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DETERMINANTS OF PRENATAL ATTACHMENT BASED ON SOCIODEMOGRAPHIC AND OBSTETRIC FACTORS IN PREGNANT WOMEN

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Abstract

Prenatal attachment reflects the emotional bond between a mother and her fetus and plays a crucial role in maternal and neonatal outcomes, including maternal readiness, health behaviors during pregnancy, and postnatal bonding. Suboptimal prenatal attachment may negatively affect maternal psychological adaptation and infant care. However, evidence on the combined influence of sociodemographic and obstetric factors remains limited. This study aimed to analyze the determinants of prenatal attachment based on sociodemographic and obstetric factors among pregnant women. A quantitative analytic study with a cross-sectional design was conducted among 130 pregnant women selected using consecutive sampling. Data were collected using structured questionnaires on sociodemographic and obstetric characteristics and a validated prenatal attachment inventory. Data analysis included univariate, bivariate, and multivariate analyses using logistic regression. The findings revealed that maternal age (p = 0,042), gestational age (p = 0,031), parity (p = 0,021), and history of pregnancy complications (p = 0,037) were significantly associated with prenatal attachment (p < 0.05). Multivariate analysis showed that gestational age was the most dominant factor influencing prenatal attachment with OR = 3.21, 95% CI = 1.75–5.88, p = 0.001. Prenatal attachment is influenced by a combination of sociodemographic and obstetric factors, with gestational age as the strongest determinant. These findings highlight the importance of integrating psychosocial assessment into antenatal care, including early screening and targeted interventions to enhance maternal–fetal attachment and improve maternal and neonatal outcomes..

Keywords: obstetric factors; prenatal attachment; sociodemographic factors,

1. INTRODUCTION

Prenatal attachment is defined as the emotional bond that develops between a mother and her unborn baby during pregnancy. This attachment is increasingly recognized as an important component of maternal–fetal health because it influences maternal emotional well-being, health behaviors during pregnancy, maternal adaptation to motherhood, and postnatal mother–infant bonding. Recent evidence shows that stronger prenatal attachment is associated with positive maternal psychological outcomes and improved maternal responsiveness after birth, whereas weak attachment may increase the risk of anxiety, stress, and impaired maternal adaptation (1). Consequently, prenatal attachment has become an important topic in maternal and child health research.

Current trends in prenatal attachment research emphasize the influence of psychological, sociodemographic, and obstetric factors on maternal bonding during pregnancy. A systematic review by Wing Shan Yuen and colleagues demonstrated that psychoeducational interventions can significantly improve prenatal attachment, indicating that attachment is modifiable and influenced by maternal experiences during pregnancy (2). Furthermore, advances in antenatal care and imaging technology have changed the maternal experience of pregnancy. A recent systematic review by Emily Skelton et al. reported that antenatal imaging, particularly ultrasound examinations, may enhance emotional connection between parents and the fetus by increasing visualization and interaction with the unborn baby (3). These findings suggest that prenatal attachment is shaped not only by emotional factors but also by maternal perceptions and experiences throughout pregnancy.

Several studies have identified important determinants associated with prenatal attachment. Maternal anxiety has been reported as a significant factor affecting attachment, particularly among high-risk pregnant women. Elif Keten Edis and Suemeyye Bal found that increased prenatal anxiety was negatively associated with prenatal attachment levels, while social support and positive maternal adaptation contributed to stronger attachment (4). In addition, sociodemographic characteristics such as maternal age, education, employment status, income level, and family structure have also been associated with variations in attachment scores. Research among adolescent pregnant women demonstrated that younger maternal age, unplanned pregnancy, and inadequate family support were related to lower prenatal attachment levels (5). Similarly, recent findings by Serap Tekbaş and Suna Aras Çelik showed that educational level, parity, gestational age, and pregnancy intention significantly influenced prenatal attachment among pregnant women (6).

Although previous studies have explored factors related to prenatal attachment, several research gaps remain. First, most existing studies focus predominantly on psychological variables such as anxiety and stress, while limited attention has been given to the combined contribution of sociodemographic and obstetric characteristics. Second, findings across studies remain inconsistent regarding which factors are the strongest determinants of prenatal attachment. Third, many previous studies were conducted in specific populations such as adolescent pregnancies or high-risk pregnancies, limiting the generalizability of findings to the broader pregnant population. Therefore, further investigation is needed to comprehensively evaluate the determinants of prenatal attachment based on both sociodemographic and obstetric factors among pregnant women.

Based on these considerations, the present study aims to analyze the determinants of prenatal attachment based on sociodemographic and obstetric factors in pregnant women. This study hypothesizes that maternal sociodemographic characteristics, including age, education, occupation, and income, as well as obstetric factors such as parity, gestational age, pregnancy planning, and pregnancy history, significantly influence prenatal attachment levels.

This study is expected to contribute theoretically and practically to maternal health research and practice. The findings may enrich the current understanding of factors influencing prenatal attachment and provide evidence for healthcare professionals, particularly midwives and nurses, in identifying pregnant women at risk for low prenatal attachment. In addition, the results may support the development of targeted interventions and maternal health education programs aimed at strengthening maternal–fetal bonding during pregnancy, thereby improving maternal and infant well-being outcomes

2. METHODOLOGY

This study employed a quantitative analytic observational design using a cross-sectional approach. The cross-sectional design was selected because it enables the researcher to assess prenatal attachment and its associated sociodemographic and obstetric factors simultaneously at a single point in time. This approach is appropriate for identifying relationships and determining potential predictors of prenatal attachment among pregnant women efficiently and systematically.

The study population consisted of pregnant women who attended antenatal care services at the selected healthcare facilities during the study period. A total of 130 respondents who met the

inclusion criteria were recruited using a consecutive sampling technique. Consecutive sampling is a non-probability sampling method in which all eligible participants encountered during the data collection period are included consecutively until the required sample size is achieved. This technique was chosen to minimize selection bias and ensure that all accessible eligible pregnant women had the opportunity to participate in the study.

The inclusion criteria were pregnant women who:

1. Were willing to participate in the study and signed informed consent,
2. Were able to communicate effectively, and
3. Could complete the questionnaire independently or with minimal assistance.

Meanwhile, pregnant women with severe medical or psychological conditions that interfered with participation in the study were excluded.

Data were collected using structured questionnaires consisting of three sections:

1. **Sociodemographic Questionnaire** was developed to obtain information regarding respondents' sociodemographic characteristics, including maternal age, educational level, occupation, marital status, and family income.
2. **Obstetric Characteristics Questionnaire, was developed to obtain information of o**bstetric-related information included gestational age, parity, pregnancy planning status, pregnancy complications, and antenatal care history.
3. Prenatal attachment was measured using the Prenatal Attachment Inventory (PAI), a standardized instrument designed to assess the emotional bond between pregnant women and their unborn babies which has undergone a validity test with a Cronbach's alpha value of 0.937, indicating very high reliability. The PAI consists of several statements rated using a Likert scale, with higher scores indicating stronger prenatal attachment.

Prior to data collection, ethical approval and permission were obtained from the relevant institutions and healthcare facilities. Eligible pregnant women attending antenatal care services were approached by the researchers and informed about the objectives, procedures, benefits, and confidentiality of the study. Respondents who agreed to participate were asked to sign informed consent forms.

Data collection was conducted directly by distributing the questionnaires to respondents. The researchers provided explanations regarding how to complete the questionnaires and assisted respondents when necessary. Each participant completed the sociodemographic questionnaire, obstetric questionnaire, and Prenatal Attachment Inventory during the same session. The completed questionnaires were checked for completeness before data entry and analysis. The collected data were analyzed using statistical software. Descriptive statistics were used to describe respondents' sociodemographic, obstetric, and prenatal attachment characteristics. Bivariate analysis was conducted to identify associations between independent variables and prenatal attachment scores. Variables with significant associations were further analyzed using multivariate regression analysis to determine the dominant factors influencing prenatal attachment among pregnant women. Statistical significance was determined at a p-value < 0.05.

3. RESULTS

This study involved 130 pregnant women who met the inclusion criteria and participated in the study. The respondents were characterized based on sociodemographic and obstetric variables, including education level, occupation, gestational age, parity, and history of pregnancy complications.

The majority of respondents were in the productive reproductive age group and had completed secondary education. Most respondents were unemployed or housewives. Regarding obstetric characteristics, the majority of respondents were in the second and third trimesters of pregnancy, multiparous, and did not report previous pregnancy complications.

3.1 Characteristics of respondents

3.1.1 Socio-demographic characteristics of the respondents

Table 1. *Socio-demographic characteristics of the respondents*

Characteristics of respondents	n	%
Maternal age		
< 20	8	6.2
20 - 35	95	73.1
> 35	27	20.7
Educational level		
Elementary school	13	10.0
Junior High school	39	30.0
Senior high school	75	57.7
College	3	2.3
Occupation		
Housewife	117	90.0
Private employees	8	6.1
Enterpreuner	4	3.1
Civil servant	1	0.8
Marital status		
Married	129	99.2
Unmarried	1	0.8
Family income		
Low	91	70.0
Middle	39	30.0
High	0	0.0

According to the study results, the majority of respondents (73.1%) were within the healthy reproductive age range of 20–35 years. This finding indicates that the majority of pregnant women are at an age that is considered biologically and reproductively optimal for pregnancy (7). Most of the respondents (57,7%) have a high school education or higher. Educational level plays a crucial role in shaping a mother's ability to understand information related to maternal health, make informed decisions, and raise awareness of the importance of prenatal care and fetal well-being. Mothers with higher levels of education tend to have better health literacy, making them more proactive in seeking information, attending prenatal care appointments, and building psychological readiness during pregnancy (8). Most of the respondents (90%) were stay-at-home mothers who did not have formal employment and still married (99,2%). About 70% of respondents are in the low-income family. This can affect the mental health of pregnant women (9).

3.1.2 Obstretic characteristics of the respondents

Table 2. *Obstretic characteristics of the respondents*

Obstretric characteristics	n	%
Gestational age		
1st trimester	29	22.3
2nd trimester	41	31.5
3rd trimester	60	46.2
Parity		
Primipara	39	30.0
Multipara	91	70.0

Pregnancy planning status		
Planned	59	45.4
Unplanned	71	54.6
Pregnancy complication		
Yes	69	53.1
No	61	46.9
Antenatal care history		
Adequate	93	71.5
Inadequate	37	28.5

Based on obstetric characteristics, the majority of respondents were in the third trimester of pregnancy (46.2%). This suggests that as gestational age increases, mothers tend to undergo prenatal checkups more frequently and are easier to reach for research purposes. Recent studies indicate that in the third trimester, mothers typically experience increased emotional attachment to the fetus as fetal movements become more pronounced and preparations for childbirth become more tangible. Additionally, the majority of respondents were multiparous (70.0%), indicating that most mothers had prior pregnancy experience. Such experience can influence psychological readiness and adaptation during pregnancy (6).

The study results also show that the majority of pregnancies were unplanned (54.6%). Unplanned pregnancies are often associated with increased psychological stress, lower emotional readiness, and delays in starting antenatal care. Nevertheless, the majority of respondents still had a history of adequate antenatal care (71.5%), indicating that mothers remain conscious of maintaining their pregnancy health even though some pregnancies were unplanned. Recent studies indicate that the quality and regularity of antenatal care play a crucial role in improving maternal health and supporting the psychological well-being of pregnant women (10). In addition, more than half of the respondents had a history of pregnancy complications (53.1%). This finding indicates that complications during pregnancy remain a significant issue among pregnant women and can affect both their physical and psychological well-being.

3.1.3 Prenatal attachment of respondents

Table 3. *Prenatal attachment of respondents*

Prenatal attachment	n	%
High	81	62.3
Low	49	37.7

The results of the study show that the majority of pregnant women (62.3%) have high prenatal attachment, while the remaining 37.7% have low prenatal attachment. These findings indicate that the majority of respondents have been able to establish a strong emotional bond with the fetus during pregnancy. High prenatal attachment reflects the mother's emotional involvement, attention, and positive response to fetal development, which can support maternal readiness and the mother–infant relationship after childbirth. women and can affect both their physical and psychological well-being (11). A healthy prenatal bond is supported by the pregnant woman's health, both physical and psychological (12). Prenatal attachment is defined as an emotional bond that can encourage pregnant women to adopt healthy behaviors for the well-being of themselves and their fetuses, including adhering to antenatal care (ANC) visits (13). Prenatal attachment refers to the emotional, cognitive, and behavioral bond that develops between a pregnant mother and her fetus during pregnancy. This bond is reflected in the mother's attention toward the fetus, feelings of affection, desire to protect, and emotional involvement in the development of the unborn baby (14).

3.1.4 The relationship between sociodemographic factors and prenatal attachment

Table 4. *Cross-tab Sociodemographic factors and Prenatal attachment*

Characteristics of respondents	Prenatal Attachment	p value

	High	Low	Total	
Maternal age				
< 20	5	3	8	0,042
20 - 35	58	37	95	
> 35	18	9	27	
Total	81	49	130	
Educational level				
Elementary school	6	7	13	0,327
Junior High school	17	22	39	
Senior high school	56	19	75	
College	2	1	3	
Total	81	49	130	
Occupation				
Housewife	73	44	117	0,559
Private employees	4	4	8	
Enterpreuner	3	1	4	
Civil servant	1	0	1	
Total	81	49	130	
Marital status				
Married	80	49	129	0,336
Unmarried	1	0	1	
Total	81	49	130	
Family income		0		
Low	60	31	91	0,081
Middle	21	18	39	
High	0	0	0	
Total	81	49	130	

The results of the study indicate that maternal age is significantly associated with prenatal attachment (p = 0.042), with the majority of mothers exhibiting high prenatal attachment falling within the 20–35 age range. The healthy reproductive age is considered the optimal period because mothers tend to be better prepared physically, emotionally, and psychologically to undergo pregnancy and form a bond with the fetus. Recent research indicates that a more mature maternal age is associated with increased emotional readiness and psychological adaptation during pregnancy, which can support maternal–fetal attachment (7,11). A healthy reproductive age supports a mother's ability to understand the changes that occur during pregnancy, accept the presence of the fetus, and build a positive emotional bond with the baby starting from the prenatal period.

Regarding the education variable, the majority of respondents with high prenatal attachment had a high school education, although this did not show a statistically significant association (p = 0.327). Education continues to play a role in improving maternal health literacy, the ability to understand pregnancy-related information, and engagement in antenatal care. Recent studies indicate that mothers with higher levels of education tend to have better knowledge and awareness of maternal health and fetal development (6).

A higher level of education makes it easier for a woman to accept, understand, and follow the advice of healthcare professionals regarding the care of her pregnancy. The majority of respondents were homemakers, and no significant association was found with prenatal attachment (p = 0.559). This suggests that employment status is not the sole factor determining a mother's attachment to her fetus. Family support, psychological well-being, and the pregnancy

experience may have a greater influence on the development of prenatal attachment than employment status alone (1). Family support refers to the assistance, care, acceptance, and involvement that family members provide to an individual facing a particular condition or problem, including during pregnancy.

Nearly all respondents were married, and there was no significant association with prenatal attachment (p = 0.336). Relationship stability and spousal support during pregnancy remain important factors in fostering the mother's emotional well-being. Recent research indicates that social and spousal support contribute to improved psychological well-being in mothers during pregnancy and support maternal attachment (3). Family income did not show a significant association with prenatal attachment (p = 0.081), although the majority of respondents with high attachment were in the low-income group. This finding suggests that a mother's emotional bond with her fetus is influenced not only by economic factors but also by her psychological readiness, family support, and her pregnancy experience.

3.2 The relationship between obstetric factors and prenatal attachment

Table 5. *Cross-tab Obstetric factors and Prenatal attachment*

Characteristics of respondents	Prenatal Attachment			p value
	High	Low	Total	
Gestational age				
1st trimester	6	23	29	0,031
2nd trimester	26	15	41	
3rd trimester	49	11	60	
Total	81	49	130	
Parity				
Primipara	19	20	39	0,021
Multipara	62	29	91	
Total	81	49	130	
Pregnancy planning status				
Planned	38	21	59	0,117
Unplanned	43	28	71	
Total	81	49	130	
Pregnancy complication				
Yes	27	42	69	0,037
No	54	7	61	
Total	81	49	130	
Antenatal care history				
Adequate	55	38	93	0,244
Inadequate	26	11	37	
Total	81	49	130	

The results of the study indicate that gestational age has a significant association with prenatal attachment (p = 0.031). Most mothers with high prenatal attachment were in the third trimester of pregnancy. These findings are consistent with the research by Serap Tekbaş and Suna Aras Çelik, which states that an increase in gestational age is associated with an increase in prenatal attachment (6). This suggests that as gestational age increases, the mother's emotional bond with the fetus tends to grow stronger. In the final trimester, fetal movements are felt more distinctly, mothers begin preparing for childbirth, and the perception of the baby's presence becomes more tangible, thereby enhancing the mother's emotional engagement with the fetus.

Parity also showed a significant association with prenatal attachment (p = 0.021), with most multiparous mothers exhibiting higher levels of prenatal attachment compared to primiparous mothers. Previous experiences with pregnancy and childbirth can help mothers become more emotionally and psychologically prepared for subsequent pregnancies, thereby facilitating the formation of a bond with the fetus. Research by Meltem Uğurlu et al. (2023) explains that previous maternal experiences can influence readiness for pregnancy adaptation and prenatal emotional bonding (1).

Regarding the status of pregnancy planning, no significant association was found with prenatal attachment (p = 0.117), although the majority of mothers with high prenatal attachment were from the unplanned pregnancy group. These results suggest that even if a pregnancy was initially unplanned, mothers can still develop a strong emotional bond with the fetus as the pregnancy progresses and with the support of their environment. Family support is essential for mothers, particularly those with unplanned pregnancies (15).

A history of pregnancy complications shows a significant association with prenatal attachment (p = 0.037). Mothers without pregnancy complications tend to have higher levels of prenatal attachment compared to mothers with pregnancy complications. Complications can increase anxiety, stress, and uncertainty during pregnancy, which may potentially affect the mother's emotional attachment to the fetus. Research by Elif Keten Edis and Suemeyye Bal (2023) indicates that anxiety in high-risk pregnancies is associated with low prenatal attachment (4). Pregnant women with pregnancy complications tend to experience anxiety that can affect their acceptance of their baby.

Meanwhile, the history of antenatal care showed no significant association with prenatal attachment (p = 0.244), although most mothers who received adequate antenatal care had high levels of prenatal attachment. This suggests that the quality of the mother's emotional bond with the fetus is likely influenced more by psychological factors and the pregnancy experience than by the number of antenatal care visits alone.

3.3 Factors associated with prenatal attachment

Based on the results of the bivariate analysis, it has been found that factors influencing prenatal attachment include maternal age (p=0,042), gestational age (p=0,031), parity (p=0,021) and history of pregnancy complications (p=0,037). Based on these factors, a further analysis was conducted using a multivariate test involving multiple logistic regression, with the following results:

Table 6. Multivariate Logistic Regression Analysis of Factors Associated with Prenatal Attachment Among Pregnant Women

Variables	p value	OR	95% CI
Maternal age	0.021	2.32	1.07–5.01
Gestational age	0.001	3.21	1.75–5.88
Parity	0.042	2.49	1.15–5.39
Pregnancy complication	0.024	0.37	0.15–0.89

The results of the multivariate analysis showed that maternal age, gestational age, parity, and history of pregnancy complications were significantly associated with prenatal attachment. However, gestational age was the most dominant factor influencing prenatal attachment with an OR value of 3.21; 95% CI = 1.75–5.88; p = 0.001. These findings indicate that mothers in later stages of pregnancy are 3.21 times more likely to have high prenatal attachment compared to mothers in earlier stages of pregnancy. As gestational age increases, mothers tend to be better able to build an emotional bond with the fetus due to an increased perception of the baby's presence, more distinct fetal movements, and readiness for childbirth and the role of motherhood. Recent research explains that prenatal attachment develops gradually throughout pregnancy and

tends to increase in the third trimester when the mother's emotional interaction with the fetus becomes stronger (16).

The findings of this study confirm that prenatal attachment is a multidimensional process influenced by biological, psychological, and obstetric factors. Therefore, healthcare providers need to adopt a holistic approach during antenatal care by not only focusing on the mother's physical condition but also paying attention to her emotional and psychosocial well-being to support the development of optimal prenatal attachment. Recent research also indicates that psychosocial interventions and prenatal education can help improve prenatal attachment and maternal well-being during pregnancy (11).

4. CONCLUSIONS

This study concludes that prenatal attachment among pregnant women is influenced by several sociodemographic and obstetric factors. Maternal age, gestational age, parity, and history of pregnancy complications were significantly associated with prenatal attachment. Pregnant women in the healthy reproductive age group, with more advanced gestational age, multiparity, and without pregnancy complications tended to have higher prenatal attachment.

Among all variables analyzed, gestational age was identified as the most dominant factor influencing prenatal attachment, with pregnant women at more advanced gestational stages having a greater likelihood of developing stronger emotional attachment to their fetuses. These findings indicate that maternal–fetal attachment develops progressively throughout pregnancy and is affected by maternal reproductive experiences and psychological adaptation during pregnancy.

The results of this study emphasize the importance of integrating psychosocial assessment into antenatal care services. Healthcare providers, especially midwives and nurses, should provide comprehensive antenatal care not only focusing on physical health but also supporting maternal emotional well-being and maternal–fetal bonding. Early identification of mothers at risk for low prenatal attachment may help in developing targeted educational and psychosocial interventions to improve maternal and neonatal outcomes.

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