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The Relationship Between Maternal Anxiety In Pregnant Women And Fetal Growth Disorders At Manggar Baru Public Health Center

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ABSTRACT

Introduction: *Maternal anxiety during pregnancy has been associated with adverse pregnancy outcomes, including impaired fetal growth. However, evidence regarding the relationship between maternal anxiety and fetal growth status remains limited in primary healthcare settings in Indonesia. This study aimed to determine the association between maternal anxiety and fetal growth status among pregnant women attending the Manggar Baru Community Health Center work area in 2025, Balikpapan*
Methods: *The methods use quantitative cross-sectional study was conducted involving 36 pregnant women selected using consecutive sampling. Maternal anxiety was assessed using the Perinatal Anxiety Screening Scale (PASS), while fetal growth status was classified as Small for Gestational Age (SGA) or Appropriate for Gestational Age (AGA). Data were analyzed descriptively, and the association between maternal anxiety and fetal growth status was examined using Fisher's Exact Test*
Results: *The results showed that most most respondents experienced severe anxiety (52.8%) or moderate anxiety (38.9%), while 69.4% of fetuses were classified as SGA. Pregnant women with moderate to severe anxiety were more likely to have SGA fetuses (75.8%) than those with low anxiety levels. Fisher's Exact Test demonstrated a statistically significant association between maternal anxiety and fetal growth status (p = 0.023).*
Conclusions: *These findings suggest that maternal anxiety is associated with impaired fetal growth and highlight the importance of integrating routine mental health screening into antenatal care to support maternal well-being and optimize fetal health outcomes.*

Introduction

Pregnancy is a natural physiological process accompanied by various physical and psychological adaptations as the maternal body supports fetal growth and development. Alongside these physical changes, pregnant women commonly experience emotional and psychological responses, including anxiety, worry, and emotional distress related to childbirth as well as concerns about their own health and that of their unborn babies. These psychological conditions may reduce maternal well-being during pregnancy and potentially affect fetal development, highlighting the importance of appropriate support and interventions to promote the health and well-being of both mother and fetus (Yuliawardani et al., 2024).

Maternal mental health has become a major global public health concern during the antenatal period. Physiological and hormonal changes throughout pregnancy may trigger various emotional responses, increasing the risk of stress, anxiety, and depression among pregnant women. According to Jalal et al., (2024) the World Health Organization (WHO), approximately

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10% of pregnant women and 13% of postpartum women experience mental health disorders. Maternal psychological problems may be influenced by family conflicts, lack of partner support, work–life imbalance, and other social or medical factors. If left untreated, maternal stress and anxiety can adversely affect pregnancy outcomes, increasing the risk of preterm birth, low birth weight, impaired fetal development, and neonatal complications. Therefore, early identification and appropriate interventions for maternal mental health are essential to improve both maternal and fetal health outcomes.

Maternal stress is recognized as an important factor influencing fetal growth and development. Psychological stress during pregnancy may interfere with normal fetal development and increase the risk of adverse pregnancy outcomes, including preterm birth, low birth weight (LBW), and neonatal morbidity (Tandaki et al., 2025). Furthermore, prolonged psychological stress during pregnancy may interfere with normal fetal growth and development, leading to an increased risk of preterm birth, fetal growth restriction (FGR), and low birth weight (LBW).

Recent evidence suggests that higher maternal perceived stress during pregnancy is associated with an increased risk of delivering a small-for-gestational-age (SGA) infant. In addition, maternal stress has been linked to alterations in fetoplacental cortisol metabolism, indicating a potential biological mechanism through which psychological stress may impair fetal growth (Jalal et al., 2024). These findings are supported by recent evidence demonstrating that pregnant women with higher perceived stress levels are more likely to deliver small-for-gestational-age (SGA) infants compared with women experiencing lower stress levels. Maternal stress is also associated with alterations in fetoplacental cortisol metabolism, suggesting a potential biological pathway through which psychological stress may impair fetal growth and development.

Maternal psychological stress is thought to affect fetal growth through alterations in placental cortisol metabolism. Increased fetal exposure to cortisol may impair normal fetal development and increase the risk of fetal growth restriction (FGR) and small-for-gestational-age (SGA) births. Assessment of fetal growth is an essential component of antenatal care. One of the routine methods used to monitor fetal growth is the estimation of fetal weight (estimated fetal weight/EFW), which enables early identification of fetal growth abnormalities and appropriate clinical management. According to the UNICEF–WHO Joint Low Birthweight Estimates (2023), approximately one in seven newborns worldwide (14.7%), equivalent to 19.8 million infants, were born with low birth weight in 2020, indicating that impaired fetal growth remains a major global public health challenge. Furthermore, Okwaraji et al. (2025) reported about low birth weight is associated not only with increased neonatal mortality but also with long-term adverse outcomes, including childhood stunting, neurodevelopmental impairment, and an increased risk of chronic diseases later in life. These findings highlight the importance of identifying modifiable maternal risk factors, including psychological changes during pregnancy, that may contribute to fetal growth disorders.

In Indonesia, analysis of the 2021 National Socio-Economic Survey (SUSENAS) reported that the prevalence of low birth weight reached 11.7%, indicating that fetal growth disorders continue to be an important maternal and child health problem at the national level. Low birth weight remains associated with various maternal and environmental risk factors and contributes substantially to neonatal morbidity and mortality (Ekoriano et al., 2025). These findings suggest that early identification of modifiable maternal risk factors, including psychological changes during pregnancy, is essential to prevent adverse fetal growth outcomes and improve neonatal health. In line with the global burden of low birth weight (LBW), Indonesia continues to experience a substantial burden of this condition. The Indonesia Health Profile (2024) reported

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in 2024 that among the 97% of newborns whose birth weight was successfully measured across 38 provinces, 3.9% were classified as having low birth weight (<2,500 g).

These findings suggest that fetal growth disorders continue to pose a significant challenge to improving maternal and neonatal health in Indonesia. Therefore, early identification of modifiable risk factors, particularly maternal psychological conditions during pregnancy, is essential to prevent adverse fetal outcomes and promote optimal fetal growth. Maternal psychological stress has been increasingly recognized as one of the factors that may adversely affect fetal growth and contribute to the occurrence of fetal growth restriction (FGR) and low birth weight (LBW). Furthermore, Sulistiawan & Bai (2024) an Indonesian study reported that maternal psychosocial conditions during pregnancy may contribute to low birth weight through indirect pathways involving inadequate antenatal care utilization and insufficient family support.

According issued in East Kalimantan Province 2024 reported 3,371 low birth weight (LBW) infants among 63,152 live births (5.97%). This figure exceeds the national prevalence, highlighting the continuing burden of fetal growth disorders in the province (Ministry of Health of the Republic of Indonesia, 2024). Previous studies in East Kalimantan have identified maternal adherence to iron supplementation and adequate antenatal care (ANC) visits as important factors associated with the incidence of low birth weight (LBW). These findings highlight the importance of quality maternal healthcare in preventing adverse birth outcomes (Rahmawati et al., 2025). However, evidence regarding the influence of maternal psychological factors, particularly anxiety during pregnancy, on fetal growth disorders and LBW remains limited in this setting.

Based on records from the Manggar Baru Public Health Center, the number of pregnant women receiving antenatal care (ANC) services was 821 in 2022, 724 in 2023, and increased to 953 in 2024. During the same period, the prevalence of low birth weight (LBW) was 15.15% in 2022, 8.82% in 2023, and 8.47% in 2024. Although the prevalence of LBW has shown a declining trend, the rate remains relatively high, indicating that fetal growth disorders continue to represent an important maternal and child health concern in the Manggar Baru Public Health Center catchment area. This condition underscores the need to identify potentially modifiable risk factors, including maternal anxiety during pregnancy, that may influence fetal growth outcomes.

Although previous studies have demonstrated the association between maternal psychological stress and adverse fetal outcomes, most studies have been conducted in hospital settings or in populations outside Indonesia. In East Kalimantan, existing studies have primarily focused on nutritional factors and antenatal care utilization as determinants of low birth weight, while evidence regarding the relationship between maternal anxiety during pregnancy and fetal growth status remains limited, particularly in primary healthcare settings.

Therefore, this study aims to examine the relationship between maternal anxiety during pregnancy and fetal growth status among pregnant women attending antenatal care at the Manggar Baru Public Health Center, Balikpapan.

Methods

Design: This study employed a quantitative analytic study with a cross-sectional design to investigate the relationship between maternal anxiety during pregnancy and fetal growth status among pregnant women attending antenatal care (ANC) services at the Manggar Baru Public Health Center, Balikpapan, Indonesia. A cross-sectional design was chosen because both the independent variable (maternal anxiety) and the dependent variable (fetal growth status) were measured simultaneously at a single point in time, allowing the assessment of the association between these variables within the study population

Setting: The study was conducted at the Manggar Baru Public Health Center, Balikpapan, East Kalimantan, Indonesia, from March to July 2025.

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The research: Data collection was carried out during routine ANC services. Primary data were obtained through the Perinatal Anxiety Screening Scale (PASS) questionnaire, which was completed directly by eligible pregnant women after providing informed consent. Secondary data were collected from the Maternal and Child Health (MCH) handbook, including uterine fundal height measurements routinely recorded during ANC examinations to estimate fetal weight and determine fetal growth status. The population consisted of all pregnant women in the first, second, and third trimesters who attended antenatal care (ANC) services at the Manggar Baru Public Health Center during the study period. Participants were recruited using a convenience (accidental) sampling technique, in which pregnant women attending routine ANC services who met the eligibility criteria were invited to participate. Based on preliminary data, approximately 40 pregnant women attended ANC services during the two-day data collection period. The minimum sample size was calculated using the Slovin formula with a 5% margin of error, resulting in a minimum required sample of 36 participants. The inclusion criteria were: (1) pregnant women in the first, second, or third trimester; (2) primigravida pregnant women; (3) married pregnant women; (4) able to read and write; and (5) willing to participate in the study. The exclusion criteria were: (1) pregnant women who were absent during the data collection period and (2) pregnant women who declined to participate in the study. Maternal anxiety was assessed using the Perinatal Anxiety Screening Scale (PASS) developed by Somerville et al. (2014). PASS is a self-report instrument consisting of 31 items designed to assess anxiety symptoms during the perinatal period. Each item is scored on a 4-point Likert scale ranging from 0 ("not at all") to 3 ("almost always"), yielding a total score ranging from 0 to 93. The total scores were categorized as 0–20 (no anxiety), 21–26 (mild anxiety), 27–40 (moderate anxiety), and 41–93 (severe anxiety). The Indonesian version of the PASS questionnaire adopted from previous Indonesian research was used in this study. The original PASS instrument demonstrated excellent internal consistency with a Cronbach's alpha of 0.96, indicating high reliability (Somerville et al., 2014). Fetal growth status was determined using the estimated fetal weight recorded in the Maternal and Child Health (MCH) handbook based on routine uterine fundal height measurements during ANC examinations. Fetal growth was classified into three categories: Small for Gestational Age (SGA), Appropriate for Gestational Age (AGA), and Large for Gestational Age (LGA).

Data Analysis were processed through editing, coding, data entry, cleaning, scoring, and tabulation prior to statistical analysis. Descriptive (univariate) analysis was performed to summarize participants' characteristics and the distribution of study variables using frequencies and percentages. Bivariate analysis was conducted using the Chi-square test to examine the relationship between maternal anxiety and fetal growth status. Statistical significance was determined at a 95% confidence level with a p-value of <0.05.

Results

Total of 36 pregnant women participated in this study. The findings are presented sequentially, beginning with the demographic and obstetric characteristics of the respondents, followed by the distribution of maternal anxiety levels and fetal growth status, and finally the analysis of the association between maternal anxiety and fetal growth status.

Table 1 Distribution of Respondents by Maternal Age

Age	Frequency (n)	Accuracy (%)
<20 years	5	13.9%
20-35 years	29	80.6%

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>35 years	2	5.6%
Total	**36**	**100.0%**

Table 1 shows the distribution of respondents by maternal age. Most participants were between 20 and 35 years of age (80.6%, n = 29), whereas 13.9% (n = 5) were younger than 20 years and 5.6% (n = 2) were older than 35 years.

Table 2 Distribution of Respondents by Gestational Age

Gestational Age	Frequency (n)	Accuracy (%)
First trimester	5	13.9%
Second trimester	15	41.7%
Third trimester	16	44.4%
Total	**36**	**100.0%**

Table 2 shows the distribution of respondents by gestational age. The majority of participants were in the third trimester of pregnancy (44.4%, n = 16), followed by the second trimester (41.7%, n = 15), while only 13.9% (n = 5) were in the first trimester.

Table 3 Distribution of Respondents by Education Level

Education	Frequency (n)	Accuracy (%)
Elementary school	3	8.3%
Junior high school	6	16.7%
Senior high school	22	61.1%
Diploma	1	2.8%
Bachelor's degree	4	11.1%
Total	**36**	**100.0%**

Table 3 shows the educational characteristics of the respondents. Most participants had completed senior high school education (61.1%, n = 22), while the remaining respondents had completed junior high school (16.7%, n = 6), bachelor's degree (11.1%, n = 4), elementary school (8.3%, n = 3), or diploma education (2.8%, n = 1).

Table 4 Distribution of Respondents by Occupation

Occupation	Frequency (n)	Accuracy (%)
Employed	10	27.8%
Unemployed	26	72.2%
Total	**36**	**100.0%**

Table 4 shows the employment status of the respondents. The majority of respondents were unemployed (72.2%, n = 26), whereas 27.8% (n = 10) were employed.

Table 5 Distribution of Maternal Anxiety Levels (PASS)

Maternal Anxiety	Frequency (n)	Accuracy (%)
No anxiety	1	2.8%
Mild anxiety	2	5.6%
Moderate anxiety	14	38.9%
Severe anxiety	19	52.8%
Total	**36**	**100.0%**

Table 5 shows the distribution of maternal anxiety levels among the respondents. Severe anxiety was the most common category, affecting 52.8% (n = 19) of participants, followed by moderate

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anxiety in 38.9% (n = 14). In contrast, only 5.6% (n = 2) experienced mild anxiety and 2.8% (n = 1) reported no anxiety.

Table 6 Distribution of Fetal Growth Status

Fetal Growth Status	Frequency (n)	Accuracy (%)
Small for Gestational Age (SGA)	25	69.4%
Appropriate for Gestational Age (AGA)	11	30.6%
Total	**36**	**100.0%**

Table 6 shows the distribution of fetal growth status among the study participants. Most fetuses were classified as Small for Gestational Age (SGA) (69.4%, n = 25), whereas 30.6% (n = 11) were classified as Appropriate for Gestational Age (AGA).

Table 7 Association Between Maternal Anxiety and Fetal Growth Status

Maternal Anxiety	SGA n (%)	AGA n (%)	Total n (%)
Low anxiety (No + Mild)	0 (0.0%)	3(100.0%)	3 (100.00%)
High anxiety (moderate + severe)	25 (75.8%)	8 (24.2%)	33 (100.0%)
Total	**25 (69.4%)**	**11 (30.6%)**	**36 (100.0%)**

Fisher's Exact Test**:** $p = 0.023$

Table 7 presents the association between maternal anxiety and fetal growth status. Fisher's Exact Test was used because several expected cell frequencies were less than five. Pregnant women with moderate to severe anxiety were more likely to have fetuses classified as Small for Gestational Age (SGA) (75.8%) than those with low anxiety levels, among whom all fetuses were classified as Appropriate for Gestational Age (AGA). The analysis revealed a statistically significant association between maternal anxiety and fetal growth status (p = 0.023).

Discussion

The demographic characteristics of the respondents indicate that most pregnant women were within the optimal reproductive age of 20–35 years, were in the second and third trimesters of pregnancy, and had completed secondary education. Although this age range is generally considered biologically favorable for pregnancy, psychological adaptation during pregnancy remains a complex process influenced by hormonal changes, maternal role transition, family expectations, and concerns regarding fetal wellbeing and childbirth. Therefore, maternal age alone may not adequately reflect psychological readiness during pregnancy.

Furthermore, the predominance of respondents in the later stages of pregnancy may have important implications for maternal mental health. As pregnancy progresses, women often experience increasing concerns related to labor, infant health, and parenting responsibilities, which may contribute to heightened anxiety. These psychological responses are considered normal adaptive processes; however, persistent or excessive anxiety may adversely affect maternal wellbeing and potentially influence pregnancy outcomes.

Taken together, the respondent characteristics observed in this study represent a population in which psychological adaptation and fetal development occur simultaneously. Consequently, understanding maternal anxiety during pregnancy is important, as psychological conditions may be associated with fetal growth status and should be considered as part of comprehensive antenatal care services.

The present study found that severe anxiety was the most common psychological condition among pregnant women, affecting 19 respondents (52.8%), followed by moderate anxiety in 14 respondents (38.9%). Only two respondents (5.6%) experienced mild anxiety, while one

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respondent (2.8%) reported no anxiety. These findings indicate that moderate-to-severe anxiety was highly prevalent among pregnant women attending antenatal care services at Manggar Baru Public Health Center.

The predominance of moderate and severe anxiety observed in this study indicates that psychological distress remains common among pregnant women attending antenatal care services. Pregnancy-related anxiety may arise from concerns regarding fetal health, childbirth, maternal role adaptation, and other psychosocial challenges encountered during pregnancy. Previous studies have similarly reported that anxiety is frequently experienced by primigravida women and may be exacerbated by inadequate social support and poor emotional regulation during pregnancy, highlighting the importance of psychosocial assessment as part of routine antenatal care (Nur'aini et al., 2024; Wahyuni et al., 2024). In the present study, all respondents were primigravida mothers, and the majority were in the second and third trimesters of pregnancy. These characteristics may partly explain the high prevalence of anxiety, as first-time mothers commonly experience uncertainty regarding labor, fetal wellbeing, and the transition to motherhood. Furthermore, hormonal changes and increasing physical discomfort during the later stages of pregnancy may contribute to greater psychological distress. Therefore, routine psychological screening during antenatal care should be considered to facilitate the early identification of maternal anxiety and the provision of appropriate counseling and psychosocial support.

Maternal anxiety may arise from concerns regarding fetal health, childbirth, parenting responsibilities, financial readiness, and changes in family and social roles. In the present study, all respondents were primigravida mothers, and the majority were in the second and third trimesters of pregnancy. These characteristics may partly explain the high proportion of anxiety observed, as first-time mothers commonly experience greater uncertainty and psychological adjustment during pregnancy compared with multiparous women. Although anxiety is a common psychological response during pregnancy, persistent moderate or severe anxiety requires early identification and appropriate psychosocial support because it has been associated with poorer maternal wellbeing and adverse pregnancy outcomes in previous studies.

The present study found that the majority of fetuses were classified as Small for Gestational Age (SGA), accounting for 25 respondents (69.4%), while 11 fetuses (30.6%) were classified as Appropriate for Gestational Age (AGA). These findings suggest that SGA was relatively common among the study participants. The predominance of SGA observed in this study highlights the importance of early identification of maternal risk factors and continuous fetal growth monitoring during routine antenatal care.

Fetal growth is a multifactorial process influenced by maternal, placental, fetal, and environmental factors (Martin-alonso et al., 2025). Previous studies have also demonstrated that the occurrence of SGA is associated with multiple maternal conditions, including nutritional status, chronic diseases, socioeconomic vulnerability, placental function, and access to antenatal care, indicating that fetal growth restriction results from complex interactions rather than a single maternal factor (Falcão et al., 2021; Gurung et al., 2022). Maternal nutritional status, anemia, chronic diseases, placental insufficiency, gestational age, socioeconomic conditions, and the quality of antenatal care have all been reported to influence fetal growth and contribute to the risk of SGA pregnancies. Therefore, the high proportion of SGA observed in the present study may reflect the presence of multiple maternal and pregnancy-related factors that were not fully assessed in this study, highlighting the importance of comprehensive antenatal assessment and routine fetal growth monitoring.

The findings should also be interpreted cautiously because fetal growth status in this study was determined using uterine fundal height measurements recorded in the Maternal and Child Health (MCH) handbook. Although fundal height measurement is widely used in routine antenatal

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care. Whelan et al. (2022) reported that its accuracy is lower than ultrasonography and shows considerable variability in estimating gestational age and fetal growth.

Therefore, the possibility of misclassification of fetal growth status cannot be completely excluded in the present study, particularly because fundal height measurements may be influenced by maternal characteristics, fetal position, amniotic fluid volume, and measurement technique. Consequently, ultrasonographic assessment remains the preferred method for a more accurate evaluation of fetal growth status.

The present study demonstrated a significant association between maternal anxiety and fetal growth status (Fisher's Exact Test, p = 0.023). Pregnant women with high anxiety levels were more likely to have fetuses classified as Small for Gestational Age (SGA) about 75.8% than those with low anxiety levels. However, because this study employed a cross-sectional design, these findings should be interpreted as an association rather than evidence of a causal relationship.

Maternal anxiety may activate the hypothalamic–pituitary–adrenal (HPA) axis, resulting in increased secretion of stress hormones, particularly cortisol, during pregnancy. Dysregulation of the maternal HPA axis has been proposed as one of the principal biological pathways linking prenatal psychological stress with adverse maternal and fetal health outcomes (Rinne et al., 2023). The present findings are consistent with previous studies reporting that elevated maternal anxiety during pregnancy is associated with impaired fetal growth and an increased risk of SGA or low birth weight. Although the magnitude of these associations varies across populations, cumulative evidence suggests that prenatal psychological stress may influence fetal growth through neuroendocrine, inflammatory, and placental pathways.

Persistent elevation of maternal cortisol may subsequently alter placental function and uteroplacental circulation, reducing the transfer of oxygen and nutrients required for optimal fetal growth. Chronic maternal stress has also been associated with alterations in placental physiology and fetal development, suggesting a potential mechanism through which maternal anxiety may contribute to impaired fetal growth (Matsas et al., 2023). These biological mechanisms may partly explain the significant association observed between higher maternal anxiety and the increased proportion of Small for Gestational Age (SGA) fetuses in the present study.

These findings are consistent with evidence from systematic reviews and meta-analyses demonstrating that maternal anxiety and chronic stress during pregnancy are associated with an increased risk of fetal growth restriction (FGR), low birth weight (LBW), and Small for Gestational Age (SGA) infants. Collectively, this evidence suggests that prenatal psychological distress may impair fetal growth through interconnected neuroendocrine, placental, and vascular pathways, which may partly explain the higher proportion of SGA fetuses observed among women with high anxiety levels in the present study.

In addition to neuroendocrine and placental mechanisms, maternal anxiety may also influence fetal growth through behavioral pathways. Psychological distress during pregnancy has been associated with poorer maternal well-being, sleep disturbances, and reduced engagement in positive health behaviors, which may indirectly affect pregnancy outcomes. These behavioral changes may contribute to suboptimal maternal nutritional status and alterations in the intrauterine environment, thereby limiting fetal growth and development. Therefore, the relationship between maternal anxiety and Small for Gestational Age (SGA) is likely multifactorial, involving complex interactions between physiological and behavioral mechanisms.

The findings of the present study further emphasize the importance of maternal mental health as an integral component of antenatal care. Early identification and appropriate management of anxiety symptoms through routine psychological screening, counseling, stress-

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reduction strategies, and social support may improve maternal well-being and potentially reduce the risk of adverse fetal growth outcomes. Incorporating mental health assessment into comprehensive antenatal services may therefore provide benefits for both maternal and fetal health.

Nevertheless, several limitations should be acknowledged. The cross-sectional design precludes establishing a temporal or causal relationship between maternal anxiety and fetal growth status. In addition, the relatively small sample size and the unequal distribution of participants across anxiety categories may have influenced the stability of the observed association. Furthermore, important confounding variables, including maternal nutritional status, socioeconomic factors, pregnancy complications, pre-pregnancy body mass index, and other psychosocial stressors, were not fully controlled. Future prospective longitudinal studies with larger sample sizes and comprehensive adjustment for potential confounders are needed to clarify the causal pathways linking maternal anxiety with fetal growth restriction.

Conclusion

This study found that moderate-to-severe anxiety was highly prevalent among pregnant women attending antenatal care services at Manggar Baru Public Health Center, with severe anxiety reported by 52.8% of respondents. The majority of fetuses were classified as Small for Gestational Age (SGA) (69.4%), indicating that fetal growth restriction was relatively common in the study population. A significant association was identified between maternal anxiety and fetal growth status ($p = 0.023$), with pregnant women experiencing higher levels of anxiety being more likely to have fetuses classified as SGA.

These results showed the importance of integrating maternal mental health screening into routine antenatal care as part of a comprehensive strategy to improve maternal and fetal health outcomes. However, due to the cross-sectional design, the observed relationship should be interpreted as an association rather than evidence of causation.

Future research should employ prospective longitudinal designs with larger and more diverse populations, while controlling for important confounding factors such as maternal nutritional status, socioeconomic conditions, body mass index, pregnancy complications, and other psychosocial stressors. Such studies are needed to further elucidate the causal mechanisms linking maternal anxiety and fetal growth restriction and to evaluate the effectiveness of interventions aimed at reducing maternal anxiety during pregnancy.

Ethics approval and consent to participate

This research has gone through a review process and received approval from the Health Research Ethics Committee of Bakti Indonesia Health College Balikpapan with approval number No. 165/S.AKBID-BI/V/2025

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