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Association of Maternal Age with Mental Health in Pregnant Women in Agricultural Communities : A Cross-Sectional Study in Bogor, Indonesia

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ABSTRACT

***Background**: Mental health issues such as depression and anxiety during pregnancy can significantly impact pregnancy outcomes. Agriculture is a high-stress industry that might increase the risks of depression and anxiety. Women in agricultural communities often experience a dual burden from physically demanding labor and reproductive responsibilities, with limited access to mental health services and social support—making them particularly vulnerable.* **Aims:** *This study aimed to identify factors contributing to depression and anxiety among pregnant women in an agricultural community in Bogor Regency.* **Methods:** *This cross-sectional study was conducted from August to October 2023 in Bogor Regency, West Java. A total of 69 pregnant women attending Cijeruk Primary Health Care were involved. Data were collected via interviews and medical records. Depression and anxiety levels were assessed using the Hamilton Depression Rating Scale (HDRS) and Hamilton Anxiety Rating Scale (HARS).* **Results:** *The majority of subjects (>60%) had no depression or anxiety. The prevalence of severe and very severe depression was 10.1%, and 5.8% for severe and very severe anxiety. Maternal age was negatively correlated with both depression (r = -0.317, p = 0.008) and anxiety scores (r = -0.332, p = 0.005). No significant associations were found between HDRS scores and other factors such as gestational age, education level, household income, physical activity, or farming family background.* **Conclusion:** *The correlation between maternal age and depression and anxiety scores highlights the importance of promoting mature age in premarital counseling. Further research is needed to explore broader determinants of maternal mental health in agricultural communities with larger, more diverse samples.*

***Keywords**: Agricultural Community, Anxiety, Depression, Pregnancy*

INTRODUCTION

Pregnancy is a crucial time marked by significant physical, emotional, and hormonal transformations, which can lead to stress and potentially trigger the onset or recurrence of mental health issues. Anxiety and depression are common problems during this period, affecting an estimated 13% to 15.6% of expectant mothers in low- and middle-income countries (LMICs) (Rogers et al., 2020). Beyond the immediate emotional distress, these conditions carry a substantial burden, increasing the risk of adverse pregnancy and infant outcomes (Dadi *et al.*, 2020). This burden resonates even more acutely in countries like Indonesia, where a significant segment of the population is actively engaged in agriculture—an industry with high stress levels that might contribute to the progression of depression and anxiety (Rudolphi, Berg and Parsaik, 2020).

According to the Central Bureau of Statistics (BPS, 2023), 29.36% of Indonesia's total workforce is employed in the agricultural sector, with the majority residing in rural areas. Women in these areas often juggle dual roles as contributors to agricultural production and as housewives within their households. Meanwhile, the Ministry of Agriculture's performance report (Kementerian Pertanian, 2022) highlights persistent challenges in the sector, including weather dependency, limited mechanization, unstable income, and minimal access to health insurance and social protection. Structural

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vulnerabilities in the sector contribute to a chronically stressful environment—particularly for pregnant women, who are already undergoing significant physical and emotional transitions—thereby amplifying their risk of experiencing mental health issues during pregnancy.

Depression and anxiety in pregnant women can arise from various factors. Social determinants, including poverty, low socioeconomic status, limited maternal education, and insufficient social support—conditions often found in agricultural communities—can greatly affect the emotional well-being of expectant mothers (Bedaso *et al.*, 2021; Tesfaye *et al.*, 2023). Moreover, unfavorable circumstances such as health disparities and inadequate health infrastructure in agricultural or rural areas may heighten the risk of mental health issues among pregnant women (Chang *et al.*, 2022). Other well-documented risk factors encompass age, physical activity level, hormonal fluctuations, chronic diseases, pregnancy complications, and previous mental health conditions (Rogers *et al.*, 2020); Dadi *et al.*, 2020).

The correlation between perinatal depression/anxiety and pregnancy outcomes is well-documented. Studies have linked these mental health conditions to an increased risk of postpartum depression, low birth weight, preterm birth, and impaired child development (Dadi *et al.*, 2020). These concerns are particularly poignant within agricultural communities, where women often face unique challenges such as physically demanding workloads, financial constraints, and limited access to healthcare and social support (Rudolphi, Berg and Parsaik, 2020); Ginja *et al.*, 2020). Bogor District is among the agricultural areas in Indonesia; considering that Bogor District has one of the highest maternal mortality rates in West Java (BPS Jawa Barat, 2024), studies exploring maternal health—including mental health aspects—in this area are of critical importance.

The potential incidence of depression and anxiety in farming families, especially among pregnant women, is not well understood in relation to the specific factors that contribute to these mental health conditions in this context. This gap in knowledge potentially poses serious risks to maternal and infant health. Increasing evidence from previous research suggests a link between mental health conditions and pregnancy complications, underscoring the need for supporting studies to identify key risk factors affecting pregnant women in agricultural communities.

Without evidence-based findings, women in farming communities will continue to face barriers in obtaining the necessary support, which can adversely affect maternal and child well-being. To address this gap, our study aims to investigate the potential factors associated with depression and anxiety among pregnant women residing in the agricultural communities of Bogor Regency, Indonesia.

METHODS

Participant Characteristics and Study Design

This cross-sectional study included pregnant women aged 18–40 years with singleton pregnancies who visited Puskesmas Bojong and Puskesmas Karyamekar in Cijeruk District, Bogor Regency, during the study period (September – November 2023). Women with chronic diseases such as diabetes mellitus, congenital anomalies, or cancer prior to pregnancy were excluded from the study.

The minimum sample size was calculated based on the correlation coefficient between maternal age and anxiety level reported by (Jalal, Alsebeiy and Alshealah, 2024), which was 0.34. Using a significance level of 5% and a test power of 80%, the minimum number of subjects required was 64. Participants were recruited purposively; those who met the inclusion criteria were invited to participate.

Data on subject characteristics included maternal age, level of education, gestational age, farming family origin, and household income. Nutritional status was assessed by calculating pre-pregnancy body mass index (BMI) based on data on body weight and height recorded in medical records before pregnancy, and categorized according to WHO standards (Aji *et al.*, 2022). Additionally, nutritional status was measured directly through mid-upper arm circumference (MUAC) and categorized according to gestational age.

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For early pregnancy (<20 weeks), nutritional status was classified as underweight (MUAC <24 cm), normal (MUAC 24–29 cm), and obese (MUAC ≥29 cm). For late pregnancy (≥20 weeks), classifications were underweight (MUAC <23 cm), normal (MUAC 23–28 cm), and obese (MUAC ≥28 cm) (Salih et al., 2023).

Data collection using previous records may potentially introduce recall bias if data are obtained from subjects' memories or incomplete medical records.

Data on physical activity level were collected through interviews and measured using the Short Form International Physical Activity Questionnaire (SF-IPAQ). Participants were categorized based on their levels of Metabolic Equivalent Task (MET) minutes per week as low, moderate, or high. Although not specifically designed for pregnant women, SF-IPAQ has been widely used in this population and has been reported to have good reliability and validity (Sanda *et al.*, 2017). The Indonesian version of the IPAQ also demonstrates satisfactory criterion validity (Dharmansyah and Budiana, 2021).

Levels of depression were assessed using the Hamilton Depression Rating Scale (HDRS-17), which measures symptoms of depression. Responses are graded on three- or five-point scales, ranging from 'no symptoms' to 'severe symptoms.' Anxiety levels were evaluated using the Hamilton Anxiety Rating Scale (HARS), with responses rated on a five-point scale from 'not present' to 'severe.'

Although HDRS and HARS were not originally developed specifically for pregnant women, their use in this population is common and has been reported to be valid (Davies *et al.*, 2020; Noviandry, 2023). However, these instruments may still be subject to potential bias, as factors such as gestational age and previous pregnancy outcomes can significantly influence a pregnant woman's mental state. These factors were not assessed in this study.

Data Analysis

Descriptive statistics were provided for maternal characteristics, nutritional status, physical activity, and levels of depression and anxiety. Depending on the data distribution, either Pearson or Spearman correlation tests were used to examine the relationships between these factors and levels of depression and anxiety.

Ethical Consideration

Written consent was obtained from all participants prior to data collection. This study received ethical clearance from the Ethics Committee for Studies Involving Human Subjects at IPB University, with approval number 919/IT3.KEPMSM-IPB/SK/2023.

RESULTS AND DISCUSSION

Results

A total of 69 pregnant women were included in this study. Table 1 shows that the majority of the subjects were in the third trimester (59.42%), high school graduates (62.32%), and came from farming families (60.87%). The education level of the subjects was generally low, with fewer than half having graduated from senior high school or higher. More than half (55%) of the subjects had a normal BMI prior to pregnancy, and about one-third (31.9%) were overweight or obese. The proportions are similar when considering the subjects' current nutritional status based on MUAC, which shows that more than half (55.1%) had a normal MUAC and 31.9% were obese. The prevalence of combined overweight and obesity observed in this study aligns with findings from other Asian studies, indicating that this issue persists in agricultural communities like the one studied. This is concerning, as numerous studies have confirmed that overweight and obesity during pregnancy can have significant short-term and long-term adverse effects on both the mother and the child. Most subjects had low physical activity levels (66.7%), with only 3 subjects (4.3%) exhibiting high activity levels.

The majority of subjects had no depression (63.8%) and no anxiety (see Table 3). About 10% of women experienced severe or very severe depression, while only 5.8% experienced severe or very severe anxiety. Interestingly, our data shows that those who had depression also tended to experience anxiety (data not shown).

A significant negative correlation was found between maternal age and depression scores (p=0.008, r=-0.317), as well as between maternal age and anxiety scores (p=0.005, r=-0.332). These findings

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imply that younger women tend to experience higher levels of depression and anxiety.

Table 1. Characteristics of the Subjects

Subject Characteristics	n	%
Gestational Age		
1st Trimester	8	11.59
2nd Trimester	20	28.99
3rd Trimester	41	59.42
Mean ± SD (week)	28 ± 11	
Maternal Age (Year)		
Mean ± SD	29 ± 7	
Level of Education		
<3 years in elementary school	7	10.14
Elementary school	10	14.49
Junior high school	22	31.88
Senior high school	21	30.44
Postgraduate	9	13.05
Household Income (Rp)		
Mean ± SD	3,960,145 ± 3,289,629	
Farming Family		
Yes	42	60.87
No	27	39.13

Table 2. Obstetric History of Subjects

Obstetric History	n	%
Parity		
Primigravida	18	26.1
Multigravida	51	73.9
Nutritional Status based on BMI		
Underweight (<18.5 kg/m^2)	9	13.0
Normal (18.5-24.9 kg/m^2)	38	55.1
Overweight (25.0-27.0 kg/m^2)	8	11.6
Obese (>27.0 kg/m^2)	14	20.3
Nutritional Status based on MUAC		
Undernutrition	12	17.4
Normal	35	50.7
Obese	22	31.9
Physical Activity Level		
Low	46	66.7
Moderate	20	29.0
High	3	4.3

Table 3. Prevalence of Depression and Anxiety Levels Among Subjects

Stress Level Category	n	%
Depression Level*		
Normal (score ≤ 7)	44	63.8
Mild depression (score 8-13)	13	18.8
Moderate depression (score 14-18)	5	7.2
Severe depression (score 19-22)	4	5.8
Very severe depression (score ≥ 23)	3	4.3
Anxiety Level**		
No anxiety (score <14)	47	68.1
Mild anxiety (score 14-20)	13	18.8
Moderate anxiety (score 21-27)	5	7.2
Severe anxiety (score 28-41)	2	2.9
Very severe anxiety (score 42-56)	2	2.9

*HDRS = Hamilton Depression Rating Score.
**HARS = Hamilton Anxiety Rating Score.

Table 3. Spearman's Correlations of Subject Characteristics with Depression and Anxiety Score

Variable	Depression Score		Anxiety Score	
	r	*p-value*	r	*p-value*
Gestational age	0.005	0.968	-0.115	0.346
Parity	-0.029	0.815	-0.151	0.216
Maternal age	-0.317*	0.008	-0.332*	0.005
Level of education	-0.153	0.209	-0.047	0.699
Household income	-0.159	0.191	-0.186	0.126
Farming family origin	-0.037	0.765	0.196	0.106
Physical activity level	0.233	0.054	-0.020	0.872
Nutritional Status based on BMI	-0.034	0.782	-0.085	0.486
Nutritional Status based on MUAC	0.051	0.678	0.016	0.897

Discussion

In this study, we found a significant correlation between maternal age and both depression and anxiety scores ($p<0.05$), with a negative correlation indicating that higher maternal age is associated with lower scores of depression and anxiety (r= -0.317 and -0.332, respectively). This finding aligns with previous research suggesting that younger maternal age increases the risk of depression during pregnancy (Chang *et al.*, 2022). A cross-sectional study in Serang City, which included 214 primigravidas, measured prenatal distress using multiple tools, including the PTSD Symptom Scale

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(PSS), Multidimensional Scale of Perceived Social Support (MSPSS), London Measure of Unplanned Pregnancy (LMUP), Marital Adjustment Test (MAT), and Prenatal Distress Questionnaire (PDQ). The study reported that younger age was associated with higher levels of prenatal stress.

Younger women may have less emotional resilience and fewer coping mechanisms to manage the physical and emotional challenges of pregnancy. Their ability to handle stress is often still developing, which can make them feel overwhelmed by the responsibilities of pregnancy and impending motherhood. Additionally, they often face financial and social challenges. Addressing these stressors through targeted interventions, such as counseling, education, and support programs, is essential to improve their well-being and ensure better outcomes for both mother and child (Traylor *et al.*, 2020).

While being pregnant at a young age can increase stress, studies have also found that older age (≥35 years) is associated with higher depression and anxiety scores. A recent study conducted in Klaipeda, Lithuania, involving 306 women aged 65 to 80 years, reported that nearly half of the participants experienced higher-than-normal levels of anxiety (49.0%) and depression (48.4%). This research indicates that older women exhibit higher levels of depression, anxiety, and stress symptoms, as assessed by the short form of the Depression Anxiety Stress Scale (DASS-21) (Beniusiene *et al.*, 2024). Additionally, a small study involving 56 pregnant women in Palembang City showed that depression was more prevalent in women aged over 25 years compared to those with younger ages (Nurwany *et al.*, 2023).

Several potential explanations could reconcile this discrepancy. First, our study may not have included a sufficient number of older women to detect significant differences, as only 12 or 17.4% of subjects were in this age group. Second, our study focused on an agricultural community, where older women may possess greater experience and familiarity with the demands of rural life, leading to enhanced resilience and coping mechanisms compared to their younger counterparts.

It is also worth noting that these studies used different scoring systems, such as the DASS-21 (Chang *et al.*, 2022; (Beniusiene *et al.*, 2025). Notably, the DASS-21 is a self-report questionnaire that measures symptoms experienced in the recent past, which might not fully reflect the overall mental health condition of the subjects and is susceptible to external confounding factors (Thiyagarajan, James and Marzo, 2022).

No significant associations were found between depression and anxiety scores and other factors studied, including subject characteristics such as gestational age, trimester, education level, household income, or farming family origin, as well as obstetric history factors such as nutritional status and physical activity level. These null findings could be explained by several factors. First, our sample size may have been insufficient to detect potentially significant associations, highlighting the need for larger studies in the future. Second, unmeasured variables such as personal coping mechanisms, individual resilience, and access to healthcare could play a crucial role in moderating the influence of sociodemographic factors on maternal mental well-being (Rogers *et al.*, 2020; Dadi *et al.*, 2020; Chang *et al.*, 2022).

Our research did not find a significant link between gestational age or trimester and depression and anxiety scores ($p>0.05$). While one study aligns with our results, showing no correlation between depression and gestational age, it reported a significant association between anxiety and trimester ($p=0.006$), with women in the third trimester demonstrating higher risk [aPOR = 2.53; 95% CI = 1.20–5.33] (Wegbom *et al.*, 2023). This divergence could be attributed to factors such as increased societal pressures as women approach birth. However, it also contradicts other studies indicating peak anxiety in the first trimester. Women living in rural areas are less likely to seek prenatal care during their first trimester compared to their urban and suburban counterparts. This pattern is attributed to a lack of awareness about the importance of perinatal health, obstacles in accessing healthcare facilities, and a higher prevalence of unintended pregnancies (Gordon *et al.*, 2025).

Similarly, our findings diverge from some existing research regarding the influence of education level and household income on mental health. Other studies have reported a significant correlation between lower education and both

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depression and anxiety (p=0.002 and p=0.03) (Wegbom *et al.*, 2023). Additionally, some research has found a correlation between low income and increased depression and anxiety (Biete *et al.*, 2024). Likewise, no association was observed between parity and mental health scores (p>0.05). Some studies suggest that primiparous women are more prone to antenatal depression (Nakamura *et al.*, 2020), while others identify multiparity as a risk factor due to added burdens (Yang, Wu and Chen, 2022).

This study did not identify a significant correlation between nutritional status, based on pre-pregnancy BMI and MUAC, and depression and anxiety scores (p>0.05). These findings are consistent with research conducted on pregnant women in Bogor Regency (p=0.30) (Amallia, Waluyo and Cahya, 2023). Although numerous studies have linked obesity to increased prenatal stress and adverse maternal mental health outcomes—through mechanisms such as heightened systemic inflammation and disruption of the hypothalamic-pituitary-adrenal (HPA) axis, which can intensify stress responses and psychological symptoms (Cattane *et al.*, 2021) —our results did not reflect these associations. It is possible that the small sample size and the uneven distribution of nutritional variables contributed to the lack of statistical significance.

Similarly, no significant relationship was observed between physical activity levels and depression or anxiety scores. This is somewhat unexpected, given the growing body of evidence supporting the role of physical activity in improving maternal psychological well-being. Moderate exercise during pregnancy has been consistently shown to reduce anxiety and depressive symptoms, improve sleep quality, and lower the risk of postpartum depression (Deprato *et al.*, 2024). Additionally, physical activity has been linked to optimal gestational weight gain and improved labor outcomes through enhanced endurance and muscular strength. However, the impact of physical activity on mental health is influenced by factors such as the type and intensity of exercise, the mother's baseline mental health status, and any pregnancy-related complications (American College of Obstetricians and Gynecologists, 2020). The instrument used to assess physical activity level in this study (SF-IPAQ) was not specifically designed for pregnant women; therefore, the results should be interpreted with caution.

Our findings have significant implications for mental health support and interventions in agricultural communities. Recognizing the protective effect of higher maternal age highlights potential resilience factors that could be incorporated into targeted interventions. Culturally tailored programs that leverage the experience and understanding of older women to support younger mothers could be particularly impactful. Further strengthening this approach involves enhancing mental health policies, expanding access to services within rural areas, and implementing educational workshops on stress management and coping skills. These multi-faceted efforts could help bolster resilience and prevent the onset of mental health issues, ultimately promoting the well-being of pregnant women in these settings (Wegbom *et al.*, 2023).

CONCLUSION

In summary, our findings showed a significant correlation between maternal age and both depression and anxiety in agricultural communities. Therefore, emphasizing the importance of reaching mature age during premarital education and counseling is recommended. The lack of correlation observed with other variables underscores the need for further research with larger and more diverse samples. Future studies should explore a wider range of individual and contextual factors—such as personal coping mechanisms, social support networks, and healthcare access—to gain a comprehensive understanding of the determinants of anxiety and depression among pregnant women in these settings.

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