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Parity and Interpregnancy Interval as Risk Factors for Hyperemesis Gravidarum: A Cross-Sectional Study at Puskesmas Wundulako, Kolaka

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A B S T R A C T

This cross-sectional study aimed to analyze parity and interpregnancy interval as risk factors for hyperemesis gravidarum among pregnant women at Puskesmas Wundulako, Kolaka. The study involved 80 respondents, including 40 women with hyperemesis gravidarum and 40 without, selected using purposive sampling from the 2024 maternal health register. Independent variables were parity (risky: 1 and >3; not risky: 2–3) and interpregnancy interval (risky: <2 years; not risky: ≥2 years), while the dependent variable was the occurrence of hyperemesis gravidarum. Data were analyzed using Chi-square tests. The results indicated that high-risk parity and short interpregnancy intervals significantly increased the likelihood of hyperemesis gravidarum, highlighting the need for targeted prenatal education and early monitoring at primary healthcare facilities

INTRODUCTION

Pregnancy is a physiological process accompanied by various biological, hormonal, and psychological changes in the maternal body (Kepley et al., 2025). These changes are most pronounced during the first trimester and often lead to complaints of nausea and vomiting. Such symptoms generally appear around 5–6 weeks of gestation, peak between 8–12 weeks, and gradually subside by 16–18 weeks of gestation. Nausea and vomiting during pregnancy are closely associated with elevated levels of estrogen and human chorionic gonadotropin (hCG) produced by the placenta (Lee & Saha, 2011). While most pregnant women can adapt to these conditions, some develop more severe manifestations, known as hyperemesis gravidarum.

Hyperemesis gravidarum is a pregnancy complication characterized by persistent and excessive nausea and vomiting, which can lead to dehydration, electrolyte imbalance, weight loss, and impaired nutritional status. This condition can have serious consequences for both maternal and fetal health if not properly managed (Vadakekut & Mahdy, 2025). Globally, the prevalence of hyperemesis gravidarum varies widely across countries, ranging from 0.3% to over 10% of all pregnancies (Val & Míguez, 2023). Approximately 12.5% of pregnancies worldwide are affected by hyperemesis gravidarum, making it a significant maternal health concern (Maslin & Dean, 2022).

In Indonesia, hyperemesis gravidarum remains a considerable maternal health problem. National data indicate that over 80% of pregnant women experience nausea and vomiting, with 12–13% progressing to hyperemesis gravidarum (Profil Kesehatan Indonesia, 2024)(Kemenkes, 2020). Data from Southeast Sulawesi Province during 2019–2023 show fluctuating yet consistently high incidence rates, highlighting the ongoing burden of this condition, particularly at the primary healthcare level (Dinkes Kesehatan Provinsi Sulawesi Tenggara, 2023). At the district level, Kolaka has reported notably high and relatively stable incidence rates of hyperemesis gravidarum in recent years, suggesting the presence of maternal risk factors contributing to its occurrence. Primary healthcare–based research is therefore crucial, as community health centers (puskesmas) play a key role in pregnancy monitoring, early detection, and prevention of pregnancy complications (Dinkes Kolaka, 2024).

Hyperemesis gravidarum is multifactorial, influenced by hormonal, immunological, psychological, and maternal characteristics (Vadakekut & Mahdy, 2025). Parity is one maternal factor frequently associated with its occurrence, with primiparous women being at higher risk compared to multiparous women, likely due to limited physiological adaptation and increased psychological stress during first pregnancies (Gadung et al., 2022).

Additionally, interpregnancy interval is a critical factor affecting maternal health during pregnancy. Short interpregnancy intervals, particularly less than two years, can prevent full physical and nutritional recovery, thereby increasing the risk of pregnancy complications, including hyperemesis gravidarum (Ni et al., 2023).

Several studies have demonstrated significant associations between parity, interpregnancy interval, and hyperemesis gravidarum. Pregnant women who

are primiparous or have short interpregnancy intervals are reported to have a higher likelihood of developing hyperemesis gravidarum compared to multiparous women or those with optimal interpregnancy spacing (Kjeldgaard et al., 2019). However, most previous studies were conducted in hospital or referral settings, with limited empirical evidence from primary healthcare facilities, particularly puskesmas.

Puskesmas Wundulako in Kolaka, as a primary healthcare facility, plays a strategic role in maternal and child health services, including the prevention and early detection of pregnancy complications. To date, empirical studies specifically examining parity and interpregnancy interval as risk factors for hyperemesis gravidarum in this setting remain scarce. This gap underscores the need for locally based research to inform targeted interventions. Based on the foregoing, this study aims to analyze parity and interpregnancy interval as risk factors for hyperemesis gravidarum using a cross-sectional design at Puskesmas Wundulako, Kolaka. The findings are expected to strengthen promotive and preventive strategies and enhance early detection of hyperemesis gravidarum at the primary healthcare level.

LITERATURE REVIEW

Theories and Hypothesis Development

1. Maternal Adaptation Theory

The Maternal Adaptation Theory explains that pregnancy requires a complex adjustment process involving both the maternal body and psychological state, particularly in response to hormonal, metabolic, and emotional changes. During early pregnancy, elevated levels of human chorionic gonadotropin (hCG) and estrogen play a key role in the onset of nausea and vomiting. A maternal inability to adequately adapt to these changes may trigger more severe complications, including hyperemesis gravidarum(Kepley et al., 2025).

Parity is a crucial factor in this adaptation process. Primiparous women, who lack prior pregnancy experience, generally have limited physiological and psychological adaptation to the changes associated with pregnancy. This can increase sensitivity to hormonal fluctuations and pregnancy-related stress, ultimately elevating the risk of developing hyperemesis gravidarum (Sebastiani et al., 2020).

Previous quantitative studies support the association between parity and hyperemesis gravidarum. Studies by (Karacan & Karacan, 2026; Morokuma et al., 2016) reported that primiparous women have a higher risk of experiencing hyperemesis gravidarum compared to multiparous women. However, some studies reported nonsignificant results, highlighting the need for further investigation in the context of primary healthcare settings.

H1**:** There is a significant association between parity and the incidence of hyperemesis gravidarum among pregnant women at Puskesmas Wundulako, Kolaka.

2. Maternal Depletion Theory

The Maternal Depletion Theory posits that pregnancy, childbirth, and breastfeeding deplete maternal energy and nutrient reserves. When interpregnancy intervals are too short, the maternal body does not have sufficient time to restore physical, hormonal, and nutritional status. This condition increases vulnerability to pregnancy complications, including hyperemesis gravidarum (Kovacs, 2000).

Short interpregnancy intervals, particularly less than two years, are often associated with hormonal imbalance and suboptimal nutritional status, which can exacerbate the maternal response to early pregnancy changes. This biological unpreparedness may trigger more severe and persistent nausea and vomiting(Mazza et al., 2022).

Previous studies have shown that short interpregnancy intervals are significantly associated with hyperemesis gravidarum. Research by (Kozhimannil et al., 2016; Kumar et al., 2025) reported that women with short interpregnancy intervals are at higher risk of experiencing pregnancy complications compared to those with optimal intervals. Nevertheless, findings vary across regions, indicating the need for primary healthcare–based research.

H2: There is a significant association between interpregnancy interval and the incidence of hyperemesis gravidarum among pregnant women at Puskesmas Wundulako, Kolaka.

3. Conceptual Framework

This study employs a quantitative approach using a cross-sectional design. The conceptual framework illustrates the relationship between the independent variables (parity and interpregnancy interval) and the dependent variable (hyperemesis gravidarum) as follows:

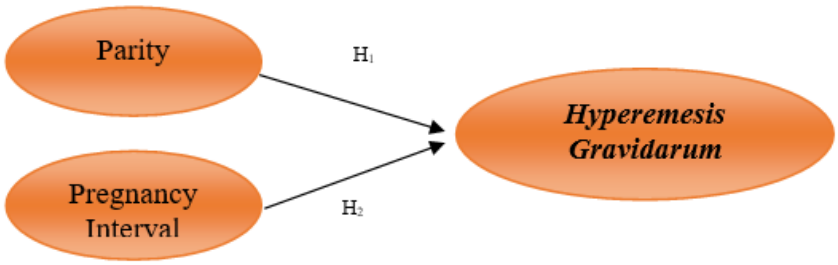

Figure 1. Conceptual Framework

METHODOLOGY

This cross-sectional study aimed to analyze the relationship between parity and interpregnancy interval with the incidence of hyperemesis gravidarum among pregnant women. Measurements of independent and dependent variables were conducted simultaneously at a single point in time. The study was carried out in June 2025 at Puskesmas Wundulako, Kolaka Regency. The population included all pregnant women recorded in the 2024 Maternal and Child Health (KIA) register, totaling 204 individuals. A purposive sampling technique was used to select 80 respondents, consisting of 40 pregnant women with hyperemesis gravidarum and 40 without, according to predefined inclusion and exclusion criteria.

The independent variables in this study were parity and interpregnancy interval, while the dependent variable was the occurrence of hyperemesis gravidarum. Parity was categorized as high-risk (parity 1 and >3) and low-risk (parity 2–3). Interpregnancy interval was classified as high-risk (<2 years) and low-risk (≥2 years). Secondary data were obtained from the KIA register at Puskesmas Wundulako. Data processing included editing, coding, entry, cleaning, and tabulation. Univariate analysis was conducted to describe respondent characteristics, while bivariate analysis using the Chi-square test was performed to examine the association between independent and dependent variables (Sugiono, 2022). All statistical analyses were conducted using SPSS software, and results were presented in tables and concise narrative form.

RESEARCH RESULT

This section presents the study findings based on the analysis of respondent data in accordance with the research objectives. The results focus on respondent characteristics and the distribution of study variables, including parity, interpregnancy interval, and the incidence of hyperemesis gravidarum. Data are presented succinctly in tables to provide an overview of respondent profiles and the status of the variables studied, prior to the analysis of associations between variables.

1. Respondent Characteristics and Study Variables

Table 1. Distribution of Respondent Characteristics and Study Variables at Puskesmas Wundulako

Variable	Category	Frequency (n)	Percentage (%)
Maternal Age	20–35 years	29	36.3
	<20 years and >35 years	51	63.8
Education	Elementary School (SD)	32	40.0
	Junior High School (SMP)	21	26.3
	Senior High School (SMA)	20	25.0

	University	7	8.8
Occupation	Housewife	61	76.3
	Entrepreneur	13	16.3
	Civil Servant	6	7.5
Parity	High-risk (1 and >3)	40	50.0
	Low-risk (2–3)	40	50.0
Interpregnancy Interval	High-risk (<2 years)	38	47.5
	Low-risk (≥2 years)	42	52.5
Hyperemesis Gravidarum	Yes	40	50.0
	No	40	50.0

Table 1 shows the distribution of respondent characteristics and study variables at Puskesmas Wundulako. Regarding maternal age, the majority of pregnant women were in the high-risk age group (<20 years and >35 years), accounting for 63.8%, while women in the optimal reproductive age group (20–35 years) comprised 36.3%. In terms of education, respondents were predominantly elementary-educated (40.0%), followed by junior high school (26.3%), senior high school (25.0%), and university education (8.8%). Most respondents were housewives (76.3%), while the remainder were entrepreneurs (16.3%) and civil servants (7.5%). Parity distribution was balanced, with 50.0% classified as high-risk (1 and >3) and 50.0% as low-risk (2–3). The majority of respondents had low-risk interpregnancy intervals (≥2 years, 52.5%) compared to high-risk intervals (<2 years, 47.5%). Regarding hyperemesis gravidarum, the proportion of women experiencing and not experiencing the condition was equal, each at 50.0%.

Table 2. Association Between Parity, Interpregnancy Interval, and Hyperemesis Gravidarum at Puskesmas Wundulako

Variable	**Category**	**Hyperemesis Gravidarum (Yes) n (%)**	**Hyperemesis Gravidarum (No) n (%)**	**OR (95% CI)**	**p-value**
Parity	High-risk (1 and >3)	25 (62.5)	15 (37.5)	2.778 (1.123–6.868)	0.044
	Low-risk (2–3)	15 (37.5)	25 (62.5)	Reference	—
Interpregnancy Interval	High-risk (<2 years)	25 (62.5)	13 (32.5)	3.462 (1.379–8.691)	0.014
	Low-risk (≥2 years)	15 (37.5)	27 (67.5)	Reference	—

As shown in Table 2, both parity and interpregnancy interval were significantly associated with the incidence of hyperemesis gravidarum at Puskesmas Wundulako. Regarding parity, women with high-risk parity (1 and >3) had a higher proportion of hyperemesis gravidarum (62.5%) compared to women with low-risk parity (2–3). The analysis revealed an odds ratio (OR) of 2.778 (95% CI: 1.123–6.868) with a p-value of 0.044, indicating that women with high-risk parity were approximately 2.8 times more likely to experience hyperemesis gravidarum than those with low-risk parity. Similarly, for interpregnancy interval, women with high-risk intervals (<2 years) also had a higher proportion of hyperemesis gravidarum (62.5%) compared to women with low-risk intervals (≥2 years). The OR was 3.462 (95% CI: 1.379–8.691) with a p-value of 0.014, demonstrating a statistically significant association, where women with interpregnancy intervals shorter than two years had approximately 3.5 times higher risk of developing hyperemesis gravidarum than women with longer intervals.

DISCUSSION

The findings of this study confirm that parity and interpregnancy interval are significant risk factors for hyperemesis gravidarum among pregnant women at Puskesmas Wundulako, Kolaka Regency. Women with high-risk parity, including primiparas and multiparas with more than three previous births, demonstrated a higher likelihood of developing hyperemesis gravidarum compared to women with moderate parity (2–3). These findings are consistent with previous studies identifying primiparas as a group with lower physiological and psychological adaptation to pregnancy, making them more susceptible to severe nausea and vomiting during the first trimester (Chevalley Gerber et al., 2025; Franz et al., 2025). This can be explained by heightened hormonal responses, particularly human chorionic gonadotropin (hCG) and estrogen, combined with limited prior pregnancy experience, which may increase psychological stress and exacerbate the intensity of hyperemesis symptoms. Multiparas with high parity (>3) also exhibited a similar risk, likely associated with cumulative physiological burdens and adaptive changes resulting from previous pregnancies (Sinaga et al., 2024).

Furthermore, interpregnancy interval was found to significantly influence the risk of hyperemesis gravidarum. Women with intervals of less than two years had a higher likelihood of developing this condition compared to women with longer intervals (≥2 years). Literature supports this finding, indicating that excessively short interpregnancy intervals hinder maternal physical recovery and nutritional replenishment following a previous pregnancy, leaving the body physiologically unprepared for the subsequent pregnancy (Chen et al., 2023). This insufficient recovery not only affects physiological condition but also increases vulnerability to psychological stress, cumulatively triggering or worsening hyperemesis gravidarum (Schneiderman et al., 2005; Sonnentag, 2018).

These findings suggest that parity and interpregnancy interval act synergistically in influencing hyperemesis gravidarum risk. High-risk parity and

short interpregnancy intervals amplify hormonal imbalances, nutritional deficiencies, and limitations in maternal psychological adaptation. Therefore, monitoring these factors is crucial for developing promotive and preventive strategies in primary healthcare settings, particularly at puskesmas, which play a central role in early detection, education, and intervention.

From a clinical practice perspective, this study highlights the importance of individualized approaches in pregnancy counseling. Women with high parity or short interpregnancy intervals should receive targeted attention, including nutritional education, stress management strategies, and routine follow-up to prevent severe hyperemesis gravidarum. Additionally, community-level reproductive health programs can emphasize the importance of family planning and optimal spacing between pregnancies as part of broader strategies to prevent pregnancy-related complications.

This study reinforces empirical evidence that maternal reproductive characteristics are key indicators in assessing hyperemesis gravidarum risk. The findings align with various international studies emphasizing the role of parity and interpregnancy interval in pregnancy complication risk, providing a scientific basis for evidence-based interventions at the primary care level(Mu et al., 2025; Ytterberg et al., 2023). Moreover, these results highlight opportunities for further research on the interaction of physiological, psychological, and social factors in influencing hyperemesis gravidarum, which could enhance comprehensive prevention and management strategies for this condition.

CONCLUSIONS AND RECOMMENDATIONS

Based on this study on parity and interpregnancy interval as risk factors for hyperemesis gravidarum at Puskesmas Wundulako, Kolaka Regency, it can be concluded that high-risk parity (primiparas and multiparas with more than three previous births) and short interpregnancy intervals (less than two years) are significantly associated with the occurrence of hyperemesis gravidarum. These factors affect maternal physiological adaptation, nutritional status, and hormonal balance, thereby increasing the risk of developing the condition. It is recommended that healthcare providers offer targeted pregnancy education and counseling for at-risk women, conduct early screening, and regularly monitor maternal nutritional and psychological status to prevent complications.

ADVANCED RESEARCH

This study has several limitations, including a relatively small sample size and the use of retrospective data from maternal and child health (MCH) registers. Future research is recommended to adopt a prospective or longitudinal design to provide stronger evidence of causal relationships, incorporate additional variables such as nutritional status, psychological stress, and pregnancy-related hormonal profiles, and expand the study scope across multiple primary healthcare centers or regions to enhance representativeness and generalizability of the findings.

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