

Factors Associated with Hyperemesis Gravidarum among First-trimester Pregnant Women in the Midwifery Ward of RSDKH Balangan

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Abstract: **Background:** Hyperemesis gravidarum (HG) is a severe form of nausea and vomiting in pregnancy that may cause dehydration, weight loss, electrolyte disturbances, and impaired quality of life. Early identification of women who require closer assessment may support timely antenatal care. **Objective:** This study aimed to examine the associations of maternal age, education level, economic status, and parity with HG among first-trimester pregnant women treated in the Midwifery Ward of RSDKH Balangan. **Methods:** A retrospective analytical study was conducted using medical records of 154 first-trimester pregnant women recorded from January to December 2025. Total sampling was used. Data were analyzed descriptively and with Pearson's chi-square test; crude odds ratios (ORs) with 95% confidence intervals (CIs) were calculated. **Results:** HG was documented in 80 women (51.9%). Risk age (<20 or >35 years) was associated with HG ($p<0.001$; OR 3.65, 95% CI 1.85–7.20), as were lower education ($p<0.001$; OR 3.85, 95% CI 1.95–7.58), lower economic status based on treatment class ($p=0.010$; OR 2.31, 95% CI 1.21–4.41), and risk parity (primiparity or grand multiparity) ($p<0.001$; OR 4.09, 95% CI 2.09–8.01). **Conclusion:** Maternal age, education, economic status, and parity were associated with HG in this hospital-based sample. The findings support combined early assessment and antenatal counseling, but they should not be interpreted as independent predictors or causal effects because the study was retrospective, single-center, and based on bivariate analyses.

Keywords: education; economic status; hyperemesis gravidarum; maternal age; parity

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Introduction

Pregnancy is a physiological process accompanied by substantial hormonal and metabolic changes. Nausea and vomiting commonly begin in early pregnancy, usually between the fourth and seventh weeks, and most cases resolve by the twentieth week. Hyperemesis gravidarum (HG) represents the severe end of this spectrum and can substantially impair oral intake, hydration, nutritional status, daily functioning, and quality of life (Lowe & Steinweg, 2022; Royal College of Obstetricians and Gynaecologists [RCOG], 2024). HG is clinically distinct from uncomplicated nausea and vomiting of pregnancy because severe cases may involve dehydration, electrolyte abnormalities, weight loss, and nutritional deficiency. Contemporary guidance emphasizes clinical assessment, exclusion of alternative diagnoses, and objective assessment of symptom severity rather than relying on vomiting frequency alone (RCOG, 2024; Wong et al., 2022). The condition may also be associated with adverse maternal and offspring outcomes, particularly when severe nutritional compromise occurs (Dean et al., 2022).

The etiology of HG is multifactorial. Endocrine and placental factors are increasingly recognized, and recent genetic research has identified growth/differentiation factor 15 (GDF15) as an important biological pathway related to nausea and vomiting in pregnancy (Fejzo et al., 2024; Fejzo et al., 2022). Nevertheless, demographic and obstetric characteristics remain relevant when identifying women who may require closer clinical assessment. Large population-based studies have reported associations involving maternal age, parity, previous HG, and socioeconomic characteristics (Fiaschi et al., 2016; Pont et al., 2024).

Maternal education may influence health literacy and the ability to recognize warning signs, understand dietary and fluid recommendations, and seek appropriate care. Socioeconomic circumstances may also influence access to antenatal services, nutrition, transportation, and treatment. These pathways should, however, be interpreted cautiously because education and socioeconomic position are potential proxies for broader social

determinants rather than direct biological causes (Lowe et al., 2020; Tan et al., 2017). Despite increasing international evidence, hospital-based evidence from South Kalimantan remains limited. Records from the Midwifery Ward of RSDKH Balangan indicated that 154 first-trimester pregnant women were eligible during January–December 2025, including 80 women with documented HG and 74 without HG. Therefore, this study examined the associations of maternal age, education level, economic status, and parity with HG in this specific clinical population. The study was intended to provide local evidence for early assessment and antenatal counseling rather than to establish causal relationships.

Method

This retrospective analytical study used secondary medical-record data from the Midwifery Ward of RSDKH Balangan, South Kalimantan, Indonesia. The observation period was January to December 2025. The reporting structure was aligned with the principles of the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement (von Elm et al., 2007). The study population comprised all first-trimester pregnant women recorded in the Midwifery Ward during the study period. Total sampling was applied. Inclusion criteria were: (1) gestational age of 0–12 weeks, (2) examination or treatment in the Midwifery Ward, and (3) complete records for maternal age, education level, treatment class, parity, and HG diagnosis. Records were excluded when gestational age exceeded 12 weeks, records were incomplete or unreadable, duplicate records were identified, or the pregnancy was multiple. The final analytical sample consisted of 154 women.

The outcome variable was documented HG diagnosis in the medical record. Because the study was based on retrospective records, the analysis used the recorded clinical diagnosis rather than reconstructing the diagnosis from symptom scores. Maternal age was categorized as at risk (<20 or >35 years) and not at risk (20–35 years). Education was categorized as lower (elementary/junior high school) and higher (senior high school/university). Economic status was operationalized using treatment class as a proxy: lower status (Class II–III) and higher status (VIP–Class I). The manuscript explicitly recognizes that treatment class may reflect insurance coverage, referral mechanisms, or service preference and therefore should not be interpreted as a direct measure of household income. Parity was categorized as risk parity (primiparity or grand multiparity) and non-risk parity (multiparity, 2–3 births).

Data were extracted using a structured checklist and underwent editing, coding, data entry, cleaning, and tabulation. Descriptive statistics were presented as frequencies and percentages. Associations between each categorical maternal characteristic and HG were assessed using Pearson's chi-square test. Crude odds ratios (ORs) and 95% confidence intervals (CIs) were calculated to quantify the magnitude of association. Statistical significance was defined as $p < 0.05$. Because the available dataset contained only separate two-way tables and no individual-level cross-tabulation of all predictors, multivariable logistic regression was not performed; consequently, the reported ORs are unadjusted and should not be interpreted as independent effects. Ethical clearance was obtained from the Ethics Committee of Universitas Muhammadiyah Banjarmasin (No. 317/UMB/KE/VI/2026). Patient identifiers were not included in the analytical dataset.

Results and Discussion

Among 154 first-trimester pregnant women, 80 (51.9%) had a documented diagnosis of HG and 74 (48.1%) did not. The risk-age group comprised 66 women (42.9%), the lower-education group 67 (43.5%), the lower-economic-status group 81 (52.6%), and the risk-parity group 77 (50.0%). Maternal age was associated with HG. Women in the risk-age category had approximately 3.65 times the odds of documented HG compared with women aged 20–35 years. This finding is consistent with large population-based evidence showing that maternal age is associated with the likelihood of HG-related hospital care (Fiaschi et al., 2016; Pont et al., 2024). However, the present categorization combined women younger than 20 years and older than 35 years. Therefore, the analysis cannot determine whether the association was driven primarily by younger age, older age, or both. Age should consequently be regarded as one component of risk assessment rather than an isolated causal factor.

Education level was also associated with HG. Women with lower education had approximately 3.85 times the odds of documented HG compared with women with higher education. Education may influence health literacy, communication with healthcare providers, recognition of dehydration or persistent vomiting, and timely care-seeking. Nevertheless, health literacy and care-seeking behavior were not measured directly in this study. Therefore, these mechanisms remain plausible explanations rather than findings demonstrated by the dataset. Social and healthcare-access pathways should be considered when interpreting this association (Tan et al., 2017; Lowe et al., 2020).

Lower economic status, operationalized using treatment class, was associated with HG (OR 2.31, 95% CI 1.21–4.41). This association was weaker in magnitude than those observed for age, education, and parity. Importantly, treatment class is an imperfect socioeconomic proxy because it may reflect insurance arrangements, referral pathways, institutional policy, or patient preference. It should therefore not be interpreted as equivalent to household income or material deprivation. Future studies should collect direct measures such as household income, employment, food security, and health-service access.

Parity showed the largest crude OR among the four variables. Women classified as having risk parity had approximately four times the odds of documented HG compared with women with 2–3 previous births. Previous population-based research has also identified parity and previous reproductive history as relevant factors in HG (Fiaschi et al., 2016; Pont et al., 2024). However, primiparity and grand multiparity were combined into one exposure category, even though these groups may have different biological and social profiles. Moreover, the analysis was bivariate; therefore, parity cannot be considered the dominant or independent predictor of HG. The findings should also be interpreted in the context of contemporary biological evidence. Recent work has demonstrated an important role for GDF15 signaling in nausea and vomiting during pregnancy, illustrating that HG cannot be adequately explained by demographic variables alone (Fejzo et al., 2024). Maternal age, education, economic circumstances, and parity may identify groups with different levels of vulnerability or healthcare exposure, but they do not capture the biological pathways underlying HG.

Taken together, the observed associations support a multidimensional approach to early assessment. The practical implication is not to classify women as destined to develop HG based on demographic characteristics, but to use these characteristics as prompts for closer symptom assessment, counseling, and timely referral when clinically indicated. This interpretation is consistent with contemporary guidance emphasizing early recognition and individualized management of severe nausea and vomiting in pregnancy (RCOG, 2024; Lowe & Steinweg, 2022). Midwives and other antenatal care providers may use maternal age, education, socioeconomic context, and parity as contextual indicators during first-trimester assessment. These indicators should be combined with direct clinical assessment of nausea and vomiting severity, hydration status, weight change, nutritional intake, and relevant medical history. At the service level, the findings support improving the completeness of medical-record documentation and developing a standardized assessment checklist. However, the present data do not establish sufficient predictive performance to justify a validated clinical prediction tool. Any screening checklist should therefore be prospectively evaluated before routine implementation.

First, the retrospective design and single-center setting limit causal inference and external validity. Second, HG was identified from the recorded clinical diagnosis, and the study did not independently validate the diagnosis using a standardized symptom instrument such as the Pregnancy-Unique Quantification of Emesis (PUQE) score. Third, secondary medical-record data may be affected by incomplete documentation and information bias. Fourth, treatment class was used as a proxy for economic status and may misclassify household socioeconomic position. Fifth, several clinically relevant variables, including previous HG, psychological distress, nutritional status, body mass index, multiple pregnancy, and biological markers, were not consistently available. Sixth, the statistical analysis was bivariate, so residual confounding cannot be excluded. Finally, the combination of <20 and >35 years and the combination of primiparity and grand multiparity may conceal subgroup-specific associations.

Table 1. Association between maternal age and hyperemesis gravidarum

Maternal age	HG Yes, n (%)	HG No, n (%)	Total, n	p-value	Crude OR (95% CI)
Risk (<20 or >35 years)	46 (69.7)	20 (30.3)	66	<0.001	3.65 (1.85–7.20)
Not at risk (20–35 years)	34 (38.6)	54 (61.4)	88		
Total	80 (51.9)	74 (48.1)	154		

Table 2. Association between education level and hyperemesis gravidarum

Education	HG Yes, n (%)	HG No, n (%)	Total, n	p-value	Crude OR (95% CI)
Lower (elementary–junior high)	47 (70.1)	20 (29.9)	67	<0.001	3.85 (1.95–7.58)
Higher (senior high–university)	33 (37.9)	54 (62.1)	87		
Total	80 (51.9)	74 (48.1)	154		

Table 3. Association between economic status and hyperemesis gravidarum

Economic status	HG Yes, n (%)	HG No, n (%)	Total, n	p-value	Crude OR (95% CI)
Lower (Class II–III)	50 (61.7)	31 (38.3)	81	0.010	2.31 (1.21–4.41)
Higher (VIP–Class I)	30 (41.1)	43 (58.9)	73		
Total	80 (51.9)	74 (48.1)	154		

Table 4. Association between parity and hyperemesis gravidarum

Parity	HG Yes, n (%)	HG No, n (%)	Total, n	p-value	Crude OR (95% CI)
Risk (primipara or grand multipara)	53 (68.8)	24 (31.2)	77	<0.001	4.09 (2.09–8.01)
Non-risk (2–3 births)	27 (35.1)	50 (64.9)	77		
Total	80 (51.9)	74 (48.1)	154		

Conclusion

Among first-trimester pregnant women treated at RSDKH Balangan, maternal age, education level, economic status, and parity were statistically associated with documented hyperemesis gravidarum. The largest crude association was observed for risk parity, followed by education, maternal age, and economic status. These findings should be interpreted as unadjusted associations rather than independent risk estimates or causal effects. Clinical assessment should therefore integrate these maternal characteristics with direct evaluation of symptom severity and nutritional and hydration status. Future multicenter prospective studies using standardized HG diagnostic criteria and multivariable modeling are needed to determine independent predictors and improve the generalizability of the findings.

Declaration of Generative AI

The authors confirm that this manuscript was independently developed and written without the use of generative artificial intelligence (AI) or automated content-generation tools.

Authors' Contribution

All authors made equal contributions to all stages of the research, including study conception and design, data collection, data analysis, interpretation of the findings, manuscript preparation, and critical revision. All authors reviewed and approved the final manuscript for submission.

Conflict of Interests Statement

The authors declare that there are no conflicts of interest associated with this research or its publication.

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Data Availability

The data generated and/or analyzed during this study are available from the corresponding author upon reasonable request, subject to applicable conditions.

Informed Consent

Written informed consent was obtained from all participants prior to their involvement in the study.

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