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Education, Parity, and Health Worker Support Associations to Postpartum Care in Indonesian Context

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ABSTRACT

Introduction: Maternal mortality during the postpartum period remains a significant public health concern. In 2022, most cases of maternal deaths in Semarang City occurred during postpartum period. Maternal knowledge and attitudes regarding postpartum selfcare are essential for preventing complications. Midwives' visit to postpartum mothers' program in Indonesia can be improved to increase mothers' knowledge and attitude on postpartum care. This study aimed to investigate the factors associated to postpartum care in urban area of Indonesia.
Methods: A cross-sectional study was conducted involving 90 postpartum mothers selected from three primary health care centers in Semarang City, which were chosen based on high numbers of postpartum mothers and demographic variations. Data were collected using validated, structured interviews to assess maternal knowledge, attitudes, and health worker support. Data were analyzed using Pearson correlation tests and multiple linear regressions to determine the associations between socio demographic factors and postpartum care indicators.
Results: The average maternal knowledge score (8.2 ± 1.16), and the attitude score were good (22.2 ± 2.82). The knowledge of mothers was lack in face's sign of preeclampsia. The attitude of mothers was lack in self-assessment on breast inflammation. Educational attainment ($p = 0.061$) and parity ($p = 0.015$) positively correlated to knowledge. Age ($p = 0.014$), parity ($p = 0.049$), and support from health workers ($p = 0.041$) significantly associated to maternal attitudes.
Conclusion: Higher levels of education and strong support from health workers were associated to improved maternal knowledge and attitudes toward postpartum care. These findings showed the importance of interventions on postpartum care. Focusing on less educated mothers and enhancing healthcare engagement are important to reduce postpartum related complications and maternal mortality.

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INTRODUCTION

About 50 % of the total maternity deaths in the world occurred in developing countries (1,2). Maternal deaths are caused by direct and indirect factors. About 46.96% of maternal deaths were influenced by direct causes such as bleeding, preeclampsia, and infection, while 51.49% were influenced by indirect causes, and the rest were unknown or caused by other factors (2,3). In Indonesia, the maternal mortality rate (MMR) was still relatively high, reaching 305 per 100,000 live births in 2020 (4). In Central Java Province, the MMR in 2022 was recorded at 76.15 per 100,000 live births. Meanwhile, in Semarang City, there were 16 cases of maternal deaths in the same year, of which 68.75% occurred during the postpartum period (3,5,6). In Indonesia, midwives' visits to the postpartum mothers' program has been implemented. Therefore, it is important to understand the performance of local health systems and the factors that associated to postpartum care, especially in Semarang city, which is in urban setting.

The complication in postpartum period can occurred suddenly, even in woman who was classified as low risk during pregnancy, is still vulnerable to serious complications in the postpartum period, such as bleeding, thromboembolism and infection (7–9). In this situation, early detection and vigilance from health workers and family members are critical to reducing avoidable deaths. Thus, on low-risk mothers during pregnancy, vigilance is still needed to ensure the mother's overall safety (10).

Maternal knowledge and attitudes towards postpartum complications critically influence postpartum care practices (11). Women with insufficient knowledge are more prone to develop negative attitudes toward health-seeking behaviors, increasing their vulnerability to complications (12) (12). Caesarean deliveries are also increase the risk of infection and require enhanced postpartum monitoring (13).

Demographic factors, including education, parity, and income, significantly impact postpartum care practices (14). Mothers who are knowledgeable about postpartum warning signs are better equipped to make timely health decisions (15). Conversely, poor access to care and lack of knowledge are strongly linked to delays in treatment and avoidable mortality (16). While studies from African countries illustrate this pattern, evidence from Indonesian urban populations is limited.

Health service utilization is closely related to mothers' education, age, parity, income, knowledge, and attitudes (17). Complications during the postpartum period are largely preventable with adequate knowledge and responsive care. Factors such as education, antenatal visits, and skilled birth attendance are key determinants of outcomes (8,18) However, studies that triangulate these factors with actual postpartum behavior and perceptions especially in Indonesian cities are scarce.

This study aimed to fill that knowledge gap by examining the determinants influencing postpartum mothers' knowledge and attitudes in Semarang City, focusing on education, parity, and the role of health worker support. The findings are intended to be used to targeted health promotion efforts and strengthen maternal health policy in urban Indonesian settings.

METHOD

Research Type

The research uses a quantitative approach with a cross sectional study design. This design was chosen because it allows for efficient identification of associations between socio demographic characteristics, health worker support knowledge and attitudes in postpartum care at a single point in time.

Population and sample.

The study population were 337 postpartum mothers in three primary health care centres in Semarang City. A total of 90 postpartum mothers were selected, comprising 22 mothers from Srondol, 30 from Tlogosari Kulon, and 38 from Ngaliyan Primary Health care Centres. Participants were recruited based on predetermined inclusion criteria. postpartum women at day 1 to 5 who received assistance from their husbands or families at home, postpartum 1 to 5 days to ensure relevance to the research objectives.

Research Location

The research was conducted in three Primary Health Care centres in Semarang City: Srondol, Tlogosari Kulon, and Ngaliyan. These centres were purposively selected based on their high numbers of postpartum mothers and demographic variation, ensuring representation across different urban catchment areas in Semarang City.

Instrumentation or tool

The questionnares were structured by the author. Validity and reliability of the questionnaires on knowledge, attitude, health worker support were tested on 30 respondents at the study location. The validity was measured using Pearson correlation tests and the results showed that all questionnaires were valid. The reliability tests showed the Cronbach's alpha of 0.814 for knowledge items, 0.729 for attitude items and 0.928 for health worker support items, indicating good internal consistency. The questionnaires assessed the key variables including maternal knowledge, attitudes, and health worker support, along with socio demographic factors such as age, parity, education level, employment status, and per capita income.

Data Collection Procedures

Data collection was conducted from April to May 2024. To ensure consistency among interviewers, a standardized interviewer training session was held, including role plays stimulation and interrater reliability testing. Trained interviewers conducted face to face structured interviews using the validated questionnaires to ensure data reliability and validity. Key indicators measured included knowledge of postpartum care, attitudes towards health-seeking behavior, and perceptions of health worker support.

Data Analysis

The collected data were analyzed using Pearson correlation tests to examine the relationships between independent variables (age, parity, length of education, income, health worker support) and the dependent variables (knowledge and attitudes). A p value of <0.05 was used for determining significant association between two variables. A threshold of $p < 0.25$ was used to select the important variables to be included in the multiple linear regression models. It was done to avoid premature exclusion of potentially important predictors, consistent with exploratory research practices in public health. Variables that met this criterion were then included in multiple linear regression models to identify significant predictors of postpartum maternal knowledge and attitudes toward postpartum care.

Ethical Approval

This study obtained ethical clearance from the Ethics Committee in Health Research of Faculty of Public Health, Universitas Diponegoro, Semarang, with certificate number of 141/EA/KEPK-FKM/2024. All participants provided informed consent prior to participation, and data confidentiality was strictly maintained throughout the research process.

RESULTS

Characteristics of Respondents

Table 1 show the continuous variables of the respondents' characteristics. The demographic profile of the respondents is presented in Table 1. The average maternal age was 29.14 ± 5.87 years, and the mean length of education was 13.56 ± 2.26 years. A majority (53.3%) were housewives, and more than half (55.6%) were first-time mothers. Secondary education was the most common educational attainment (44.4%), and 70% of respondents were classified as economically not poor, with an average per capita income of one million rupiah per mont

Table 1. Respondents' Characteristics for Continuous Variables

Variable	Mean	SD	Min–Max
Age (years)	29.14	5.87	20 – 43
Length of Education (years)	13.56	2.26	8 – 16
Parity (number of children)	1.67	0.86	1 – 4
Per Capita Income per Month (Million IDR)	1.00	4.82	0.27 – 3.00
Health Worker Support Score	12.20	4.19	6 – 19

Table 2 shows the categorical variables of respondents' characteristics. More than half of the mothers (53.3%) were not working. The majority had one child (55.6%), 44.4% of the respondents' education had completed high school and 70% were not in poor category.

Table 2. Respondents' Characteristics for Categorical Variables

Variable	Category	N	%
Occupation	Civil Servant	4	4.4
	Teacher	3	3.3
	Self-employed	3	3.3
	Private employee	20	22.2
	Street vendor	1	1.1
	Freelancer	4	4.4
	General employee	7	7.8
	Not working	48	53.3
Parity	1 child	50	55.6
	2 children	23	25.6
	3 children	13	14.4
	4 children	3	3.3
Education Level	Junior High School	6	6.7
	High School	40	44.4
	Diploma	15	16.7
	Bachelor's Degree	29	32.2
Income Status	Poor	27	30.0
	Not Poor	63	70.0

Knowledge and Attitudes Towards Postpartum Care

Table 3, shows the average maternal knowledge score of 8.2 ± 1.16 was good as the possible maximum knowledge score was 10. this average knowledge score reflected the understanding of postpartum care. However, some warning signs and symtomps were not knowen properly. Respondents who answered incorrectly about the signs of preeclampsia on the face were 48.9%, and 58.9% had not recognized the symptoms of postpartum hemorrhage. Table 3 also showered thad the average attitude scores 22.8 ± 2.82, was good as the maximum possible score was 30. It is suggesting the moderately positive health seeking behaviors. However, a significant proportion of mothers indicated that they would not seek care when feeling weak (74.4%) or appearing pale (68.9%), highlighting the need for improved health education.

Table 3. Knowledge and attitudes of postpartum mothers towards postpartum care

No	Knowledge	Correct answer n %	Wrong answer n %
1	Danger signs of postpartum mothers in a condition that requires help	89 (98.9)	1 (1.0)
2	Sign of postpartum hemorrhage	53 (58.9)	37 (41.1)
3	Go to health care facility if bleeding	84 (93.3)	6 (6.7)
4	Danger signs of preeclampsia/eclampsia	77 (85.6)	13 (14.6)
5	Signs of preeclampsia seen on the face	44 (48.9)	46 (51.1)
6	Visible signs of preeclampsia on the hands	74 (82.2)	16 (17.8)
7	Signs of preeclampsia on blurred eyes	88 (97.8)	2 (2.2)
8	Early signs of infection after childbirth	85 (94.4)	5 (5.6)
9	Go to health care facility if having fever more than 2 days	61 (67.8)	29 (32.0)
10	Signs of psychological disorder on the mother	86 (95.6)	4 (4.4)
	Average knowledge score ± SD		8.2 ± 1.16

No	Attitude	Strongly disagree n (%)	Disagree n (%)	Agree n (%)	Strongly Agree n (%)
1	If I feel weak, I will immediately check with a health service	67 (74.4)	23 (25.6)	0 (0.0)	0 (0.0)
2	Mother did not go for a check-up even though she felt a high body for more than 2 days	1 (1.1)	3 (3.3)	59 (65.6)	27 (30.0)
3	When mothers notice their breasts are complete, they do not seek assistance from health services	8 (8.9)	46 (51.8)	4 (37.8)	2 (2.2)
4	I will check if the breasts feel swollen	0 (0.0)	0 (22.2)	50 (55.6)	20 (22.2)
5	I'm going to check if the breasts are reddish	29 (32.2)	58 (64.4)	3 (3.3)	0 (0.0)
6	I felt very dizzy, so I will immediately check with the health service	1 (1.1)	0 (0.0)	39 (43.3)	6 (50.6)
7	Even though I was pale, I didn't check in at the health care site	0 (0.0)	8 (8.9)	62 (68.9)	20 (22.2)
8	I will visit a health service facility to check my face if it becomes swollen	0 (0.0)	4 (4.4)	49 (54.4)	37 (41.1)
9	If my feelings are uncertain, I'll keep quiet	0 (0.0)	7 (7.8)	74 (71.1)	19 (21.1)
10	I will check at the health care centre if my vision is blurry	0 (0.0)	2 (2.2)	51 (56.7)	37 (41.1)
Average Attitude ± SD				22.8 ± 2.82	

Health Worker Support for Postpartum Mothers

Respondents reported an average health worker support score of 12.2 ± 4.19 (Table 3), indicating suboptimal 115 support. This level was similar with two other studies in Palembang City and Garut Regency, Indonesia that the support of health workers on postpartum were also good at 55.6% and 47.6%, respectively, which indicated the suboptimal support (19,20).

Alarmingly, 40% stated that midwives never conducted home visits, and 23% noted a lack of information 116 regarding postpartum infection dangers. Table 4. shows the midwife support for postpartum women on ten service indicators with a mean support score of 12.2 ± SD 4.19, which mean that support was at a moderate level withed quite high variation. Forty percents of respondents were never visited by midwives for examination and 23.3% of the respondents never received information regarding sign of postpartum infection from midwives. There were 17.8% of the respondents who had never recommended by midwives to pay attention to the danger sign of postpartum.

Table 4. Support from Health Worker

No	Health Worker Support	Never n (%)	Often n (%)	Always n (%)
1	Midwives recommended paying attention to the danger signs of postpartum	16 (17.8)	46 (51.1)	28 (31.1)
2	Midwife explained the danger signs of postpartum	8 (8.9)	45 (50.0)	37 (41.1)
3	Midwife visits home for examination	36 (40.0)	40 (44.4)	14 (15.6)
4	A midwife explained the signs and symptoms of postpartum bleeding	15 (16.7)	43 (47.8)	32 (35.6)
5	Midwives explained the danger signs of postpartum infection	21 (23.3)	55 (61.1)	14 (15.6)
6	Midwives explained the correct way to breastfeed	8 (8.9)	39 (43.3)	43 (47.8)
7	The midwife gave me enough time when I consulted	3 (3.3)	43 (47.8)	44 (48.9)
8	Midwives asked about health problems during the postpartum period	15 (16.7)	58 (64.4)	17 (18.9)
9	My midwife advised me to eat nutritious food.	21 (1.1)	43 (47.8)	46 (51.1)
10	Midwives provided quick response when I need medical assistance	1 (1.1)	42 (46.7)	47 (52.2)
Average support score from health workers ± SD				12.2 ±4.19

Correlation Between Determinants to Maternal Knowledge and Attitudes

Table 5 shows that parity, years of education, and health worker support are the significant factors correlated to knowledge and attitudes. The parity variable is positively related to knowledge ($r = 0.236$, $p = 0.025$), but negatively correlated to attitudes ($r = -0.255$, $p = 0.015$).

Table 5. Correlations of determinants to knowledge and attitudes

Research variables	Knowledge		Attitude	
		P	Correlations	*p*
Age (years)	0.137	0.199	- 0.100	0.349
Length of Education (years)	0.172	0.104*	0.227	0.032*
Parity	0.236	0.025*	-0.255	0.015*
Per Capita Income (in Million Rupiah)	0.003	0.974	0.166	0.119
Support from health workers	- 0.160	0.133	0.183	0.085

* Statistically significant at $p < 0.05$

Figure 1 shows the scatter plots of the correlations between education to knowledge and attitude. There was a positive correlation between the level of education and knowledge. The respondents who had the higher the education, had the higher knowledge on postpartum care.

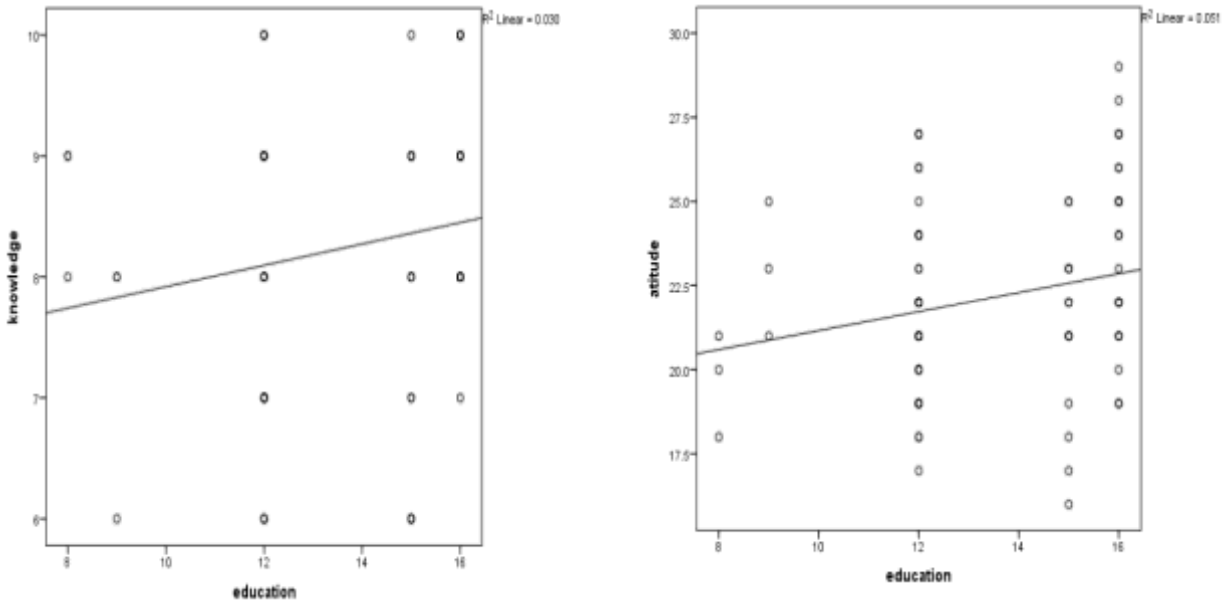

Figure 1. Scatter plots of mothers' education level on knowledge and attitude

Figure 2 shows scatter plots of the correlation between parity to knowledge and attitude. Parity and knowledge was positively correlated, which mean that the respondents have tends to increase the level knowledge. Education on attitude score has a positive correlated which attitude, which mean that increasing the level of education can affect the positive attitude of postpartum care and parity to attitude shows a negative correlation, which means that the more the number of children, the lower the mother's attitude towards postpartum care.

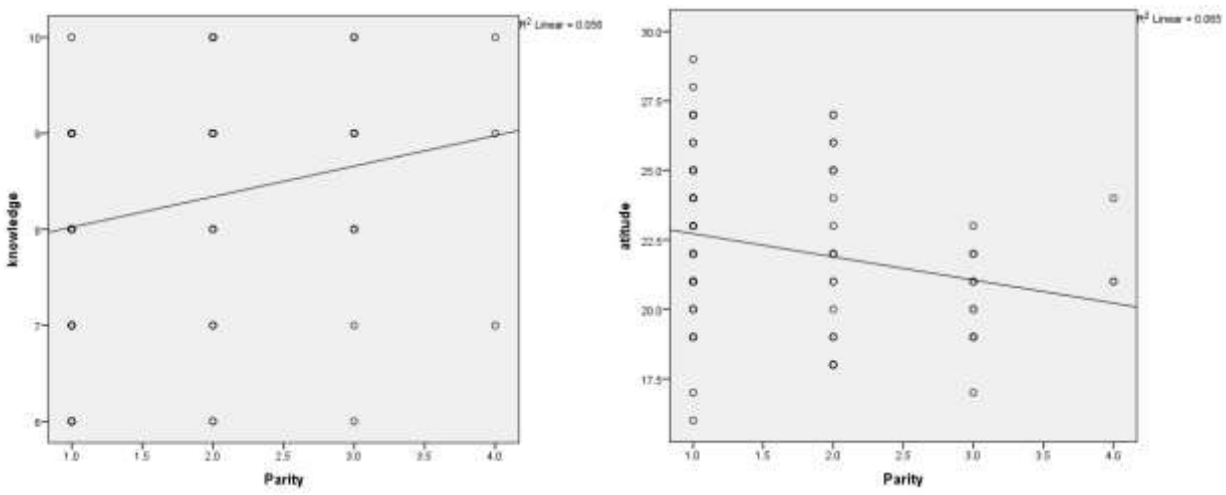

Figure 2. Scatter plot of mothers' parity to knowledge and attitude

Multivariate Analysis of Knowledge and Attitudes

Table 6 shows that the regression model for knowledge as the dependent variable has a coefficient determination (R^2) of 0.072 which means that the length of education (p=0.061) and parity (p=0.015) together affect knowledge by 7.2%. There are still other variables that affect postpartum care knowledge. The variable of education, parity and family support affects the attitude of postpartum women on postpartum care by 12 % ($R^2 = 0.120$), and the rest is influenced by other variables that have not been measured.

Table 6. Linear Regression Analysis of Factors Related to Knowledge and Attitudes of Postpartum Mothers

Knowledge	Variable	Unstandardized coefficients	t	*p*-value
	Constanta	6.310	8.119	0.000
	Length of Education (years)	0.100	1.899	0.061
	Parity	0.341	2.469	0.015
R^2=0.072				
Attitude	Constanta	17.156	20.04	0.000
	Length of Education (years)	0.321	2.507	0.014
	Parity	-0.663	-2.001	0.049
	Support from health workers	0.144	0.125	0.041
R^2=0.120				

These results emphasize the critical role of education, parity, and health worker support in shaping postpartum mothers' knowledge and attitudes.

DISCUSSION

Determinants of Knowledge

This study found that education and parity accounted for 7.2% ($R^2 = 0.072$) of the variance in maternal knowledge about postpartum care, suggesting that additional unmeasured factors may contribute significantly. Each additional year of education increased knowledge by 0.1, reinforcing the importance of maternal education in equipping women with essential postpartum information. Education enhances mothers' ability to understand health risks and engage with healthcare services effectively. This is in accordance with the results of research in Surabaya which stated that maternal education was important in building postpartum health awareness (21). Another study in India concluded that postnatal health education using visual flip charts improved knowledge, which had effect lasted

up to six months later (22). The findings of this study are in line with another study in Rwanda that maternal education was positively associated with awareness of danger signs of obstetrics (23).This result also aligned with findings from another low and middle income countries (LMICs) where maternal education was positively associated with awareness of danger signs and timely healthcare utilization (22)

Recent studies further support that health education applications targeting postpartum women significantly improved their understanding of self-care practices, benefiting both maternal and infant health (26,27). An another study in Indonesia, where multiparous mothers had significantly better knowledge than primiparous mothers ($p < 0.001$) (28). Parity also demonstrated a positive association with knowledge ($\beta = 0.341$), suggesting that prior birth experiences can contribute to awareness. However, parity is a nonmodifiable factor and its impact depend on the quality and outcomes of previous maternal care experiences (24,29–31).

The results of this study are relevant to the context of Semarang City, where maternal health services are easily accessible to the community through primary health care. However, utilization of these services does not necessarily reflect mothers' understanding of postpartum care. The findings suggest that mothers' education level plays a role in influencing the receipt of structured health information, such as in mother's class activities, although the implementation is often constrained by various factors. Education and parity are factors that influence mothers' knowledge of postpartum care in Semarang City.

Determinants of Attitudes

Education, parity, and health worker support collectively explained 12% ($R^2 = 0.120$) of the variation in maternal attitudes toward postpartum care. Each additional year of education improved the attitude score by 0.321, indicating that education plays a vital role in fostering preparedness and positive health behaviors during the postpartum period. Mothers with higher education levels demonstrated greater willingness to seek health services promptly (32,33)

In contrast, parity negatively impacted attitudes ($\beta = -0.66$), suggesting that mothers with higher numbers of childbirths become less proactive in seeking postpartum care. Increased physical and emotional exhaustion, previous negative experiences, or overconfidence in handling postpartum symptoms reduced the attention to care. Highlighted how demographic factors, including the number of children, impacted maternal readiness to engage in child health services, reinforcing the relevance of contextual and psychosocial factors in shaping postpartum attitudes (34). The results of study was in line with research in China where higher education levels among mothers significantly increased the attitude to seek postpartum care (AOR = 1.05; $p = 0.03$) (35). Another study in China found that education was significantly effective in improving postpartum mothers' attitudes towards seeking health literacy (36). This supports existing evidence that maternal education fosters better engagement with health services (29,32,33). High parity was found to have a negative impact on maternal attitudes ($\beta = -0.66$), the results of this study are in line with research in Semarang which shows that mothers who have many children become less proactive in postpartum care.(37). Girolamo's study stated that mothers with more than 3 parities tend to be less proactive in seeking postnatal care because they often experience physical and mental fatigue (38). While the findings of a study conducted in Iran state that there is a need for a program to improve postpartum care by combining strategies to improve health literacy, ongoing counselling, family empowerment and culture as an additional mediator, in order to balance the negative impact of high parity on postpartum women's attitudes (39)

Broader Socioeconomic and Family Factors

The relatively low R^2 values in both models suggest that many additional variables warrant exploration. These include socioeconomic background, family support, access to healthcare, and psychological well-being. Studies.(40) show that financial capacity and health service accessibility significantly affect maternal health behaviors. Moreover, family support, particularly from spouses and close relatives, plays a vital role in enabling postpartum care. (41)

The findings highlight the necessity of comprehensive interventions that incorporate family dynamics as an integral component to improve maternal health outcomes. Moreover, the routine utilization of high-quality healthcare services fosters maternal awareness and promotes sustained health-seeking behaviors, thereby reinforcing the

urgency of system-level improvements in healthcare accessibility (42). Health care accessibility is a modifiable factor, thus it is easier to be increased compared to the non-modifiable factors such as education and parity factor.

These broader determinants, particularly familial and community influences, have been shown to significantly impact maternal decisions in Low Middel Incomes Countries (43). Broader determinants, particularly family and community influences, have been shown to play a significant role in influencing maternal decision-making in low- and middle-income countries. This suggests that family structure, level of autonomy in decision-making, and cultural context play an important role in shaping maternal care-seeking behavior (44). Finlayson K. et.al. shows that the mediation of family members-especially spouses and parents-was a key component in increasing or delaying the use of postpartum health services (45).

Integrated interventions should therefore extend beyond the individual mother to include partners, family members, and social networks. In urban Indonesian settings, where nuclear family structures are becoming more common, engaging partners and peers may be critical to fostering positive maternal health behaviors (42). Family involvement, particularly spouses and parents, in maternal care has been shown to significantly improve service-seeking behavior and adherence to postpartum care in low- and middle-income countries (LMICs). In addition, high quality and continuous health services, care that respects the dignity of the patient, and easy access to follow-up create an enabling environment that increases mothers' awareness and encourages them to maintain health-promoting behavior on an ongoing basis.(46). To capture unmeasured variables, future research could adopt the Social Ecological Model (SEM) as a conceptual framework. SEM emphasizes individual behaviors that are influenced by various factors including family, community, and health care system factors (47). Application of this model will help identify key factors that influence postpartum care, such as spousal support, cultural norms, and accessibility of services, and guide the development of multilevel interventions.

Improving Health Worker Support

Health worker support plays a central role in shaping maternal attitudes and health behaviors. To maximize this influence, particularly in urban contexts like Semarang, an integrated and strategic approach is required. This includes continuous professional development for health workers, with emphasis on communication skills, empathetic counseling, and cultural competence. Empowering health workers to deliver both psychosocial and informational support strengthens maternal trust and increases compliance with recommended postpartum practices (48).

In parallel, the integration of digital health education tools including mobile applications, educational videos, and online counseling platforms has demonstrated considerable potential in enhancing maternal awareness. Evidence from previous studies indicates that such interventions significantly improve critical health practices, including exclusive breastfeeding and postpartum hygiene (39,40). Furthermore, contextualized health counseling has been 195 emphasized as essential, with findings from suggesting that informal, culturally adaptive educational approaches may 196 be more effective and relatable for diverse maternal populations

Combining formal education which offers structured, institutional knowledge with informal and community-based health education can bridge the gap in maternal knowledge and attitudes. While formal education provides foundational understanding, informal methods such as health talks, community outreach, and audiovisual content offer flexibility, personalization, and cultural resonance.

To institutionalize this synergy, community health programs should adopt models such as "Bidanku", which integrate direct counselling with mobile-based education to reach postpartum mothers effectively in both clinical and home settings (39). Building on this, cross-sector collaborations between primary health care, digital platforms, and community leaders are essential to strengthen outreach and ensure sustainability of care.

Ultimately, improving health worker support is not only about training individuals but also about creating systems and environments that enable consistent, empathetic, and informed care delivery. Such integrative strategies are essential to close the gaps in postpartum support, especially in urban areas with diverse maternal needs. Maternal education length, parity, and health system support are significant but not exclusive determinants of postpartum knowledge and attitudes. A holistic, culturally sensitive, and system-integrated strategy is essential to optimize postpartum health outcomes. Policymakers and health practitioners should focus on blended education approaches,

strengthening family and community support, and innovating service delivery methods to empower mothers throughout the postpartum period.

Several studies in Indonesia have found that support from health workers significantly influenced maternal attitudes through guidance, information and emotional support. Support from health workers requires reform at the service system level, and individual capacity building. Training midwives in communication, empathy and cultural understanding is essential, especially in urban community-based care settings (49–51). Another study in Indonesia have found that digital tools such as mobile apps and online counselling can improve maternal knowledge and skills, especially for mothers in urban areas who have limited time (52). A study in Australia stated that health worker visits can improve maternal knowledge and health (53). Evidence from Indonesia and other LMICs supports the effectiveness of blended models combining in-person and digital outreach, especially when adapted to local languages and beliefs (54).

Combining formal education which offers structured, institutional knowledge with informal and community-based health education can bridge the gap in maternal knowledge and attitudes. While formal education provides foundational understanding, informal methods such as health talks, community outreach, and audiovisual content offer flexibility, personalization, and cultural resonance. To institutionalize this approach, initiatives like "Bidanku" that combine mobile-based content with face-to-face counselling can be scaled up through public-private partnerships. Integration into existing primary care systems will be the key to sustainability (55). Building on this, cross-sector collaborations between primary health care, digital platforms, and community leaders are essential to strengthen outreach and ensure sustainability of care. Knowledge and attitudes can be included as one of the indicators of the national health survey that is measured every year in Indonesia.

Research Implication

The findings of this study underscore the critical role of maternal education, childbirth experience (parity), and support from health workers in shaping knowledge and attitudes toward postpartum care. These results offer practical insights for public health policy and maternal health programming in urban contexts such as Semarang.

First, interventions targeting postpartum mothers should prioritize educational components that enhance both knowledge and self-efficacy. Programs that combine formal education with informal, community-based strategies such as counselling, audiovisual media, and mobile health applications can be especially effective. Tailored health education, sensitive to local sociocultural conditions, can empower mothers to make informed health decisions during the vulnerable postpartum period. Second, health worker engagement must be strengthened through capacity-building programs that emphasize communication, empathy, and contextual understanding. Empowering midwives and community health workers to deliver consistent, high-quality postpartum care and education will increase maternal responsiveness and trust in health services.

Third, collaborative approaches that involve families and communities are essential to extend the reach of health promotion. Health promotion programs should not only target mothers but also include partners, caregivers, and community influencers to foster supportive environments for postpartum well-being. Lastly, the integration of digital innovations such as mobile applications and e-counselling into maternal health services has strong potential to increase the accessibility and personalization of postpartum care, especially for mothers with limited mobility or time constraints.

Study Limitations

Despite its contributions, this study has several limitations. The cross-sectional design limits the ability to establish causal relationships between the independent variables and maternal knowledge or attitudes. Longitudinal studies are recommended to examine changes over time and determine causal pathways.

In addition, the reliance on self-reported data may introduce bias, particularly recall bias or social desirability bias, where respondents might overreport positive behavior or knowledge levels. Future research should consider mixed-method designs that combine quantitative surveys with qualitative interviews or observations for more robust insights.

The sample size, limited to 90 postpartum mothers across three Primary Health care centres, not fully capture the diversity of maternal experiences in Semarang or other regions. Expanding the sample and including rural or peri-

urban populations would enhance generalizability. Lastly, unmeasured variables such as cultural beliefs, emotional support, mental health status, and previous birth complications may have also influenced maternal knowledge and attitudes but were not included in the analysis. These factors should be incorporated into future studies to build a more comprehensive understanding of postpartum care determinants.

CONCLUSION

This study reaffirms the significance of maternal education, parity, and health worker support as key determinants influencing postpartum mothers' knowledge and attitudes toward postpartum care. Mothers with higher levels of formal education tend to possess stronger awareness and demonstrate more proactive health behavior. Although parity enhances maternal knowledge through experiential learning, it may concurrently lead to reduced motivation and attentiveness, thereby negatively affecting attitudes.

The findings suggest that strengthening health worker engagement through regular home visits, counselling, and responsive communication can substantially improve maternal attitudes and health-seeking behavior. Therefore, health promotion strategies should prioritize mothers with lower educational attainment and those in their early or first-time motherhood phases, who are often more vulnerable to inadequate care practices.

Moreover, incorporating tailored education programs and leveraging digital platforms such as mobile apps and online counseling can bridge the information gap, offering flexible and accessible learning opportunities. These efforts must be reinforced through collaborative community-based health promotion that involves families and local support systems.

Addressing disparities in postpartum care requires a comprehensive and integrative approach. By enhancing maternal education and optimizing health worker support, public health programs can significantly reduce postpartum complications and contribute to better maternal and neonatal health outcomes in urban settings like Semarang and beyond.

It is recommended to the policy maker to strengthen the postpartum program through collaborative community-based health promotion that involve families and local support system.

AUTHOR'S CONTRIBUTION STATEMENT

Umaroh: conceptualization, investigation, methodology, supervision, data analysis, writing – original draft, review and editing. Martha Irene Kartasurya: methodology, writing original draft, formal analysis. Cahya Tri Purnami: methodology, formal analysis, writing original draft. Syamsulhuda Budi Mustofa: methodology, writing original draft.

CONFLICTS OF INTEREST

All authors declare that they have no competing interests related to this article

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

During the preparation of this work the authors used ChatGPT to enhance the clarity of the writing. After using the ChatGPT, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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