# Maternal-fetal attachment among pregnant women at risk for mental health: a comparative study

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## Abstract

**Background:** Mental problems (stress, anxiety, and depression) experienced by the pregnant negatively affect the life and health of the fetus in the future and may increase the complications seen in pregnancy, delivery and postpartum.

**Aim:** In this study, it was aimed to determine maternal-fetal attachment among pregnant women at risk for mental health.

**Methods:** This cross-sectional study was conducted with 404 women between June 10, 2023 and September 30, 2023 in the obstetrics and gynecology outpatient clinics of a private hospital in eastern Türkiye. Data were collected with the Personal Information Form, the Maternal Antenatal Attachment Scale (MAAS), and the General Health Questionnaire (GHQ-28). The data were evaluated according to the General Health Questionnaire (GHQ-28) mean score, by dividing them into two groups as those at risk for mental health and those without risk for mental health.

**Results:** The MAAS mean score of the women participating in the study was 67.78±9.66, and the mean scores of the subscales of "Attachment Quality" and "Time Spent on Attachment" of the MAAS were 40.82±55.33 and 26.95±5.62, respectively; it was determined that the mean score they got from the GHQ-28 was 2.98±3.81. Between the groups with high-risk and non-risky pregnancies, the mean scores of the MAAS and the subscale of Attachment Quality were found to be higher in non-risky pregnancies (p<0.05). Additionally, it was determined that the mean score of "Time Spent on Attachment" of non-risky pregnant women was higher than that of high-risk pregnant women, but there was no statistically significant difference between the groups (p> 0.05). The GHQ-28 mean score was lower in non-risky pregnant women (p<0.05).

**Conclusion:** In the study, it was determined that the maternal-fetal attachment levels of pregnant women with psychological risk were low. Therefore, the results suggest that it is necessary to determine mental problems in pregnant women and to conduct screening programs more frequently.

**Keywords:** Attachment, maternal, mental health, pregnant,

## Introduction

The pregnancy process is a period that is considered as a preparation stage for motherhood and aimed to provide a positive experience, with various changes in female anatomy, physiology, and psychology [1]. If the expectant mother cannot cope with the intense changes and stress factors she encounters during pregnancy, the risk of developing mental illnesses may increase. Stress and mental disorders experienced during pregnancy can negatively affect both the mother and the fetus [2, 3]. Previous studies in the literature presented that depression and anxiety are the most common mental illnesses during pregnancy [4, 5]. In a study evaluating anxiety and depression during pregnancy, it was determined that 26.9% of Turkish women and 9.5% of Hispanic women had anxiety and depression [6]. In a study conducted in Turkey in 2009, it was determined that 27.9% of pregnant women had depression, and there was a positive relationship between depression and anxiety. In a systematic review and meta-analysis conducted in 2021, the prevalence of depression was found to be 30.3% in low-income countries, 30.8% in middle-income countries, and 18.1% in high-income countries. In the study conducted by Fawcett et al., it was determined that anxiety disorders were seen at a rate of 20.7% [7]. Mental illnesses among pregnant women can affect the pregnant woman and the fetus in many ways. The maternal attachment that develops in this process may be affected by the mental state of the pregnant woman.

Maternal attachment begins with pregnancy and continues throughout life [8]. Attachment is viewed as a psychological process. Feelings related to attachment enable the development of maternal identity and affection for the baby. From the beginning of pregnancy, the woman perceives her baby both as a part of herself and as a new individual. The attachment process includes a multifactorial process such as maternal health, psychosocial health, stress, environmental factors, receiving prenatal care, baby's gender, spouse's approach, and unwanted pregnancy. It was determined that there is a positive relationship between the psychosocial health of pregnant women and the role of motherhood [9]. Mental problems (stress, anxiety, and depression) experienced by the pregnant negatively affect the life and health of the fetus in the future and may increase the complications seen in pregnancy and delivery [10, 11]. Problems that negatively affect neonatal health such as prematurity delivery, low birth weight, and fetal growth retardation may arise [12]. Mental health problems experienced during pregnancy may negatively affect the mother and baby bonding during infancy and may cause the child to lead an unhealthy social life in the future [13].

It is known to be effective onIn addition, mental health problems negatively affect family health. For these reasons, mothers should be carefully screened during pregnancy not only physically but also in terms of mental health, and the risks should be determined. The most important task in this regard falls to midwives and nurses working in primary care.

For this reason, it was aimed to determine maternal-fetal attachment levels among pregnant women at risk for mental health. It is hoped that the findings obtained in this study would guide midwives and nurses in terms of health protection and the services they provide for pregnant women at risk for mental health. The findings of this study would guide healthcare professionals by emphasizing the importance of evaluating the mental health of pregnant women.

Research questions:

1. What is the maternal-fetal attachment level of pregnant women at risk for mental health?

## Materials and Methods

This cross-sectional study was conducted between June 10, 2023 and September 30, 2023 in the obstetrics and gynecology outpatient clinics of a private hospital in eastern Türkiye. Pregnant women who applied to gynecology outpatient clinics were included in the sample of the study by utilizing the random sampling method. In the study, the sample size was determined as at least 385 in the 5% error level, 80% power, and 95% confidence interval, when the power analysis was performed together with the sample calculation of the unknown population. The study was completed with 404 pregnant women who volunteered to participate in the study. The data were evaluated according to the General Health Questionnaire (GHQ-28) score, by dividing them into two groups as those at risk for mental health and those without risk for mental health. In the study, those with a total score of GHQ-28 survey above 4 were considered at risk for mental health, and those with a score of 4 points and below were considered not at risk for mental health.

**Inclusion criteria:** Being 18 years of age and older and being pregnant.

**Exclusion criteria:** Being a woman with a previous psychological disorder and not being diagnosed with a high-risk pregnancy (multiple pregnancies, gestational diabetes, diabetes, preeclampsia, with risks to the fetus such as congenital anomalies etc).

## Data Collection Tools

Data were collected with the Personal Information Form, the Maternal Antenatal Attachment Scale (MAAS), and the General Health Questionnaire (GHQ-28).

**Personal Information Form:** It was created by researchers in order to determine some personal characteristics of pregnant women. In this form, some sociodemographic (age, educational level, employment, income level, family type, duration of the marriage, the status of being married willingly, the status of the relationship with the spouse, etc.), obstetric characteristics of women, and some factors that may affect attachment (parity, trimester, having a desired pregnancy, feeling of the baby's movements, having the pregnancy after the application of assisted-reproduction treatment, knowing the baby's gender, requesting to know the baby's gender, hospitalization during pregnancy, etc.) are included in this form [14-16].

**General Health Questionnaire (GHQ-28):** This questionnaire was developed by Goldberg in 1972 and its validity and reliability study in Turkiye was established by Kılıç in 1999 [17, 18]. The questionnaire is a screening test that was developed to determine the mental health problems of society, encountered outside of psychiatric clinics, and that individuals can fill in themselves. The aim of the questionnaire is to determine the disorders that lead the individual to apply to a clinic other than psychiatry, with a mental problem. The questionnaire has 4 subscales (somatic symptoms, anxiety and insomnia, social dysfunction, and severe depression) and consists of 28 questions. The subscales are independent of each other. The questions consist of four-item answers, "less than usual" and "more than usual", questioning the individual's recent complaints. The four-item response scale was used as a two-item scale in which the first two items were scored as negative and the last two items were scored as positive, which is the "GHQ type scoring" method developed by Goldberg. Accordingly, items a and b were taken as "(0) zero", and items c and d as "(1) one". The four-item response has the benefit of avoiding the tendency to mark the extreme or middle answers. After the application, a minimum of 0 and a maximum of 28 points are obtained. Those with a total score between 0 and 4 are considered normal in terms of mental health, and those above 4 points are considered high-risk in terms of mental health [16, 18, 19]. The Cronbach's alpha reliability coefficient of the scale was calculated as 0.94. In this study, the Cronbach's alpha reliability coefficient of the scale was found to be 0.88.

**Maternal Antenatal Attachment Scale (MAAS):** The Turkish validity and reliability study of the scale developed by Condon was performed by Gölbaşı et al. [20, 21]. The 19-item scale focuses on the pregnant woman's feelings, attitudes, and behaviors towards the fetus. The scale is in the form of a 5-point Likert-type and items are scored between 1 and 5 (5 represents very strong feelings towards the fetus; 1 represents the absence of feelings towards the fetus). The lowest "19 points" and the highest "95 points" can be obtained from the scale. High scores on the scale indicate a high degree of attachment. The calculation is made by reversing items 1, 3, 5, 6, 7, 9, 10, 12, 15, 16, and 18 on the scale. The scale consists of two subscales. Its subscales are the Attachment Quality (items 3, 6, 9, 10, 11, 12, 13, 15, 16, and 19) and the Time Spent on Attachment (items 1, 2, 4, 5, 8, 14, 17, and 18). The 7th item of the scale is added to the total score in the assessment of attachment, without being included in the subscales. The Cronbach's alpha reliability coefficient of the scale was calculated as 0.79 [21]. In this study, the Cronbach's alpha reliability coefficient of the scale was found to be 0.80.

## Statistical analysis

The data of the study were analyzed with SPSS 25.0 for Windows software (SPSS, Chicago, Il, USA). While reporting the results, pregnant women were divided into 2 groups: (1) those with high-risk pregnancies and (2) healthy pregnant women who did not have high-risk pregnancies. Descriptive statistics were given as numbers and percentages. The chi-square test was used to compare the difference between the groups, and the t-test was used for the two-group comparisons for the variables meeting the parametric test conditions. Statistical significance was determined as $p<0.05$.

## Ethics

Before the data were collected, ethical approval was obtained from the Health Sciences, Non-Interventional Clinical Research and Publication Ethics Committee of İnönü University (Decision Number: 2023/4596, Date: 05.02.2023). In addition, prior to the application of the data collection tools, the consent of the participants was obtained by creating an information letter about the research and data collection tools. Participation in the study was carried out on a voluntary basis.

## Results

The comparison of the sociodemographic characteristics of the participants according to their statuses of having high-risk or non-risky pregnancies is presented in Table 1. It was determined that the mean age of the participants with high-risk pregnancies was 27.83±5.25, and the mean age of those with non-risky pregnancies was 27.53±5.12. It was determined that there were statistically significant differences between the groups in terms of income level, family type, and the status of the relationship with the spouse of women with high-risk and non-risky pregnancies ($p<0.05$). However, it was determined that there were not any statistically significant differences between the groups in terms of educational level, employment, duration of the marriage, and the status of being married willingly ($p>0.05$; Table 1).

| **Table 1** | Comparison of the participants' sociodemographic characteristics according to their statuses of having high-risk or non-risky pregnancies (n= 404) | | | | | | |
|---|---|---|---|---|---|---|---|
| Characteristics | High-risk (n=114) | | Non-risky (n=290) | | Total (n=404) | | Test and p value |
| | n | % | n | % | n | % | |
| Age, year (mean±SD) | 27.84±4.61 | | 27.86±5.28 | | 28.68±5.72 | | t=-0.048 p=0.960 |
| Educational Level | | | | | | | |
| ≤ Middle School or Lower | 71 | 62.3 | 183 | 63.1 | 254 | 62.9 | χ2=0.590 |
| ≤ High School | 30 | 26.3 | 81 | 27.9 | 111 | 27.5 | p=0.744 |
| ≥ University or Higher | 13 | 11.4 | 26 | 9.0 | 39 | 9.7 | |
| Employment | | | | | | | |
| Employed | 11 | 9.6 | 44 | 15.2 | 55 | 13.6 | χ2=2.123 |
| Unemployed | 103 | 90.4 | 246 | 84.8 | 349 | 86.4 | p=0.145 |
| Income Level | | | | | | | |
| Good | 5 | 4.4 | 22 | 7.6 | 27 | 6.7 | χ2=6.664 |
| Moderate | 60 | 52.6 | 181 | 62.4 | 241 | 59.7 | p=0.036 |
| Low | 49 | 43.0 | 87 | 30.0 | 136 | 33.7 | |
| Family Type | | | | | | | |
| Nuclear Family | 22 | 19.3 | 90 | 31.0 | 292 | 72.3 | χ2=5.625 |
| Extended Family | 92 | 80.7 | 200 | 69.0 | 112 | 27.7 | p=0.018 |
| Duration of the Marriage | | | | | | | |
| 1 | 34 | 29.8 | 77 | 26.6 | 111 | 27.5 | χ2=0.440 |
| ≥ 2 | 80 | 70.2 | 213 | 73.4 | 293 | 72.5 | p=0.507 |
| The Status of Being Married Willingly | | | | | | | |
| Present | 108 | 94.7 | 273 | 94.1 | 381 | 94.3 | χ2=0.055 |
| Absent | 6 | 5.3 | 17 | 5.9 | 23 | 5.7 | p=0.815 |
| The Status of the Relationship with the Spouse | | | | | | | |
| Good | 94 | 82.5 | 264 | 91.0 | 358 | 88.6 | χ2=6.131 |
| Moderate | 19 | 16.7 | 24 | 8.3 | 43 | 10.6 | p=0.047 |
| Bad | 1 | 0.9 | 2 | 0.7 | 3 | 0.7 | |

$x^2$: Chi-square test

Comparison of the obstetric characteristics of the participants according to their statuses of having high-risk or non-risky pregnancies is presented in Table 2. It was determined that there were statistically significant differences between the groups in terms of the trimester, having a desired pregnancy, feeling of the baby's movements, having the pregnancy after the application of assisted-reproduction treatment, knowing the baby's gender, whether the baby's gender was the desired one, and hospitalization during pregnancy ($p<0.05$). However, it was determined that there was no statistically significant difference between the groups in terms of parity ($p>0.05$; Table 2).

In Table 3, the distribution of the mean scores of the GHQ-28, MAAS, and its subscales are presented. The MAAS mean score of the women participating in the study was found to be 67.78±9.66. In addition, it was determined that the mean score of the MAAS's subscale of the **"Attachment Quality"** was 40.82±55.33, and the mean score of the MAAS's subscale of the **"Time Spent on Attachment"** was 26.95±5.62. The GHQ-28 mean score was found to be 2.98±3.81.

The comparison of the mean scores of the GHQ-28, AEAS, and its subscales according to the participants' statuses of having high-risk or non-risky pregnancies is presented in Table 4. It was determined that the AEAS and its subscale of quality of attachment mean scores were higher in high-risk and non-risky pregnancies, and the differences between the groups were statistically significant ($p<0.05$). Additionally, it was determined that the mean score of "time in attachment mode" of non-risky pregnant women was higher than that of high-risk pregnant

Table 2

**Table 2** Comparison of the obstetric characteristics of the participants according to their statuses of having high-risk or non-risky pregnancies (n= 404)

| Characteristics | High-risk (n=114) | | Non-risky (n=290) | | Total (n=404) | | Test and p value |
|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | |
| Parity | | | | | | | |
| Multiparous | 63 | 55.3 | 163 | 56.2 | 226 | 55.9 | $x^2$=0.030 |
| Primiparous | 51 | 44.7 | 127 | 43.8 | 178 | 44.1 | p=0.863 |
| Trimester | | | | | | | |
| Trimester I | 29 | 25.4 | 27 | 9.3 | 56 | 13.9 | $x^2$=17.901 |
| Trimester II | 20 | 17.5 | 58 | 20.0 | 78 | 19.3 | p<0.001 |
| Trimester III | 65 | 57.0 | 205 | 70.7 | 270 | 66.8 | |
| Having a Desired Pregnancy | | | | | | | |
| Present | 82 | 72.8 | 236 | 82.1 | 321 | 79.5 | $x^2$=4.61 |
| Absent | 32 | 27.2 | 54 | 17.9 | 83 | 20.5 | p=0.037 |
| Feeling of the Baby's Movements | | | | | | | |
| Present | 89 | 78.1 | 258 | 89.0 | 347 | 85.9 | $x^2$=8.016 |
| Absent | 25 | 21.9 | 32 | 11.0 | 57 | 14.1 | p=0.005 |
| Having the Pregnancy after the Application of Assisted-Reproduction Treatment | | | | | | | |
| Present | 17 | 14.9 | 22 | 7.6 | 39 | 9.7 | $x^2$=5.036 |
| Absent | 97 | 85.1 | 268 | 92.4 | 365 | 90.3 | p=0.025 |
| Knowing the Baby's Gender | | | | | | | |
| Present | 84 | 73.7 | 242 | 83.4 | 326 | 80.7 | $x^2$=5.008 |
| Absent | 30 | 226.3 | 48 | 16.6 | 78 | 19.3 | p=0.025 |
| Whether the baby's gender was the desired one | | | | | | | |
| Yes | 55 | 48.2 | 121 | 41.7 | 176 | 43.6 | $x^2$=9.665 |
| No | 39 | 34.2 | 74 | 25.5 | 113 | 28.0 | p=0.008 |
| It does not matter | 20 | 17.5 | 95 | 32.8 | 115 | 28.5 | |
| Hospitalization during Pregnancy | | | | | | | |
| Present | 78 | 69.3 | 245 | 15.9 | 323 | 20.0 | $x^2$=13.170 |
| Absent | 36 | 30.7 | 45 | 84.1 | 81 | 80.0 | p=0.001 |

$x^2$: Chi-square test

**Table 3** Distribution of the mean scores of the GHQ-28, MAAS, and its subscales (n=404)

| Scales | Min-Max | Mean ± SD |
|---|---|---|
| MAAS | 32-90 | 67.78±9.66 |
| Attachment Quality | 18-50 | 40.82±55.33 |
| Time Spent on Attachment | 10-40 | 26.95±5.62 |
| GHQ-28 | 0-25 | 2.98±3.81 |

SD: Standard Deviation, MAAS: Maternal Antenatal Attachment Scale; GHQ-28: General Health Questionnaire

women, but there was no statistically significant difference between the groups (p> 0.05). It was determined that the GHQ-28 mean score of the non-risky pregnant women was lower and the difference between the groups was statistically significant (p<0.05; Table 4).

According to the study findings, it can be said that the total DSPAS score of pregnant women at risk is lower, and the quality of attachment sub-dimension score is lower than those who do not have a risky pregnancy.

**Table 4** Comparison of the mean scores of the GHQ-28, MAAS, and its subscales according to the participants' statuses of having high-risk or non-risky pregnancies (n = 404)

| Variables | High-risk (n=114) Mean±SD | Non-risky (n=290) Mean±SD | Test* | p value | Confidence intervals | |
|---|---|---|---|---|---|---|
| | | | | | Lower | Upper |
| MAAS | 65.67±9.58 | 68.61±9.59 | 2.769 | p=0.006 | 0.850 | 5.019 |
| Attachment Quality | 38.57±5.84 | 41.71±4.85 | 5.690 | p<0.001 | 2.027 | 4.266 |
| Time Spent on Attachment | 26.89±5.82 | 27.10±5.11 | -0.341 | p=0733 | -1.371 | 0.947 |
| GHQ-28 | 7.40±4.16 | 1.24±1.65 | -21.303 | p<0.001 | -6.957 | -5.366 |

SD: Standard Deviation, *: Independent samples t-test, MAAS: Maternal Antenatal Attachment Scale
GHQ-28: General Health Questionnaire

## Discussion

In this study, in which maternal-fetal attachment was evaluated among pregnant women at risk for mental health, it was determined that pregnant women at risk for mental health had a higher rate of poor income and extended family type than those without risk, and the rate of those who expressed good relationship with their spouse was lower. Women are more likely to encounter psychological problems such as stress due to negative life experiences such as violence, low income, excessive workload, and challenging living conditions throughout their lives, so psychological problems are more common among women [22]. In the literature, mental problems in high-risk pregnancies were extensively investigated [10, 15], but pregnant women with mental health risks were neglected [22-24]. It has been seen that the results related to income and family type are supported by the literature. Pregnancy is a unique period of life for women and their partners. While the woman and her husband experience happiness, joy, and excitement upon receiving the

news of pregnancy, each individual perceives the physical and psychological changes experienced with pregnancy differently and may show different reactions, and the relationship with the spouse may change. The factors affecting the adjustment to pregnancy can be listed as the spouse's attitude towards pregnancy, having a high-risk pregnancy, the status of having a desired pregnancy, having a desired gender for the baby, and mental illnesses [25-28]. When the obstetric characteristics of pregnant women with and without risk for mental health were examined, it was seen that there were differences between the groups in terms of the trimester, having a desired pregnancy, feeling the baby's movements, having the pregnancy after the application of assisted-reproduction treatment, knowing the baby's gender, whether the baby's gender was the desired one, and hospitalization during pregnancy, and the results of the present study are similar to the literature [25].

In the study, it was determined that the GHQ-28 mean score of all participants was 2.98, MAAS mean score was 67.78, the mean score of the MAAS's subscale of the "Attachment Quality" was 40.82, and the mean score of the MAAS's subscale of the "Time Attachment Mode" was 26.95. There are many studies in which antenatal maternal attachment levels were evaluated with similar and different scales [29, 30]. In a study using the same scale, the MAAS mean score was found to be 75, and the mean scores of the subscales of the "Attachment Quality" and "Time Spent on Attachment" were found to be 40 and 30, respectively [31]. In another study, the MAAS mean score was found to be 71, and the mean scores of the subscales of the "Attachment Quality" and "Time Spent on Attachment" were calculated as 41 and 25, respectively [32]. It is known that as MAAS scores increase, attachment also increases. In these studies, it was seen that the mean scores of attachment are higher than the results of the present study. This difference is thought to be due to the inclusion of mentally high-risk pregnant women in the sample.

In the study, when the antenatal attachment levels of pregnant women with and without risk for mental health were compared, it was determined that the attachment level of pregnant women with psychological risk was low. Again, it was determined that the mean score of the subscale of the "Attachment Quality", which is one of the MAAS's subscales, was lower in mentally risky pregnant women. Although there is no study in the literature evaluating the antenatal maternal attachment level of mentally risky pregnancies, there are many studies evaluating attachment in high-risk pregnancies [14, 15, 25, 33, 34]. Mother-infant attachment during pregnancy includes the woman's perception of herself as a mother during pregnancy, her emotional interaction with the baby, and the processes of forming the identity of motherhood. There are many factors that cause mental problems during pregnancy [14, 15, 25, 33, 34]. In addition, weak mother-infant attachment can increase mental problems such as anxiety [15]. Training programs with the presence of social support may affect this process [35, 36].

While the increase in mental problems such as anxiety during pregnancy affects attachment negatively, the fact that weak prenatal attachment can also pave the way for mental problems such as anxiety shows that these concepts may have an opposite relationship with each other. As a result, it is thought that stress, anxiety, and attachment problems during pregnancy negatively affect women's mental health, and thus, affect the health of the mother, fetus, and newborn, and consequently, family and community health [15].

It was determined that there was a difference between the groups in terms of some criteria evaluated in the present study. It was mentioned in the literature that attachment and mental problems are affected by these features [15, 37-39]. It was determined that the social environment and cultural structure of the pregnant woman, family type (extended family), income level (low socio-economic level), having an undesired pregnancy (unplanned pregnancy), substance use (cigarette and alcohol), relationship with the spouse, having a planned pregnancy, baby's gender, and social support systems affect the pregnant's mental problems, such as stress, anxiety, and depression [40-42]. For this reason, it is thought that the similarities and differences between the results of the present study and the studies in the literature are due to social and obstetric characteristics such as the relationship with the spouse, social support, the gender of the baby, and hospitalization. Additionally, the education and counseling received during pregnancy was not questioned in the study. The education regarding pregnancy, birth or postpartum period received by the group with and without risk in terms of mental health may have affected these results.

## Limitations

This study has some limitations. First of all, the risks in pregnancy were handled in a general way, and no grouping was made according to the type and severity of the risk. This might have affected the results. However, the results of the present study are similar to the studies in the literature, indicating that this risk is low. Secondly, it is related to screening tests used to identify mental risks such as GHQ-28. Although these tools have high sensitivity and specificity, they cannot be used instead of clinical examination. Thirdly, inclusion and exclusion criteria, data collection methods, or possible methodological problems, conducting the study in a single center might have affected the results. Another limitation is that complications that may affect the mental state of the mother and the attachment of the fetus were not taken into account in the current study.

Despite these limitations, it is thought that the present study is the first study to examine the effects of maternal-fetal attachment levels among pregnant women at risk for mental health in the same study.

## Conclusion and recommendations

In the study, it was determined that the attachment levels of pregnant women at psychological risk were significantly lower than those of pregnant women without psychological risk. Therefore, the results suggest that it is necessary to determine mental problems in pregnant women and to conduct screening programs more frequently. GHQ-28 was used in the study to determine psychological risk. Evidence-based effective screening strategies may be developed in further studies. It is recommended to execute more studies for the purpose of developing interventions on the subject. Subsequent studies can be carried out by limiting or expanding the study population in terms of the economic status of the pregnant woman, the quality and quantity of training received for the newborn during birth and postpartum. Effective screening may be helpful in identifying the risks early and avoiding the effects of those risks.

acquisition – not applicable. All authors have read and agreed to the published version of the manuscript.

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