



## **Diagnostic Accuracy of the Perinatal Anxiety Screening Scale (PASS) Against MINI-ICD-10: A Cross-Sectional Study Among Pregnant Women in Primary Care Settings, Indonesia**

**Sartika\*, Nia Karuniawati, Andi Magfirah, Andi Sani**

Universitas Muslim Indonesia, Makassar, Indonesia

\*Correspondence Address: [sartika.suyuti@umi.ac.id](mailto:sartika.suyuti@umi.ac.id)

### **Article Info**

#### **Article History**

Received: Dec 27, 2025

Revised: Apr 23, 2026

Accepted: May 05, 2026

#### **Keywords:**

Anxiety, pregnancy, PASS, MINI-ICD 10, screening, validation

### **ABSTRACT**

Anxiety disorders during pregnancy are prevalent mental health concerns that can affect both maternal and fetal outcomes. Valid and reliable screening tools are essential for early detection and intervention. This study aimed to evaluate the diagnostic performance of the Perinatal Anxiety Screening Scale (PASS) compared to MINI-ICD 10 as the gold standard in detecting anxiety disorders among pregnant women. A cross-sectional diagnostic accuracy study was conducted at Kaluku Bodoa Community Health Center, Makassar City, from October to November 2025. Eighty pregnant women attending antenatal care were recruited using purposive sampling. Data were collected through structured interviews using PASS and MINI-ICD 10 questionnaires. Diagnostic accuracy measures including sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and overall accuracy were calculated. The prevalence of anxiety disorders was 36.25% (n=29) based on MINI-ICD 10 and 53.8% (n=43) based on PASS. The majority of participants were aged 21-35 years (80%), had completed senior high school education (53.8%), and were housewives (77.5%). Most were in their third trimester (67.5%) and nulliparous (43.8%). PASS demonstrated good diagnostic performance with sensitivity of 86.21%, specificity of 64.71%, PPV of 58.14%, NPV of 89.19%, and overall accuracy of 72.5%. PASS showed acceptable diagnostic performance as a screening tool for anxiety disorders in pregnant women, with high sensitivity making it suitable for initial screening in primary healthcare settings. However, the moderate specificity suggests that positive screening results should be confirmed with gold standard diagnostic interviews.

## **INTRODUCTION**

Anxiety disorders represent one of the most common mental health problems during pregnancy, with prevalence rates ranging from 15% to 25% in different populations. Perinatal anxiety can have significant adverse effects on maternal wellbeing, pregnancy outcomes, and child development. Despite its high prevalence and clinical importance, anxiety disorders during pregnancy often remain undetected and untreated in routine antenatal care settings. The identification of anxiety disorders in pregnant women requires valid and reliable screening instruments that are feasible for use in busy clinical settings. While structured diagnostic

interviews such as the Mini International Neuropsychiatric Interview based on ICD-10 criteria (MINI-ICD 10) are considered the gold standard for diagnosing anxiety disorders, they are time-consuming and require trained interviewers, making them impractical for routine screening in primary healthcare facilities.

The Perinatal Anxiety Screening Scale (PASS) was developed specifically to screen for anxiety disorders during pregnancy and the postpartum period. It is a self-report questionnaire designed to assess various types of anxiety symptoms commonly experienced during the perinatal period. However, the diagnostic accuracy of PASS in different populations and healthcare settings needs to be established before it can be recommended for routine clinical use. In Indonesia, particularly in primary healthcare settings such as community health centers (Puskesmas), there is a lack of validated screening tools for perinatal anxiety disorders. This study aimed to evaluate the diagnostic performance of PASS compared to MINI-ICD 10 as the gold standard among pregnant women attending Kaluku Bodoa Community Health Center in Makassar City.

## **METHODS**

### **Study Design and Setting**

A cross-sectional diagnostic accuracy study was conducted at Kaluku Bodoa Community Health Center, Makassar City, Indonesia, from October to November 2025.

### **Participants**

The study included 80 pregnant women who attended antenatal care services at the health center. Sample size was determined using the formula for diagnostic accuracy studies proposed by Buderer (1996), based on an expected sensitivity of 85%, desired precision of 10%, and a 95% confidence level ( $Z\alpha = 1.96$ ), yielding a minimum required sample of 75 participants; 80 participants were enrolled to account for potential data loss. Participants were recruited using purposive sampling, a non-probability method selected because the study required participants with specific characteristics (pregnant women actively attending antenatal care during the study period) and the population was accessible and well-defined within the health center setting. While this approach limits random selection, it is widely applied in diagnostic accuracy studies conducted in primary care facilities where a defined target population attends a single service point. Readers should note that findings may not be fully generalization beyond similar urban Puskesmas settings. Inclusion criteria were: (1) pregnant women at any gestational age, (2) attending antenatal care at the health center during the study period, (3) able to communicate in Indonesian language, and (4) willing to participate and provide informed consent. Exclusion criteria were: (1) women with a previously documented psychiatric diagnosis, (2) women who were unable to complete the interview due to medical complications, and (3) incomplete questionnaire responses.

### **Instruments**

Two instruments were used in this study:

1. Perinatal Anxiety Screening Scale (PASS): A 31-item self-report questionnaire developed by Somerville et al. (2014) to screen for anxiety disorders specific to the perinatal

period. Each item is scored on a 4-point Likert scale (0–3), yielding a total score ranging from 0 to 93. Participants were classified as having anxiety if their total score met or exceeded the established cut-off of 26. The original PASS demonstrated strong internal consistency (Cronbach's  $\alpha = 0.96$ ) and good construct validity. For the purposes of this study, the Indonesian-language version of PASS was administered. Prior to data collection, the instrument's internal consistency was assessed in a pilot sample of 20 pregnant women at the study site, yielding a Cronbach's  $\alpha$  of 0.89, indicating acceptable reliability for use in the Indonesian primary care context.

2. MINI International Neuropsychiatric Interview for ICD-10 (MINI-ICD 10): A structured diagnostic interview used as the gold standard. It includes modules for various anxiety disorders including generalized anxiety disorder, panic disorder, social phobia, agoraphobia, obsessive-compulsive disorder, and post-traumatic stress disorder. Trained interviewers administered the MINI-ICD 10 to all participants.

### **Data Collection**

Data were collected through face-to-face interviews. Demographic and obstetric characteristics were recorded including maternal age, education level, occupation, gestational age, parity, and obstetric history. Both PASS and MINI-ICD 10 were administered to all participants.

### **Data Analysis**

Data were entered and analyzed using SPSS software. Descriptive statistics were used to summarize participant characteristics and prevalence of anxiety disorders. Diagnostic accuracy measures were calculated by constructing a 2×2 contingency table comparing PASS results with MINI-ICD 10 as the reference standard. The following measures were calculated:

- Sensitivity = True Positives / (True Positives + False Negatives) × 100%
- Specificity = True Negatives / (True Negatives + False Positives) × 100%
- Positive Predictive Value (PPV) = True Positives / (True Positives + False Positives) × 100%
- Negative Predictive Value (NPV) = True Negatives / (True Negatives + False Negatives) × 100%
- Accuracy = (True Positives + True Negatives) / Total Sample × 100%

### **Ethical Considerations**

The study was conducted in accordance with ethical principles. Informed consent was obtained from all participants before data collection.

## **RESULTS**

### **Participant Characteristics**

A total of 80 pregnant women participated in the study. Table 1 presents the demographic and obstetric characteristics of the participants.

The majority of participants were in the optimal reproductive age group (21-35 years, 80%), had completed senior high school education (53.8%), were housewives (77.5%), in their third trimester (67.5%), and experiencing their first pregnancy (43.8%).

**Table 1.** Demographic and Obstetric Characteristics of Participants

Characteristic		n	%
Maternal Age (years)	≤ 20	10	12,5
	21-35	64	80,0
	>35	6	7,5
Education Level	Elementary School	2	2,5
	Junior High School	28	35,0
	Senior High School	43	53,8
	College/University	7	8,7
Occupation	Housewife	62	77,5
	Farmer	1	1,2
	Self-employed	13	16,3
	Civil Servant	4	5,0
Gestational Age	First trimester	5	6,2
	Second trimester	21	26,3
	Third trimester	54	67,5

Source: Primary Data, 2025

### Prevalence of Anxiety Disorders

Based on MINI-ICD 10 as the gold standard, 29 participants (36.25%) were diagnosed with anxiety disorders, while 51 participants (63.75%) did not meet the diagnostic criteria. Using PASS, 43 participants (53.8%) screened positive for anxiety, while 37 participants (46.2%) screened negative.

**Table 2.** 2×2 Contingency Table of PASS vs. MINI-ICD 10 Diagnostic Results

PASS Result	Anxiety (MINI-ICD 10+)	No Anxiety (MINI-ICD 10-)	Total
Positive (Anxiety)	25 (TP)	18 (FP)	43
Negative (No Anxiety)	4 (FN)	33 (TN)	37
Total	29	51	80

Source: Primary Data, 2025

Based on this comparison, the diagnostic performance measures of PASS were:

- **Sensitivity:** 86.21% ( $25/29 \times 100\%$ )
- **Specificity:** 64.71% ( $33/51 \times 100\%$ )
- **Positive Predictive Value (PPV):** 58.14% ( $25/43 \times 100\%$ )
- **Negative Predictive Value (NPV):** 89.19% ( $33/37 \times 100\%$ )
- **Overall Accuracy:** 72.5% ( $58/80 \times 100\%$ )

These results indicate that PASS has high sensitivity in identifying pregnant women with anxiety disorders but moderate specificity, resulting in a considerable number of false positive results.

## DISCUSSION

This study evaluated the diagnostic accuracy of the Perinatal Anxiety Screening Scale (PASS) compared to MINI-ICD 10 as the gold standard for detecting anxiety disorders among pregnant women at a primary healthcare facility in Indonesia. The findings demonstrate that PASS has acceptable diagnostic performance, particularly high sensitivity, making it a potentially useful screening tool in this setting.

### Prevalence of Anxiety Disorders

The prevalence of anxiety disorders in our study was 36.25% based on MINI-ICD 10, which is higher than rates reported in some previous studies but consistent with findings from other low- and middle-income countries. Research has shown considerable variation in the prevalence of perinatal anxiety across different populations, ranging from approximately 15% to over 40%. The relatively high prevalence observed in our study may reflect several factors including socioeconomic challenges, limited mental health support services, and cultural factors related to pregnancy and childbearing in the Indonesian context.

The majority of participants in our study were housewives with secondary education levels, which may have contributed to the high anxiety rates. Studies have indicated that unemployment or being a housewife can be associated with increased risk of perinatal anxiety, potentially due to factors such as financial stress, social isolation, and lack of social support outside the home. Additionally, while education is generally considered protective against mental health problems, the relationship between education and perinatal anxiety appears complex and may be influenced by other sociodemographic factors.

### Diagnostic Performance of PASS

The sensitivity of PASS in our study was 86.21%, indicating that the instrument correctly identified the majority of pregnant women who had anxiety disorders according to MINI-ICD 10. This high sensitivity is particularly important for a screening tool, as it minimizes the risk of missing cases that require further evaluation and intervention. Previous validation studies of PASS in other populations have reported sensitivity ranging from approximately 74% to 91%, suggesting that our findings are consistent with the international literature.

However, the specificity of PASS was moderate at 64.71%, resulting in 18 false positive cases (35.3% of those without anxiety disorders). This means that approximately one-third of women who did not have anxiety disorders according to MINI-ICD 10 were incorrectly identified as positive by PASS. The moderate specificity could be attributed to several factors. First, PASS may be capturing subclinical anxiety symptoms that do not meet full diagnostic criteria but are nevertheless clinically significant. Second, the overlap between normal pregnancy-related concerns and pathological anxiety symptoms may contribute to false positive results. Third, cultural and linguistic factors in the adaptation and interpretation of the scale may influence its specificity in the Indonesian context.

The positive predictive value (PPV) of 58.14% indicates that among women who screened positive on PASS, approximately 58% actually had anxiety disorders confirmed by MINI-ICD 10. While this may seem modest, it is important to interpret PPV in the context of prevalence. In our study, with a prevalence of 36.25%, a PPV of 58.14% is actually reasonable

and suggests that a positive PASS result substantially increases the probability of having an anxiety disorder compared to the base rate in the population. In clinical practice, this means that women screening positive on PASS should undergo further assessment to confirm the diagnosis before initiating treatment.

The negative predictive value (NPV) was high at 89.19%, indicating that when PASS identifies a woman as not having anxiety, there is approximately 89% probability that she indeed does not have an anxiety disorder. This high NPV is valuable for efficiently ruling out anxiety disorders in busy clinical settings, allowing healthcare providers to focus their limited resources on those who screen positive and require further evaluation.

The overall accuracy of 72.5% demonstrates that PASS correctly classified approximately three-quarters of participants. While this is lower than the ideal accuracy that would be expected from a gold standard diagnostic tool, it is acceptable for a brief screening instrument intended for use in primary care settings. Meta-analyses of anxiety screening tools have shown that most validated instruments achieve accuracy in the range of 70-85%, placing our findings within the expected range.

### **Clinical Implications**

The high sensitivity and NPV of PASS make it suitable as a first-line screening tool in antenatal care settings where mental health services are limited. The instrument can effectively identify most pregnant women who need further evaluation while also confidently ruling out anxiety disorders in those who screen negative. This is particularly relevant in Indonesia's primary healthcare system, where Puskesmas serve as the first point of contact for pregnant women seeking antenatal care.

However, the moderate specificity and PPV indicate that positive screening results should not be interpreted as definitive diagnoses. Women who screen positive on PASS should be referred for comprehensive clinical assessment, ideally using structured diagnostic interviews or evaluation by mental health professionals. This two-stage screening approach—using PASS for initial screening followed by diagnostic confirmation for positive cases—represents a practical and resource-efficient strategy for identifying and treating perinatal anxiety disorders.

The findings also highlight the importance of training healthcare providers in the administration and interpretation of screening tools. Midwives and nurses working in antenatal clinics should be educated about the meaning of screening results, the distinction between screening and diagnosis, and appropriate referral pathways for women who screen positive.

### **Implications for Future Research**

Several areas warrant further investigation. First, research is needed to explore the optimal cut-off scores for PASS in the Indonesian population, as different thresholds may improve the balance between sensitivity and specificity. Second, longitudinal studies examining the predictive validity of PASS for adverse maternal and child outcomes would strengthen the evidence base for routine screening. Third, studies evaluating the acceptability and feasibility of implementing PASS in routine antenatal care, including cost-effectiveness analyses, would inform policy decisions regarding widespread adoption.

Additionally, qualitative research exploring the experiences and perspectives of pregnant women and healthcare providers regarding anxiety screening could provide valuable insights for improving screening practices and ensuring culturally appropriate approaches to mental health assessment during pregnancy.

### **Limitations**

This study has several limitations that should be acknowledged. First, the relatively small sample size from a single health center limits the generalization of findings to other populations and settings. Second, the study was conducted at a primary healthcare facility in an urban area, and results may differ in rural settings or among different socioeconomic groups. Third, we did not examine the test-retest reliability of PASS or assess inter-rater reliability for MINI-ICD 10 administration. Fourth, the cross-sectional design prevents assessment of the stability of anxiety diagnoses over time or the predictive validity of screening results for pregnancy outcomes. Finally, we did not collect information about treatment-seeking behavior or access to mental health services, which could influence the clinical significance of screening result

### **CONCLUSION**

The Perinatal Anxiety Screening Scale (PASS) demonstrated acceptable diagnostic performance for screening anxiety disorders among pregnant women attending primary healthcare services in Indonesia. With sensitivity of 86.21%, specificity of 64.71%, and overall accuracy of 72.5%, PASS can serve as an effective first-line screening tool in antenatal care settings. The high sensitivity is particularly valuable for identifying women who require further evaluation and support, while the high negative predictive value helps efficiently rule out anxiety disorders in those who screen negative.

However, the moderate specificity indicates that positive screening results should be followed by comprehensive diagnostic assessment before initiating treatment. Implementation of routine anxiety screening using PASS in antenatal care services should be accompanied by clear referral pathways, adequate training for healthcare providers, and access to mental health support services for women identified as having anxiety disorders.

These findings support the potential value of incorporating validated screening tools like PASS into routine antenatal care protocols to improve the detection and management of perinatal anxiety disorders, ultimately contributing to better maternal and child health outcomes.

### **ACKNOWLEDGMENTS**

The authors thank all pregnant women who participated in this study and the staff at Kaluku Bodoa Community Health Center for their support during data collection.

### **REFERENCES**

Alqahtani, A. H. et al. (2018) 'Anxiety and depression during pregnancy in women attending clinics in a University Hospital in Eastern province of Saudi Arabia: Prevalence and

- associated factors', *International Journal of Women's Health*, 10, pp. 101-108. doi: 10.2147/IJWH.S153273.
- Baljon, K. et al. (2022) 'Effectiveness of Breathing Exercises, Foot Reflexology and Massage (BRM) on Maternal and Newborn Outcomes Among Primigravidae in Saudi Arabia: A Randomized Controlled Trial', *International Journal of Women's Health*, 14(February), pp. 279-295. doi: 10.2147/IJWH.S347971.
- Colli, C. et al. (2021) 'Prenatal stress and psychiatric symptoms during early phases of the COVID-19 pandemic in Italy', *International Journal of Women's Health*, 13, pp. 653-662. doi: 10.2147/IJWH.S315467.
- Duan, C.-C. et al. (2022) 'Internet-based cognitive therapy for women with antenatal depressive symptoms during the COVID-19 pandemic: protocol for a multi-center randomized controlled trial across China', *Trials*, 23(1). doi: 10.1186/s13063-022-06728-5.
- Ge, Y. et al. (2021) 'Anxiety and adaptation of behavior in pregnant Zhuang women during the COVID-19 pandemic: A mixed-mode survey', *Risk Management and Healthcare Policy*, 14, pp. 1563-1573. doi: 10.2147/RMHP.S303835.
- Hijazi, H. H. et al. (2021) 'The impact of perceived social support during pregnancy on postpartum infant-focused anxieties: A prospective cohort study of mothers in Northern Jordan', *International Journal of Women's Health*, 13(September), pp. 973-989. doi: 10.2147/IJWH.S329487.
- Hossain, N. et al. (2020) 'Perceptions, Generalized Anxiety and Fears of Pregnant women about Corona Virus infection in the heart of Pandemic'. doi: 10.21203/rs.3.rs-32235/v1.
- Jeličić, L. et al. (2022) 'Maternal Anxiety and Its Associated Factors During the First and Second Wave of COVID-19 Pandemic in Serbia: A Cross-Sectional Study', *Psychology Research and Behavior Management*, 15(December), pp. 3775-3792. doi: 10.2147/PRBM.S391694.
- Kundarti, F. I. and Komalyana, I. N. T. (2023) 'Hypnotherapy Intervention Can Reducing Anxiety and Cortisol in Pregnancy', *Poltekita: Jurnal Ilmu Kesehatan*, 17(1), pp. 114-123. doi: 10.33860/jik.v17i1.2095.
- Lupattelli, A. et al. (2018) 'Self-reported perinatal depressive symptoms and postnatal symptom severity after treatment with antidepressants in pregnancy: A cross-sectional study across 12 European countries using the Edinburgh postnatal depression scale', *Clinical Epidemiology*, 10, pp. 655-669. doi: 10.2147/CLEP.S156210.
- Muñoz-Vela, F. J. et al. (2023) 'Fear and Anxiety in Pregnant Women During the COVID-19 Pandemic: A Systematic Review', *International Journal of Public Health*, 68(December), pp. 4993-4994. doi: 10.3389/ijph.2023.1605587.
- Nabweire, M. et al. (2024) 'Prevalence and Factors Associated with Anxiety Disorders Among Pregnant Women at Mulago National Referral Hospital, Uganda', *International Journal of Women's Health*, 16(February), pp. 237-247. doi: 10.2147/IJWH.S440361.
- Nasir A (2011) *Dasar-Dasar Keperawatan Jiwa: Pengantar dan Teori*. Jakarta: Salemba Medika.
- Nath, A. et al. (2019) 'The prevalence and determinants of pregnancy-related anxiety amongst pregnant women at less than 24 weeks of pregnancy in Bangalore, Southern India', *International Journal of Women's Health*, Volume 11, pp. 241-248. doi: 10.2147/ijwh.s193306.

- Nath S, Ryan EG, Trevillion K, et al. (2018) 'Prevalence and identification of anxiety disorders in pregnancy: the diagnostic accuracy of the two-item Generalised Anxiety Disorder scale (GAD-2).', *BMJ Open*, 8.
- Racine, N. et al. (2021) 'Maternal depressive and anxiety symptoms before and during the COVID-19 pandemic in Canada: a longitudinal analysis', *The Lancet Psychiatry*. Elsevier Ltd, 8(5), pp. 405–415. doi: 10.1016/S2215-0366(21)00074-2.
- Rini, C. et al. (no date) 'Psychological adaptation and birth outcomes: the role of personal resources, stress, and sociocultural context in pregnancy.', *Health Physical*.
- Roddy Mitchell, A. et al. (2023) 'Prevalence of Perinatal Anxiety and Related Disorders in Low- and Middle-Income Countries: A Systematic Review and Meta-Analysis', *JAMA Network Open*, 6(11), pp. 1–20. doi: 10.1001/jamanetworkopen.2023.43711.
- Surkan, P. J. et al. (2020) 'Cognitive-behavioral therapy-based intervention to treat symptoms of anxiety in pregnancy in a prenatal clinic using non-specialist providers in Pakistan: design of a randomised trial.', *BMJ Open*, 10(4). doi: 10.1136/BMJOPEN-2020-037590.
- Taubman-Ben-Ari, O. et al. (2022) 'Contributors to COVID-19-Related Childbirth Anxiety among Pregnant Women in Two Pandemic Waves', *International Journal of Environmental Research and Public Health*, 20(1), p. 110. doi: 10.3390/ijerph20010110.
- Vaiphei, K., Manukrishnan and Lobo, R. (2023) 'Psychosocial Interventions in Perinatal Mental Illness', *Indian Journal of Social Psychiatry*, 39(3), pp. 204–209. doi: 10.4103/ijsp.ijsp\_252\_23.
- Wu, Y. et al. (2020) 'Perinatal depressive and anxiety symptoms of pregnant women during the coronavirus disease 2019 outbreak in China', *American Journal of Obstetrics and Gynecology*. Elsevier Inc., 223(2), pp. 240.e1-240.e9. doi: 10.1016/j.ajog.2020.05.009.
- Xie, J. et al. (2022) 'Efficacy of psychosocial interventions for psychological distress among women undergoing termination of pregnancy for fetal anomaly: a systematic review', *Annals of Palliative Medicine*, 11(2), pp. 784–805. doi: 10.21037/apm-21-2415.
- Zhao, J. et al. (2024) 'Current Situation and Mental Health of Pregnant Women During the Prevention and Control of Novel Coronavirus Infection: A Cross-Sectional Study on the Investigation of Influencing Factors', *International Journal of Women's Health*, 16(February), pp. 193–202. doi: 10.2147/IJWH.S445473.
- Zhou, Y. et al. (2020) 'The prevalence of psychiatric symptoms of pregnant and non-pregnant women during the COVID-19 epidemic', *Translational Psychiatry*. Springer US, 10(1). doi: 10.1038/s41398-020-01006-x.
- Alqahtani, A. H. et al. (2018) 'Anxiety and depression during pregnancy in women attending clinics in a University Hospital in Eastern province of Saudi Arabia: Prevalence and associated factors', *International Journal of Women's Health*, 10, pp. 101–108. doi: 10.2147/IJWH.S153273.
- Baljon, K. et al. (2022) 'Effectiveness of Breathing Exercises, Foot Reflexology and Massage (BRM) on Maternal and Newborn Outcomes Among Primigravidae in Saudi Arabia: A Randomized Controlled Trial', *International Journal of Women's Health*, 14(February), pp. 279–295. doi: 10.2147/IJWH.S347971.

Colli, C. et al. (2021) 'Prenatal stress and psychiatric symptoms during early phases of the COVID-19 pandemic in italy', *International Journal of Women's Health*, 13, pp. 653-662. doi: 10.2147/IJWH.S315467.