mother and child. The risk of dying from pregnancy-related issues is often associated with a lack of access to antenatal care services. This issue is a prominent matter in developing countries such as Somaliland which has one of the highest maternal mortality rates in the world.*
Objective. *The objective of this study is to determine the frequency and timing of antenatal care utilization and factors influencing it among reproductive-age women.*
Methods. *A population-based cross-sectional survey is conducted among 330 randomly selected mothers who gave birth in the past two years in Borama, Somaliland.*
Result. *Although a significant number of women utilized antenatal care in their pregnancy only 31.1% initiated the first visit*

within the first trimester and 48.3% received less than the recommended four visits. Fewer antenatal care visits are significantly associated with age (OR = 3.018; CI = 1.264-7.207), gravida (OR = 3.295; CI = 1.200-9.045), and gestation age (OR = 1.737; CI = 1.013-2.979). Early marriage (OR=0.495; CI = 0.252-0.973), and large family size (OR = 3.952; CI = 1.330-11.742) are associated with delay in the commencement of the first antenatal care visit.
Conclusion. *Young women, women with multiple pregnancies, women married at a young age, and women with a large family size have a higher probability of delaying prenatal care and having fewer visits. Based on the findings, uplifting the socioeconomic status and literacy level of women through community-based education and developing strategies that would take the determining factors into account may contribute to improved and adequate utilization of antenatal care.*

Introduction

Despite the decrease in global maternal mortality, the number of deaths remains unacceptably high, especially in low-income countries. Complications during pregnancy and childbirth are the major cause of death and disability in reproductive-aged women [1]. Most of these pregnancy-related deaths can be prevented by simple cost-effective maternal care services including antenatal care (ANC), skilled birth attendants, and postnatal care [2, 3]. ANC reduces the maternal mortality rate (MMR) by screening high-risk mothers for complications and facilitating a rapid diagnosis and management of life-threatening obstetric conditions [4]. ANC is the care provided for pregnant women by qualified healthcare professionals to ensure a better pregnancy outcome [5]. World Health Organization (WHO) recommended a minimum of four visits for an uncomplicated pregnancy, initiating the first visit prior to 14 weeks of gestation [3]. However, in 2016, the ANC guidelines provided by the WHO increased from four to at least eight ANC visits, due to an increased fetal mortality risk associated with a reduced number of ANC visits [5].
While the utilization of ANC in developing countries has considerably improved, a limited number of pregnant

women attend a total of four ANC visits with 72% initiating the first visit after 12 weeks of gestation [6]. For example, in a study conducted in Kenya 58% of women had at least four ANC visits [7], while in Somalia, the utilization rate is even lower with 33% of pregnant women initiating the first visit during the 4th month of the gestation period [8]. Thus, the WHO underlines the vital need to put the focus on mothers who commence fewer visits and initiate the ANC late [9].
Numerous studies on the determinants of ANC utilization have found an association between the socio-demographic, reproductive, and obstetric variables of the mother with the utilization of ANC [10-12]. However, few studies investigated the determinants of frequent use and timing of ANC visits [13]. Delay in the timing of the first visit increases the risk of the development of complications for both mother and child [14]. Thus, knowing only the proportion of pregnant women attending ANC is insufficient, it is also important to know when attendees commence such visits and whether they pay an adequate number of visits. Moreover, addressing the factors and socioeconomic barriers is imperative for increasing women's overall utilization of health services. To the best of our knowledge, no study attempted to investigate the timing and number of visits in ANC utilization and elucidating the various factors

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influencing the use of this service in the Borama district of Somaliland. Therefore, this paper aims to contribute to this end.

Methodology

STUDY DESIGN AND SETTING

This study is a community-based cross-sectional study that is conducted in the urban part of Borama District, Awdal region of Somaliland from February to August 2017. As of 2014, the estimated population of the district is around 398,609 [15]. There are twelve maternal and child health centers (MCH), eleven health posts, and two governmental hospitals at different locations within the district.

STUDY POPULATION AND SAMPLING

The study population are women of the reproductive age group (15-49 years) that gave birth within 2 years preceding this survey irrespective of the outcome of the delivery and are permanent residents (or at least a 2 years resident) in the study area. Women who are unable to communicate are excluded.

The sample size is determined using a single population proportion formula $n = (z\sigma/2.pq)/w^2$ by considering a 95% level of confidence, 5% marginal error with an estimated proportion of 32% from Multiple Indicator Cluster Survey (MICS) [16]. The minimum required sample size is determined to be 334 participants.

To assign a representative sample, the population within the region is clustered into four zones, and two zones are randomly selected. A total of 7244 households are located in the selected zones. Using the probability proportional to size (PPS) technique, the sample size is equally allocated to each zone. Furthermore, after acquiring a list of household numbers from the government statistics department; eligible respondents are selected using a systematic sampling technique. The first study subject is randomly selected, next; respondents in every tenth household are interviewed.

VARIABLES AND MEASUREMENT

The analysis is based on two ANC-related outcomes: (a) the number of ANC visits attended during the most recent pregnancy, (b) the gestational age at which the first visit is initiated. The predictor variables are classified as socio-demographic characteristics of respondents, obstetric history, and ANC practices.

DATA COLLECTION

A structured interviewer-administered questionnaire adopted from published literature and subsequently translated into the local language (Somali) is used for data collection. To check the internal validity, the questionnaire is back-translated to English and pretested on 20 women. The questionnaire consists of three sections. The first section collects information on the socio-demographic characteristics of the respondents (age, marital status, educational status, average monthly income, family size), the second section collects information on the obstetrical history of the mother (age of marriage, gravity, parity, history of abortion, stillbirth, and child mortality), and the last section collects information on the practice and level of ANC service utilization (awareness of the pregnancy risks, perception of mothers on the advantage of the ANC, timing, and frequency of ANC visits, husband's attitude toward ANC and received services). Data collectors are trained on subject matters such as the purpose of the study, the rights of the study subject, and the content of the questionnaire prior to the actual data collection. In this study, an ANC visit is defined as the care provided by a skilled healthcare professional to pregnant women without illness being the reason for the visit. Adequate utilization of ANC is defined as early attendance (initiating the first ANC visit during the first trimester) and frequent visits (at least four ANC visits). If one of these indicators is not met, the women have not utilized ANC adequately.

DATA ANALYSIS

The collected data is entered and analyzed using the Statistical Package for Social Sciences (SPSS) version 23. Descriptive analysis is conducted on respondent's background characteristics and reported in frequencies and percentages. Bivariate analysis using the chi-square test is performed to examine the association between timing and frequency of ANC visits and the explanatory variables. The criterion for inclusion of factors in the multivariate analysis is to offer all variables with a p-value of < 0.05. All variables that met these criteria are used for building the final model. Furthermore, multivariable logistic regression analysis is used to determine the odds ratios (with the corresponding 95%CI) of attending less than four ANC visits and delayed initiation of the visits.

ETHICAL CONSIDERATION

The study obtained an ethical review approval from the Ethical Review Committee of Horn International University. Study subjects are informed of the purpose of the study and their voluntary participation is obtained through oral consent. Also, the anonymity of the respondents is assured in the study tool.

Result

SOCIO-DEMOGRAPHIC CHARACTERISTICS

The sociodemographic characteristics of the respondents given in (Tab. I) show that a total of 330 women participated in this study giving a 98% response rate. More than half (53.3%) of the respondents fall within the age range of 25–35 years old and the mean age is 29.83 ± 6.35 years. On the educational status of respondents over three quarters (78.2%) of women never attended formal education. Marital status and family size show that the majority (94.5%) are currently married and about 51.2% have a family size of 5-10. A vast majority

of the study subjects (90.9%) are unemployed and 31.5% of the respondents have a family income below 100$.

As shown in (Tab. II), 37% of the respondents married under the age of 18. The majority (90.6%) of the women gave birth 2 times or more and, a total of 19.7%, 11.8%, and 19.1% have a history of abortion, stillbirth, and child death respectively.

DISTRIBUTION OF ANC KNOWLEDGE AND UTILIZATION

As shown in (Tab. III), the majority of the participants (91.5%) attended ANC during their last pregnancy, and out of these subjects, 85.1% went for regular checkups. About 51.7% of the women attended the recommended 4 visits whereby the majority (62.3%) initiated their first

Tab. I. Sociodemographic characteristics of respondents (n = 330).

Variables	Categories	Frequency (N)	Percentage (%)
Age of mother	15-25 years	97	29.4
	25-35 years	176	53.3
	35-45 years	57	17.3
Marital status	Married	312	94.5
	Divorced	18	5.5
Educational status of mothers	Unable to read/write	207	62.7
	Able to read/write	51	15.5
	Formal education	72	21.8
Educational Status of husband	Unable to read/write	104	31.5
	Able to read/write	69	20.9
	Formal education	157	47.6
Occupational status	Employed	30	9.1
	Unemployed	300	90.9
Income	< 100 $	104	31.5
	100-200 $	132	40.0
	> 200 $	94	28.5
Nearest healthcare facility (walking)	< 20 min	113	34.2
	20-40 min	133	40.3
	> 40 min	84	25.5
Family size	< 5	140	42.4
	5-10	169	51.2
	10-15	21	6.4

Tab. II. Obstetric history of the study participants (n = 330).

Variables	Categories	Frequency (N)	Percentage (%)
Age of marriage (year)	< 18	122	37.0
	18-30	203	61.5
	> 30	5	1.5
Gravida	Primigravida	49	14.8
	Multigravida	281	85.2
Parity	Primipara	31	9.4
	Multipara	299	90.6
History of abortion	Yes	65	19.7
	No	265	80.3
Number of abortion	1	50	15.2
	> 1	15	4.5
History of stillbirth	Yes	39	11.8
	No	291	88.2
Number of stillbirth	1	31	9.4
	> 1	8	2.4
History of any child mortality	Yes	63	19.1
	No	267	80.9
Number of child mortality	1	41	12.4
	>1	22	6.7

Tab. III. Antenatal care utilization pattern among reproductive age group (n = 330).

Variables	Categories	Frequency (N)	Percentage (%)
Husband attitude	Positive	318	96.4
	Negative	12	3.6
Awareness of the pregnancy risk	Aware	66	20.0
	Non-aware	264	80.0
Attend ANC in the last pregnancy	Yes	302	91.5
	No	28	8.5
Reasons of visit	Health problem	45	14.9
	Regular checkups	257	85.1
Where did you hear about the sources of ANC?	Health institute	51	16.9
	Radio/TV	28	9.3
	Relatives	53	17.5
	Woman's group	170	56.3
Benefits of ANC	Maternal health	13	4.3
	Both maternal and child health	289	95.7
Knowledge of the required number of ANC visit	< 4 visits	140	46.4
	≥ 4 visits	162	53.6
Timing of ANC	1st trimester	94	31.1
	2nd trimester	188	62.3
	3rd trimester	20	6.6
Total number of visits	Once	13	4.3
	Twice	55	18.2
	Three	78	25.8
	Four or more	156	51.7
Health institute utilized	Hospital	18	6.0
	MCH	284	94.0
Why this particular health institute?	Nearness	252	83.4
	Little or no expenses	20	6.6
	High quality of service	30	9.9
Did you receive a Tetanus injection	Yes	282	93.4
	No	20	6.6
Number of injections	Once	85	30.1
	Twice or more	197	69.9
Prophylaxis for anemia or multivitamin	Yes	280	92.7
	No	22	7.3
Deworming	No	302	100
Health education about pregnancy and childbirth	Yes	253	83.8
	No	49	16.2
Did you ever pay for ANC	Yes	45	14.9
	No	257	85.1
How do you feel about payment	Unaffordable	15	31.8
	Fair	30	68.2
Waiting time	Long hours	92	30.5
	Short hours	210	69.5
If you didn't attend ANC, why not?	Non-requirement	19	67.9
	Poor services	5	17.9
	Busy	4	14.3

visit in the second trimester. Furthermore, a majority of the women's partners (96.4%) have a positive attitude towards ANC. However, only 20% knew the risk of pregnancy-related complications.

The percent of participants that are required to pay for utilizing ANC's services is 14.9%, out of which 31.8% reported the payment as unaffordable. Furthermore, 30.5% of women reported long waiting hours. Women who did not utilize ANC during their last pregnancy listed the most common reason for not attending as, a non-requirement (67.9%), followed by poor services (17.9%), and being too busy to attend ANC (14.3%).

FACTORS ASSOCIATED WITH THE NUMBER AND TIMING OF ANC VISITS

Bivariate analyses show significant differences in number of visits for, age of the mother (p = 0.025), family size (p = 0.015), gravida (p = 0.018), gestation age (p = 0.009), and knowledge of the required visits (p < 0.001).

Tab. IV. Bivariate model evaluating the significant association between independent variables and number and timely use of antenatal care (n = 302).

Predictor Variables	Categories	Number of ANC visits			initiation of the first ANC visit		
		< 4 visits	≥ 4 visits	P-value [a]	< 3 month	> 3 month	P-value [a]
Age of mother	15-25 years	44 (30.1)	45 (28.8)	0.025*	37 (39.4)	52 (25.0)	0.011*
	25-35 years	74 (50.7)	88 (56.4)		48 (51.1)	114 (54.8)	
	35-45 years	28 (19.2)	23 (14.7)		9 (9.6)	42 (20.2)	
Educational status of mothers	Unable to read/write	91 (62.3)	96 (61.5)	0.323	48 (51.1)	139 (66.8)	0.033*
	Able to read/write	19 (13.0)	29 (18.6)		19 (20.2)	29 (13.9)	
	Formal education	36 (24.7)	31 (19.9)		27 (28.7)	40 (19.2)	
Family size	< 5	55 (37.7)	73 (46.8)	0.015*	50 (53.2)	78 (37.5)	0.009*
	5-10	86 (58.9)	69 (44.2)		36 (38.3)	119 (57.2)	
	10-15	5 (3.4)	14 (9.0)		8 (8.5)	11 (5.3)	
Gravida	Primi	14 (9.6)	30 (19.2)	0.018*	21 (22.3)	23 (11.1)	0.010*
	Multi	132 (90.4)	126 (80.8)		73 (77.7)	185 (88.9)	
Parity	Primi-para	11 (7.5)	16 (10.3)	0.407	13 (13.8)	14 (6.7)	0.045*
	Multipara	135 (92.5)	140 (89.7)		81 (86.2)	194 (93.3)	
Age of marriage	< 18	55 (37.7)	54 (34.6)	0.528	34 (36.2)	75 (36.1)	0.030*
	18-30	43 (29.5)	41 (26.3)		31 (33.0)	53 (25.2)	
	> 30	48 (32.9)	61 (39.1)		29 (30.9)	80 (38.5)	
Knowledge of required number of ANC visit	<4 visits	114 (78.1)	32 (21.9)	<0.001*	55 (58.5)	107 (51.4)	0.254
	≥4 visits	26 (16.7)	130 (83.3)		39 (41.5)	101 (48.6)	
Waiting time	Long hours	49 (33.6)	43 (27.6)	0.258	18 (19.1)	74 (35.6)	0.004*
	Short hours	97 (66.4)	113 (72.4)		76 (80.9)	134 (64.4)	
Gestational age	< 3 months	35 (24.0)	59 (37.8)	0.009*			
	> 3 months	111 (76.0)	97 (62.2)				

[a] chi-square test; *Significant at p < 0.05.

Regarding the initiation of the first ANC visit, a relationship with multigravida (p < 0.010), age (p = 0.011), educational status (p = 0.033), parity (p = 0.045) and waiting hours (p = 0.004) are observed. Inaddition, the analyses shows significant differences in women with large families (p = 0.009), and women that married at a young age (p = 0.030) as shown in (Tab. IV). The multivariate analysis in (Tab. V) shows the significant factors affecting the initiation of ANC within the first trimester and the required number of visits. The following characteristics are independently associated with the number of ANC visits received: Age, gravida, knowledge of required ANC visits, and gestational age. In terms of gravida, the primigravida mothers had more ANC visits compared to multigravida (OR = 3.295; CI = 1.200-9.045). Women aged 25 or older (OR = 3.018; CI = 1.264-7.207) and those who knew the required number of visitation (OR = 0.045; CI = 0.024-0.085) completed the required ANC visits. Furthermore, women who commenced ANC early (before 12 weeks) had a higher number of visits (OR = 1.737; CI = 1.013-2.979). Regarding the initiation of the first ANC visit, mothers who got married at the age of 18 and above are more likely (OR = 0.495; CI = 0.252-0.973) to initiate the visits early. While the odds of delay in ANC visits are higher with large family size (3.9 times higher odds) and long waiting hours in previous pregnancies (OR = 2.609; CI = 1.409-4.832).

Discussion

In accordance with the WHO's focused antenatal care module (FANC), the recommended minimum is 4 ANC visits with early commencement of the first visit occurring within the first 12 weeks of the gestational period [17]. The study revealed that even though most of the mothers did receive ANC visits, almost half (48.3%) did not receive the minimum recommended four visits. The research attempts to investigate the reasons for the failure to acquire the minimum recommended ANC visits. Several factors ascertained this limitation, in particular, the study illustrates that younger females are not motivated to acquire ANC. This concurs with other studies in India [18] and Nigeria [19] which demonstrated a higher commencement of ANC in older women. It may be that younger women are unaware of or fail to recognize the early signs of pregnancy. Moreover contradicting result has been reported in Bangladesh and Benin [20, 21]. Nonetheless, B. Simkhada et al. suggests that parity has a confounding effect on the utilization of ANC for both teenage mothers and women that are no longer expecting other pregnancies [22]. This view presents to be more satisfactory. Multigravida is also found to be an important factor in determining decreased visits. This could be attributed to women's confidence from experiences of previous pregnancy and thus are deemed in need of less support. This coincides with findings in other literatures [21, 23, 24]. Moreover, the

Tab. V. Factors associated with delayed and fewer antenatal care visits using Logistic Regression Model (n = 302).

Predictor Variables	Categories	Number of ANC visits ≥4			Delayed initiation of ANC visit		
		Odd ratio	95%CI	P-value	Odd ratio	95%CI	P-value
Age of mother	15-25 years	1.558	0.568-4.274	0.389	0.370	0.132-1.040	0.060
	25-35 years	**3.018**	**1.264-7.207**	**.013**	0.515	0.210-1.263	0.147
	35-45 years	1.0			1.0		
Educational status of mothers	Unable to read/write				1.451	0.755-2.789	0.264
	Able to read/write				0.913	0.399-2.093	0.830
	Formal education				1.0		
Family size	< 5	0.576	0.148-2.233	0.425	2.144	0.703-6.542	0.180
	5-10	0.378	0.104-1.370	0.139	**3.952**	**1.330-11.742**	**0.013***
	10-15	1.0			1.0		
Gravida	Primi	**3.295**	**1.200-9.045**	**0.021***	0.641	0.218-1.886	0.419
	Multi	1.0			1.0		
Parity	Primi-para				1.043	0.295-3.692	0.948
	Multipara				1.0		
Age of marriage	< 18				0.783	0.399-1.538	0.478
	18-30				**0.495**	**0.252-0.973**	**0.041***
	> 30 (Ref)				1.0		
Knowledge of required number of ANC visit	< 4 visits	**0.045**	**0.024-0.085**	**< 0.001***			
	≥ 4 visits	1.0					
Waiting time	Long hours				**2.609**	**1.409-4.832**	**0.002***
	Short hours				1.0		
Gestational age	< 3 months	**1.737**	**1.013-2.979**	**0.045***			
	> 3 months	1.0					

women's perception of the required number of visits is also found to be a positive contributor indicating that prior awareness is of significance [25].

The early commencement of ANC visits is of significance because it prevents obstetric complications, facilitates the detection and care of various conditions posed by pregnant women, and contributes to a sufficient number of visitation for mothers [26-28]. However, in this study, the overall magnitude of early attendance of ANC is 31.3%, this value is far below the required threshold indicating that they are likely at risk of pregnancy-related complications. Age of marriage played a significant factor in delayed utilization of ANC, the acquired result in this work suggests women that married at a younger age (< 18 years) failed to commence early ANC visits. This further highlights the detrimental impact of child marriage on maternal healthcare utilization and seeking behavior [29, 30]. In addition, the mother's timely use of ANC is hindered in larger households. This could be due to the preoccupation of women with children's care and household activities. This was also reported in previous works [31, 32].

The results obtained in this work suggest that acquiring the recommended number of ANC visitation depends on the early commencement of ANC. Thus, the provision of ANC from the early stages of pregnancy is imperative in prenatal care.

The husband's attitude and perception of maternal healthcare services impact women's access to such services [33] However, in this work, despite attaining a high positive attitude of the husband a correlation that is in favor of ANC utilization or its hindrance couldn't be established.

Maternal health services are free and subsidized by the government, however, some participants reported out-of-pocket payments for the service. This may have implications for the utilization of ANC.

In malaria-endemic countries, the infection is primarily asymptomatic and contributes to fetal morbidity and mortality [34] to prevent that, malaria chemoprophylaxis is included in ANC essential interventions. However, one of the limitations of this study is the coverage of malaria chemoprophylaxis is not examined. Further limitation includes the gestational age measurement is based on the women's last menstrual cycle report, which may have resulted in some inaccuracies. Moreover, the study did not investigate the respondent's reasoning behind the inadequacy of ANC utilization, and the quality of care

received which may influence the reproductive service utilization, thus, further research focusing on this aspect is warranted in the future.

Conclusions

The initiation of ANC within the early stages of pregnancy as well as the completion of an optimum number of visits required throughout the pregnancy is crucial in preventing pregnancy-related complications and reduces maternal mortality. Thus, in this study the levels of ANC utilization in Borama, Somaliland is researched. The findings in this work indicate an inadequate level of ANC utilization and a high prevalence of delayed timing and less ANC attendance during pregnancy. Moreover, several socio-demographic and maternal factors that are related to the frequency and timing of ANC visits are highlighted. Mother's age, multiple pregnancies, perception of the required number of visits, child marriage, high fertility rate, and large family size were drivers for the inadequate utilization of the ANC services. Hence, this study possesses the potential to improve policymakers' awareness of the determinants of ANC utilization and provide a framework to increase the use of the service in the country as a potential intervention.

The study concludes that in order to improve the quality and utilization of ANC, female education should be prioritized. Health programs that address pregnancy-related issues and emphasize the importance of early initiation and the frequent utilization of maternal health services should be developed to increase awareness and enhance the health-seeking behavior of women. Additionally, laws against child marriage should be implemented to protect underage girls from pregnancy-related and often life-threatening health complications.

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Conflict of interest statement

The authors declare no conflict of interest.

Authors' contributions

HM: study design, data collection, and analysis; NM: critically reviewed, edited, and approved the manuscript

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