

Factors Associated with Antenatal Care Visits in Chattogram, Bangladesh

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Abstract

An essential component of maternal healthcare is antenatal care (ANC) visits during pregnancy, which works to protect the health of the developing fetus as well as the mother. The purpose of the study is to identify the factors associated with antenatal care services of women during pregnancy in Chattogram, Bangladesh. Present study used primary data by developing a questionnaire containing two sections where section one included women's demographic information and another is socioeconomic variables. For collecting primary data, the questionnaire on ANC visits was filled up by 400 married women of reproductive age within 36 months of delivery. Binary logistic regression technique was used to determine the factors associated with attendance in ANC services. Chi-square (χ^2) test revealed that a number of factors are significantly associated with assessment of antenatal care visits. The findings from binary logistic regression indicates that woman of age 26-35 years were more conscious with regard to receive these services in comparatively other age groups. Moreover, the majority portion of women adopted antenatal care services those were came from urban and rich family. In addition, education of a woman and her husband have significant effect on complete ANC services (4/4+) received by women in Chattogram. These results suggest that demographic and socioeconomic statuses are important determinants of adequate number of ANC services. The development of focused interventions for various socio-demographic groups is therefore necessary to raise the adequate general quality of ANC services.

Keywords: Chattogram, Demographic Factors, Maternal Health, Socioeconomic Factors, Utilization of ANC Services.

Introduction

The first set of interventions given to expectant mothers by the healthcare system to encourage a happy pregnancy experience and guarantee a healthy start for their unborn children is known as antenatal care (ANC). The effectiveness of ANC depends on providing appropriate care. Promoting and preserving the physical, mental and social health of the mother and unborn child is the fundamental objective of prenatal care. In order to improve the health of both mothers and infants, antenatal care is an essential part of preventive healthcare. Despite variations in availability and accessibility in low- and middle-income nations, ANC services are essential in reducing pregnancy-related problems. Women of childbearing age (aged between 15-49 years) constitute more than one-fifth of the world's population and are repeatedly exposed to the risk of pregnancy and childbearing (1). A key contributing factor to ill health is the underutilization and inadequate access to contemporary health care services (2). Expectant mothers must have routine medical

examinations from the time of conception until the start of labor. Pregnant women and their unborn children are at serious concern when prenatal care is not used and when ANC components are not received in sufficient amounts (3). Research indicates that pregnant women who attend a sufficient number of prenatal clinics have a higher chance of giving birth in a healthy manner (4). Enhancing ANC planning in a particular context requires first in order to describe the women and their families who are not receiving proper care. By promoting the use of high-quality ANC, providing healthcare education during routine ANC visits and strategically and effectively implementing healthcare services, the burden of maternal morbidity and mortality caused by inadequate ANC services can be reduced. In Bangladesh, just 21% of Bangladeshis obtain high-quality ANC (5). Medical professionals can detect risk factors and provide the right treatment by determining the quality of ANC (6). Nearly 800 women lost their lives to avoidable pregnancy-related problems per day in

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2020, with low and lower-middle-income nations accounting for nearly 95% of maternal mortality (7). In places with limited resources, the standard of care provided to expectant mothers is a serious issue. There is a chance of difficulties with every pregnancy and some are riskier than others. But even women who are considered to be at a higher risk give birth without any problems, while numerous issues arise among those who are thought to be at a lower risk. If issues are found that could affect the pregnancy and the unborn child, the visits are occurring more frequently and in broader scope. Opportunities arise throughout the prenatal stage for delivering various interventions to expectant mothers that could be essential to their health and the health of their unborn children (8). At least four prenatal care visits are necessary for pregnant women, according to the WHO's prenatal care standards (9). This need was raised in 2016 to a minimum of eight prenatal care visits for safe motherhood. In order to make antenatal care visits an effective preventive measure, the WHO also emphasized the importance of focusing on the quality and content of ANC visits. In order to increase the quality and utilization of prenatal care, the health system can include interventions for common physiological symptoms, preventive vaccinations, maternal and fetal assessments, dietary interventions and more (10). Notwithstanding worldwide endeavors to enhance maternity and child health, obstacles remain to be addressed. Significant funding and initiatives are needed to address these issues in order to prevent maternal morbidity and mortality and accomplish sustainable development objectives.

The goal of antenatal care is to maintain healthy pregnancy outcomes by accurately and consistently adhering to the principles that are crucial for the health of both the mother and the unborn child (11). Along with socioeconomic disparities, cost concern for medical treatment founded as principal reason for failing to seek care for life-threatening complications during pregnancy among Bangladeshi women (12). One-third of all pregnant women felt unwell during their pregnancy and three percent of them needed to be admitted to the hospital, according to a study done in six West African countries (13). Antenatal care service uptake was influenced by maternal affluence, men's involvement and knowledge of

ANC services (14). An additional factor in the uptake was the pregnant mother's financial stability, youth and socioeconomic status (15). Wealth level, age, health insurance ownership (particularly for rural women), educational attainment, birth order, religion and administrative area of residency were revealed to be important predictors of the intensity of antenatal care service consumption in a Ghanaian study. With wealth status, the utilization rate rose. The researcher also discovered a statistically significant correlation between the use of prenatal care and residence (16). The timing of ANC initiation among women was shaped by various factors, including concerns related to reproduction and the uncertainties surrounding the early stages of pregnancy, especially during the first trimester. The way ANC services addressed these uncertainties also played a role. Other influencing elements included the woman's age, parity and the implications these had on disclosing the pregnancy. The nature of interactions with healthcare workers, particularly the advice on when to begin ANC, which was also a contributing factor. Additionally, the costs associated with ANC, including charges for procedures, despite policies promoting free ANC services, influenced women's decisions. These factors, along with the perception that follow-up appointments were mandatory, contributed to the timing of ANC initiation (17). Distance to the service centers and transportation issues were the primary causes of the Mru Community's lack of antenatal care, according to a study conducted in Bangladesh using a multivariate technique to identify the factors associated with antenatal care (18). Another study demonstrates how urgently low-income nations must address the underlying causes of the issue in order to lower maternal mortality. Also, they emphasize the necessity of better medical facilities, focused interventions and more global projects (19). In addition to reducing pregnancy complications, ANC services are one of the best ways to improve neonatal health and delivery outcomes (20).

There have been a few studies on antenatal care (ANC) utilization in Bangladesh but have mostly been based on secondary data from the successive rounds of Bangladesh Demographic and Health Survey (BDHS) and limited to national level factors influencing maternal healthcare utilization (21-

24). These studies offer partial information regarding local-level differences in ANC use and in some cases lack information on facility-level experiences of pregnant women. Most studies have focused on BDHS data from 2011-2022 at the national level to explore trends and factors influencing maternal healthcare utilization. Moreover, there is limited evidence available from Chattogram using recent primary facility-based data that simultaneously looks at both the urban and rural population. There is a need to get updated evidence from local levels based on the demographics, socioeconomic status and access to healthcare in order to understand the existing trends of utilization of ANC and factors associated with it. This study aims to fill these gaps by utilizing primary facility-based data gathered in 2024 from Chattogram. The study considers contemporary utilization of ANC and its associated factors and offers context specific evidence to help inform the regional process of maternal health planning and focus on interventions to improve service utilization of ANC in Bangladesh. The importance of this research work is that no study on ANC visit is conducted in Chattogram, as Chattogram is the busiest seaport in the region and a major economic hub in Bangladesh.

Methodology

Source of Data

To meet the objectives of the study, primary data have been collected from different areas in the Chattogram. Women aged 15 to 49 during their reproductive age of lifespan within 36 months of delivery using a convenience sampling strategy and a personal interview has been taken using the close ended (along with related socio-economic and demographic variables) questions from questionnaire. The literature reviewed for the development of the structured questionnaire covered the aspects related to antenatal care (ANC) utilization and maternal health care in Bangladesh and similar contexts. The socio-demographic, health service utilization and the factors associated with ANC uptake were included in the questionnaire.

A total of 400 women's data has been collected throughout the period of June to December, 2024. The interviewer effectively established a welcoming environment and enhanced their motivation to participate. As determinants of ANC

visits in relation to the Bangladeshi setting are the focus of the research project's primary objective. The draft questionnaire underwent independent review by three experts who have experience in public health and maternal health research with the aim of establishing content validity. An Index of Item-Objective Congruence (IOC) approach was used to assess the relevance and consistency between each questionnaire item and the study goals. All experts scored each item on a three-point scale: +1, clearly congruent with the objective; 0, uncertain and -1, not congruent with the objective. IOC 0.50 or higher was deemed acceptable (25). The IOC values for all the items in the questionnaire were greater than 0.50 and hence all were retained. A few questions have been amended for clarity, wording and context based on expert recommendations. Prior to the main survey, a pilot test was conducted with forty married women (have at least a child) in order to determine whether or not the questionnaire could be used, who were not included in the final study sample. The aim of the pilot study was to evaluate the clarity, comprehensibility, sequencing and feasibility of the questionnaire. Some comments expressed by participants related to minor difficulties with comprehending some items and answer options. For this purpose, selected questions were modified in wording and structure prior to data collection so as to make it more suitable.

The data was self-reported and analyzed in accordance with the WHO's guideline of a minimum of four ANC visits throughout pregnancy (9). Ethical approval for the quantitative investigation was taken from Center for Research and Publication of International Islamic University Chittagong, reference number IIUC/CRP/114/2024(02).

Study Size

The sample size was obtained by using a method for a single population proportion with the assumptions of a 95% confidence interval (CI), a 5% margin of error and an anticipated 35.2% prevalence of mothers delivering babies in a health facility in the Chittagong Division of Bangladesh (26). A cross-sectional study was conducted. Out of 500 eligible women approached, 400 participated in the study, yielding an 80% response rate. The final analysis was based on these 400 respondents. In order to account for the 20% non-response rate

and the dispersion among different socio-economic groups, the survey called for the participation of 400 women of age 15 to 49 during

their reproductive age, which is adequate for a cross-sectional study (27).

The required sample size was calculated using the single population proportion formula in Equation [1],

$$n = \frac{Z^2 P(1-P)}{d^2} \quad [1]$$

Where,

n = required sample size

Z = standard normal deviate corresponding to a 95% confidence level (1.96)

p = anticipated prevalence/proportion

d = margin of error

An anticipated prevalence of 35.2% ($p = 0.352$) of mothers delivering babies in a health facility in the Chittagong Division of Bangladesh. Using a 95% confidence level and a 5% margin of error ($d = 0.05$), the sample size was calculated as:

$$n = (1.96)^2 \times 0.352 \times (1 - 0.352) / (0.05)^2$$

$$n = 350.5$$

The minimum required sample size was therefore 351 participants. To account for potential non-response and incomplete questionnaires, the sample size was increased and a total of 400 respondents were interviewed in the study.

Outcome Variable

In the current investigation, the outcome variable (Y) was determined by the total number of visits to the antenatal care (ANC). The result was a categorical variable that was determined to be full and partial visits for antenatal care (ANC) visits that occurred on four or more occasions (≥ 4) were classified as full or complete visits, while those that occurred on fewer than four occasions (< 4) were classified as incomplete visits (28). In accordance with the World Health Organization's (WHO) recommended Focused Antenatal Care (FANC) Model, a pregnant woman should attend a minimum of four antenatal care (ANC) visits (8). This classification was made for women in Bangladesh who were of reproductive age, which is defined as being between the ages of thirteen and forty-nine.

Independent Variables

The survey has considered the socio-demographic, maternal and other relevant factors that influence assessment of antenatal care services. In the present study, based on Andersen's behavioral model of health care utilization theory, age of

respondent, type of place of residence, religion, respondent's education, respondent's occupation, age of husbands, husband's education, husbands occupation, age at first marriage, spousal age difference, desire to more children, ultrasonography during pregnancy and wealth index were examined as predisposing determinant factors of adherence to the recommended number of visits to ANC clinics.

The wealth index was developed by principal component analysis (PCA), as done in the Bangladesh Demographic and Health Survey (BDHS) (5). The index was constructed using indicators related to asset ownership and housing characteristics, such as having a television, refrigerator, bicycles, motorcycles, cars or agricultural land; made of materials used in construction (floor, wall and roof); source of drinking water; and type of sanitation facility. All the variables were coded properly and then standardized before going for PCA. The first principal component was employed to create the wealth score because it accounted for the greatest amount of variance in the variables included. Households were divided into three socioeconomic tiers (tertiles) based on the scores generated. The conceptual framework for health-service utilization behavior modified from Andersen's behavioral model is shown in Figure 1.

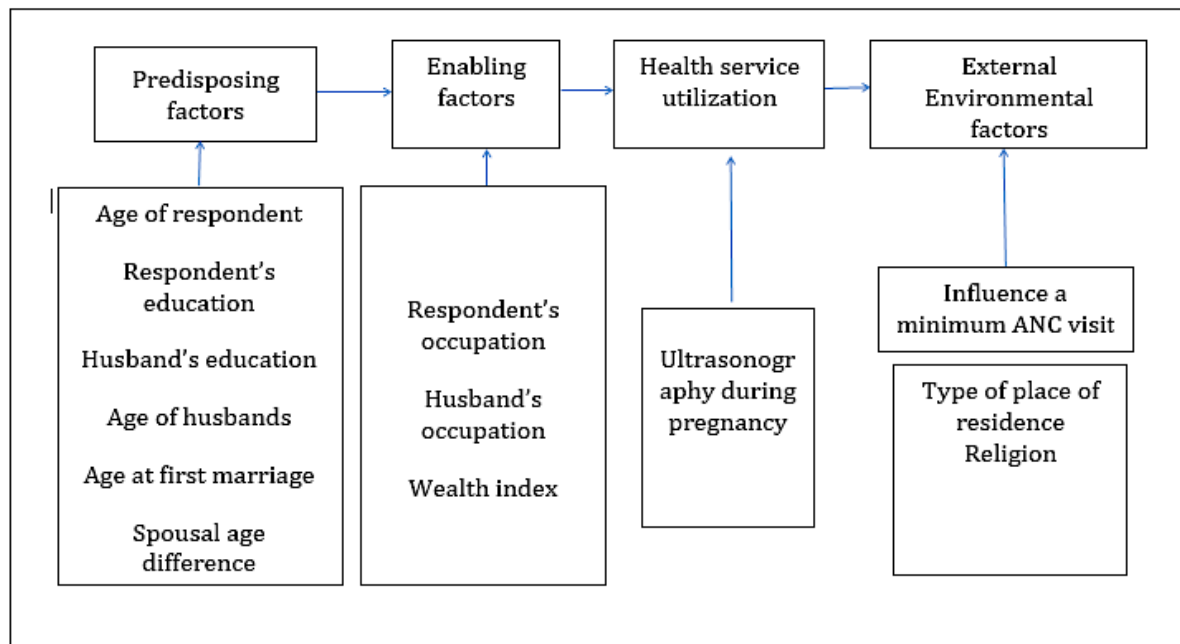


Figure 1: The Conceptual Framework for Health-service Utilization Behavior Modified from Andersen's Behavioral Model

Statistical Analysis

Descriptive statistics, bivariate analysis of chi square test(χ^2) and multivariate binary logistic regression have been used to find out the real scenario of ANC services which is adopted by reproductive women. Descriptive statistics including frequency and percentage has been employed to summarize the data. Chi square test was performing to assess associations between factors of ANC visits under different determinants. A p-value of less than 0.05 was considered statistically significant factors. Moreover, multivariate logistic regression analysis was applied to determine the factors affecting the

dependent variable. Multicollinearity was checked before applying the technique of multivariate logistic regression. The data have been analyzed using the Statistical Package for Social Sciences (SPSS) (version 24.0).

Results

Table 1 represented the descriptive statistics of the number of antenatal care visits which was the dependent variable in this study. The total number of women age 15 to 49 years was 400 of which 280 women were complete and 120 women were incomplete antenatal care visits.

Table 1: Background Characteristics of Married Women Having Pregnancy, Displayed as Frequency and Percentage

Factors	Number of Women	Percentages (%)
Age of Respondent		
≤ 25	89	22.3
26-35	215	53.7
36-49	96	24.0
Type of Place of Residence		
Urban	280	70
Rural	120	30
Religion		
Islam	384	96.0
Others	16	4.0
Respondent's Education		
No Education	40	10.0
Primary	55	13.75
Secondary	140	35.0

Higher Secondary and Above	165	41.25
Respondent's Occupation		
Housewife	300	75.0
Service	34	8.5
Teachers	36	9.0
Others	29	7.3
Husband's Education		
No Education	45	11.25
Primary	43	10.75
Secondary	148	37.0
Higher Secondary and Above	164	41.0
Husband's Occupation		
Teacher	28	7.0
Service	93	23.3
Business	13	3.3
Engineer	19	4.7
Banker	37	9.3
Others	210	52.3
Age of Husbands		
<30	49	12.3
31-40	216	54.0
40+	135	33.7
Age At First Marriage		
13-18	117	29.3
19-24	231	57.7
24+	52	13.0
Spousal Age Difference		
Less Than 5	103	25.7
6 -10	215	53.7
> 10	82	20.7
Desire To More Children		
No	247	61.7
Yes	153	38.3
Ultrasonography During Pregnancy		
No	23	5.7
At Least One Time	377	94.3
Wealth Index		
Poor	50	12.5
Middle	269	67.25
Rich	81	20.3

Majority of the women are belonged to age group between 26-35 years. Based on the study's empirical results we may infer that 22.3% women's age is below 25 years, the percentage of 26-35 years women's is 53.7% and the rest 24% are 36-49 years. Moreover, most of the studied women (70%) are urban areas with compare to rural areas. Based on religious factor we have observed that, a greater percentage of women (96%) are from Islam. Conversely, 4.0% have come from other religion. The rate of higher secondary or above women (41.25%) is higher than that of illiterate (10.0%) and primary (13.75%) educated women respectively. Table 1 also illustrated that 75.0% respondent's occupation is in homemakers.

With regard to education status of husband, a noteworthy proportion (41.0%) of women's husband uphold the higher secondary and above degree whereas the percentage of illiteracy is only 11.25%. From the category of husband's occupation, we see that, the involvement of business profession is only 3.3% and the highest percentage is seen in others job category which is 52.3%. The study findings indicate that 54% women's husbands belong to 31-40 years age group. The factor age at first marriage has an effect on receiving ANC services. Here 19-24 years age group carrying women are very concerned with accepting services in where the percentage is 57.7%. Our study result also illustrates that; 53.7%

women has 6-10 years age gap with their spouse which is considerably known as standard age difference to receive any sorts of caring from husband during antenatal period. For checking pregnancy status before delivery, ultrasonography plays an important role to assure it. In this study, from responses of women we see that most of the women (94.3%) are concerned to adopt it timely. Considering wealth index, around 67.25% of the women's wealth index is middle and only 12.5% women are belonging to poor.

Test of Multicollinearity

Multicollinearity is the phenomena of intercorrela-

tions among independent variables in a multiple regression model. To detect multicollinearity, we see some indicator called variance inflation factor (VIF). Variance Inflating factor (VIF) is used to test the presence of multicollinearity in a regression model. Multicollinearity occurs when the multiple linear regression analysis includes several variables that are significantly correlated not only with the dependent variable but also to each other. Multicollinearity makes some of the significant variables under study to be statistically insignificant. Table 2 shows the VIF values of different predictors.

Table 2: Test of Multicollinearity Among Surveyed Different Predictors of ANC Services

Predictors	Variance Inflation Factor (VIF)
Age of Respondent	1.175
Type of Place of Residence	1.192
Religion	2.125
Respondent's Education	1.208
Respondent's Occupation	1.985
Husband's Education	1.028
Husband's Occupation	1.030
Age of Husbands	2.124
Age at First Marriage	1.072
Spousal Age Difference	1.254
Desire to More Children	1.874
Ultrasonography During Pregnancy	1.110
Wealth Index	1.075

The study reveals that the value of variance inflation factor is less than 5, which means that there is an absence of multicollinearity with in predictors. Therefore, with the help of significant determinants we can conduct further analysis.

Test of Association

A test of association determines if there is a

significant relationship between two or more variables. It assesses whether the distribution of one variable differs depending on the categories or values of the other variable. Table 3 indicates the cross-tabulation analysis of ANC received by selected socio-economic and demographic factors of eligible women in Bangladesh.

Table 3: Cross Tabulation Analysis of ANC Received by Selected Socio-economic and Demographic Factors of Sampled Eligible Women in Chattogram, Bangladesh

Variables	Percentage of Adequate Antenatal Care Receive		χ^2 -value	P-value
	Incomplete visit (<4)	Complete visit (≥4)		
Age of Respondent				
≤ 25	26.97	73.03	9.165	0.002
26-35	11.63	88.37		
36-49	29.17	70.83		
Type of Place of Residence				
Urban	10.71	89.29	7.269	0.041
Rural	22.5	77.5		
Religion				
Islam	18.0	82.0	0.126	0.939
Others	12.0	88.0		
Respondent's Education				
No Education	52.0	48.0		

Primary	32.3	67.7		
Secondary	12	88	9.258	0.031
Higher Secondary and Above	2.5	97.5		
Respondent's Occupation				
Housewife	15	85		
Service	3	97	2.367	0.500
Teachers	1	99		
Others	23.5	76.5		
Husband's Education				
No Education	45	55		
Primary	23.5	76.5	10.592	0.048
Secondary	12.7	87.3		
Higher Secondary and Above	3.3	96.7		
Husband's Occupation				
Teacher	5	95		
Service	8	92		
Business	3.3	96.7	119.522	0.020
Engineer	2.4	97.6		
Banker	3.0	97		
Others	12.1	87.9		
Age Of Husbands				
<30	88.0	12.0		
31-40	46.3	53.7	1.323	0.516
40+	66.7	33.3		
Age at First Marriage				
13-18	57.3	42.7		
19-24	28.7	71.3	43.124	0.000
24+	13.0	87		
Spousal Age Difference				
Less Than 5	74.7	25.3		
6 -10	46.7	53.3	37.414	0.404
> 10	79.7	20.3		
Desire to More Children				
No	28.7	61.3	1.029	0.310
Yes	62.3	37.7		
Ultrasonography During Pregnancy				
No	95.3	4.7	50.446	0.000
At Least One Time	5.7	94.3		
Wealth Index				
Poor	50.7	49.3		
Middle	22.7	77.3	5.132	0.025
Rich	9.7	90.3		
Total size	120	280		

Mother's age plays an important role to receive this care in proper time. Table 2 shows that the percentage of incomplete ANC service corresponding age categories below 25 years and 36-49 years are 26.97 percent, 29.17 percent respectively. The results of this study show that educated women are more inclined (87.3%) to seek healthcare than their other counterparts. Occupation of husband is closely associated with provided antenatal care services receiving by women. 96.7% of husbands who had business profession have completed ANC visits. In case of

age at first marriage, women aged 18 or below (57.3%) are found to be less frequent as compared to other groups. Moreover, it can be seen that women who received at least one time ultrasonography have higher percentage of receiving complete antenatal care compare to the women who are not undertaken. A prime determining factor of quality ANC receivable is wealth status. There are significant variations among the wealth index categories. Table 2 shows that women from rich families receive (90.3%)

more complete antenatal care than those from poor (49.3%) and middle status (77.3%) families.

Multivariable Logistic Regression

Analysis

In this segment, we discuss briefly the selected independent variables that affect the women's

ANC visits during pregnancy. For binary logistic regression analysis, the dependent variable is coded as '0' when number of ANC visits occurred on fewer than four occasions and '1' for visits for antenatal care (ANC) that occurred on four or more occasions (≥ 4).

Table 4: Multivariable Logistic Regression Model for Identifying Factors Associated with Having Antenatal Care (ANC) Visits Among Women in Chattogram, Bangladesh

Background Characteristics	Coefficient	p-value	ANC visits		
			Odds Ratio: e^{β}	95% confidence interval for e^{β}	
				Lower	Upper
Age of respondent					
36-49	0.029	0.851	1.029	0.762	1.390
26-35	0.352	0.010	1.422	1.089	1.858
≤ 25 (RC)	-	-	1.000	-	-
Type Of Place of Residence					
Urban	0.218	0.009	3.243	3.056	3.464
Rural (RC)	-	-	1.000	-	-
Respondent's Education					
Higher	0.859	0.000	2.362	1.815	3.074
Secondary	0.745	0.000	2.107	1.694	2.621
Primary	0.548	0.000	1.729	1.435	2.083
No Education (RC)	-	-	1.000	-	-
Husband's Education					
Higher	0.414	0.001	2.513	2.186	2.930
Secondary	0.355	0.001	2.426	2.166	2.744
Primary	0.141	0.092	1.152	0.977	1.357
No Education (RC)	-	-	1.000	-	-
Husband's Occupation					
Teacher	0.032	0.007	1.233	0.997	1.438
Service	0.032	0.806	1.032	0.801	1.331
Business	0.033	0.804	1.033	0.797	1.341
Engineer	0.122	0.381	1.130	0.860	1.484
Banker	0.073	0.564	1.075	0.840	1.376
Others (RC)	-	-	1.000	-	-
Age At First Marriage					
24+	0.032	0.820	01.033	0.783	1.362
19-24	0.349	0.019	1.705	1.527	1.944
13-18 (RC)	-	-	1.000	-	-
Ultrasonography During Pregnancy					
At Least One Time	0.302	0.020	5.422	5.089	5.858
No	-	-	1.000	-	-
Wealth Index					
Rich	0.023	0.000	3.978	3.843	4.134
Middle	0.017	0.791	1.017	0.898	1.152
Poor (RC)	-	-	1.000	-	-

Table 4 shows that women aged 26–35 have 1.422 times higher odds of complete ANC visits compared with respondents aged ≤ 25 years old. Respondents living in urban areas have 3.243 times higher odds of complete ANC visits compared with those living in rural areas. Respondents with primary education have 1.729 times higher odds of complete ANC visits

compared with those with no education. Respondents with secondary education have 2.107 times higher odds of complete ANC visits compared with those with no education and this is statistically significant. In addition, for the husband's educational level, this variable indicated a positive relationship and had a highly with complete antenatal care visits. Women whose

husbands have higher education are 2.513 times higher odds of complete ANC visits to those husbands with no education. The model also suggests that wives of Teachers have 1.233 times higher odds of complete ANC visits than those whose husbands work in "Other" occupations. On the other hand, the odds ratio for women who married at ages 19–24 is 1.705, compared to those who married at 13–18 indicating the age groups 19–24 are more likely to complete ANC visits compared to reference group. Women who had at least one ultrasound throughout their pregnancy are more than five times more likely to have completed ANC visits than women who did not have any ultrasounds. For the variable wealth index, there is a positive relationship and had a highly significant effect of wealth index with complete antenatal care visits. Women from rich family are 3.978 times more likely complete ANC visits compared to women from poor family.

Discussion

This study aimed to find out overall scenario on adequate quality ANC services in Chattogram, Bangladesh. It revealed that socioeconomic and demographic characteristics are related to receiving these services. A total number of 400 women were interviewed in this study and the cross-tabulation analysis explored that among the twelve independent variables, eight independent variables such as: age of respondent, type of place of residence, respondent's education, husband's education, husband's occupation, age at first marriage, ultrasonography during pregnancy and wealth index were the important determinants.

The study found that the frequency with which a woman attends an antenatal clinic (ANC) is influenced by her age. Older women were 1.422 times more likely to attend the antenatal clinic on a regular basis as compared to mothers who were younger. This discovery illustrates the increased knowledge of health issues and the autonomy in decision-making that are often linked with women who are in the latter stages of life. According to the findings of our research, there is a disparity between urban and rural populations in this regard. This disparity may be traced to a number of contributing variables, such as improved availability and accessibility of medical services, a higher socioeconomic position and a higher level of educational achievement in metropolitan regions

(29). Women living in urban areas have a higher likelihood of using ANC services than those in rural areas because they have more physical accessibility to health care providers and facilities, access to skilled health care providers and greater access to health information. Rural areas are commonly linked to geographical, health service and sociocultural barriers that hinder timely participation in ANC. A lack of healthcare services utilization by mothers in rural areas, compared to urban areas, has been widely documented in Bangladesh and is indicative of long-standing inequities in access and distribution of health services.

The quality of complete antenatal care visits was shown to be heavily influenced by educational attainment, especially for women. The findings of our research demonstrate that an increase in maternal education correlates with a higher utilization of ANC services. Compared to women who only had an elementary education or none at all, women who had a secondary or higher level of education were more likely to go to antenatal care (ANC). The frequency with which ANC visits occurred was found to be lower for women who did not continue their education after marriage (30). Women who have received an education are often more aware of the advantages of receiving medical treatment instead of relying on conventional methods to deal with health difficulties. Educated mothers are more likely to possess comprehensive knowledge regarding secure pregnancy and demonstrate a strong willingness to utilize modern healthcare services. Numerous studies have demonstrated that mothers with lower levels of education exhibit reduced interest in ANC services and encounter greater challenges in accessing these services compared to mothers with higher educational attainment (31). Generally, an educated woman can have higher levels of health literacy, knowledge of pregnancy risks and understanding of the importance of timely and adequate antenatal care. Education can also improve women's autonomy, decision making power and confidence in accessing healthcare providers, boosting their chances to access ANC. By the same way, husbands' education has an important effect on Bangladesh, as fathers are actively involved in decision making of households such as seeking health care and spending money. When husbands have received

some education, they are more likely to know the importance of maternal health care, encourage their wife to attend antenatal service and provide resources for antenatal-related costs like transport, consultation fees and diagnostics. In addition, increasing educational level of both parents is often related to better socioeconomic status and higher access to health information via mass media and social networks, as well as more positive attitudes towards modern healthcare practices (32).

Differences in perceived risk in pregnancy and reproductive experience were significant determinants for older women to use ANC – which may be more or less – depending on the results. Older women might be exposed to more health services from earlier pregnancies, raising awareness of the value of antenatal care. However, in some settings, younger women may be more likely to use ANC in certain settings because of their greater education and access to health information. The mixed results obtained from studies conducted in Bangladesh and other LMICs suggest context-specific relationship between maternal age and use of ANC (29, 33).

Women's financial level is a significant factor, with middle-class and affluent women having more visits than poor women (34, 35). The financial burdens that come along with receiving complete antenatal care (ANC), which includes consultation fees, diagnostic tests, medicines and transportation to healthcare facilities are sometimes prohibitive for women of low socioeconomic status (36, 37). The implementation of policies that provide financial security, such as voucher programs or cash transfers that are contingent on certain conditions might help to alleviate this imbalance and guarantee that the expense does not serve as a barrier for women who are in poverty. This is due to the fact that in certain situations, the husbands are the ones who give the women the money so she may get maternity health care. Only women who can afford to pay attend the health facilities because it may be difficult for them to receive these services if their husbands are no longer employed. With considering this factor there are more conscious about this care in women whose husbands are service holder in addition to business and others occupation.

Strength and Limitations

There are a number of strengths of this study. First, it relied on primary data gathered in 2024 from various localities of Chattogram that yielded up-to-date and locality-specific evidence relating to antenatal care (ANC) utilization in the post-pandemic era. Second, the geographic diversity of the participants helped to better reflect the variability of ANC service use by different groups. Third, using firsthand data has allowed for the collection of detailed information that is now helping to capture a more comprehensive picture of factors associated with ANC utilization. Finally, the study provides local evidence that is useful for local policymaking and interventions in such a region with limited primary data on maternal healthcare utilization, as is the case for Chattogram. Nonetheless, there are some limitations in this study. The respondents were selected from different areas of Chattogram by non-probability sampling technique due to logistical and resource constraints. It is therefore possible that the sample is not representative of all the pregnant women in Chattogram or in Bangladesh. Women attending community-based data may in fact be different in some systematic way from those seeking care at the facility, which could result in selection bias. Thus, results are not to be interpreted to directly reflect the characteristics and experiences of the larger population. Representativeness and generalizability of findings would be strengthened with future studies using larger, community-based samples and probability-based sampling methods.

Conclusion

The study's goal was achieved since the research generally showed that socioeconomic and demographic factors influence the adequate quality antenatal care services in Bangladesh. Women who are of reproductive age (15–49 years) must understand the value of prenatal care and be able to get it in the community. Appropriate actions should also be taken into consideration in order to improve women's empowerment. This study can be used as a tool by researchers and policymakers to comprehend Bangladesh's current ANC utilization situation.

Government and non-governmental organizations, as well as concerned policymakers, should focus on encouraging all pregnant women to begin

antenatal care visits early on. This is because a sufficient number of ANC visits and ANC content may help identify and manage pregnancy outcomes early on. Women who begin postpartum care without using any prenatal care should be the focus of future studies. Policymakers and other interested parties should thus provide suitable training programs for local health professionals to assist women in maintaining acceptable high-quality ANC in order to lower the risk of pregnancy problems and in addition to they have enough knowledge regarding the coordination of satellite and mobile clinics when the need calls for it. Moreover, receiving ANC of poor quality would be enhanced through the creation of focused interventions for women. Interventions in the future must take into account both the supply-side and demand-side viewpoints. A program of education for women regular sessions aimed at improving pregnant women's understanding could be crucial in raising awareness of the value of finishing ANC visits. Additionally, documentaries regarding maternity and child health could be frequently aired on YouTube, television, Radio stations and Facebook. At the same time, the supply side ought to be reinforced by reaching communicated to the target populations about the delivery of healthcare services via information and communication technologies. If the recommendations in this study are implemented, Bangladesh's ANC quality will increase.

Abbreviations

ANC: Antenatal care, SPSS: Statistical Package for the Social Sciences, VIF: Variance Inflation Factor.

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Author Contributions

The author confirms sole responsibility for all aspects of the study, including conceptualization, data creation, analysis, writing, revisions and final approval.

Conflicts of Interest

The author declares no conflict of interest.

Data Availability

Data for the study are available on request.

Declaration of Artificial Intelligence

(AI) Assistance

The authors confirm that no generative artificial intelligence (AI) or AI-assisted technologies were used in the conception, analysis, writing, or editing of this manuscript. The authors take full responsibility for the content's originality, interpretation and accuracy.

Ethics Approval

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