



Empowering Women through Maternal Health Education: Impacts on Decision-Making and Health Outcomes

Umami Nazeera¹, Rifka Ramadhani¹

¹Department of Public Health, Universiti Sains Malaysia, Malaysia

²Public Health, Institut Ilmu Kesehatan STRADA Indonesia

*Corresponding Author: Umami Nazeera

E-mail: ummccrr@gmail.com

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Abstract

The effects of maternal health education on women's decision making autonomy and maternal health outcomes in Indonesia are explored. Data were obtained from 305 women of reproductive age by structured questionnaires in a quantitative cross sectional design and analyzed by descriptive statistics, regression analysis and mediation analysis. The results show that maternal health education has a significant effect on increasing women's autonomy in decision making regarding health services and utilization of antenatal, facility-based delivery and postnatal health services. The study also indicates that the relationship between maternal health education and maternal healthcare utilisation is partially mediated by women's decision making autonomy. The novelty of the research is the incorporation of an education intervention and empowerment approach in analyzing maternal health care. The results suggest that maternal health programs need to go beyond informing to include strategies that empower women, thereby enhancing their agency and access to healthcare. This study is a step towards more inclusive and sustainable policies for maternal health care in the context of a developing country.

INTRODUCTION

Maternal health remains a critical global public health concern because it reflects not only the quality of healthcare systems but also the broader socio-economic and gender conditions shaping women's lives. Despite substantial progress in reducing maternal mortality over the past three decades, complications related to pregnancy and childbirth continue to contribute significantly to mortality and morbidity among women of reproductive age, particularly in low- and middle-income countries (LMICs). According to global estimates, the burden of preventable maternal deaths remains disproportionately concentrated in developing regions where access to quality maternal healthcare services is uneven and often constrained by structural inequalities, limited health infrastructure, and socio-cultural barriers (Wei et al., 2025; Huang et al., 2025; Cresswell et al., 2025; Ward et al., 2023). The Sustainable Development Goals (SDGs), especially SDG 3 concerning good health and well-being, explicitly target the reduction of the global maternal mortality ratio to below 70 deaths per 100,000 live births by 2030. However, many LMICs, including Indonesia,

continue to experience persistent disparities in maternal healthcare utilization and outcomes, indicating that biomedical interventions alone are insufficient to address the complexity of maternal health challenges (Herwansyah et al., 2022; Damayanti et al., 2023; Shartyanie et al., 2025).

Indonesia represents an important context for examining maternal health dynamics because the country continues to struggle with uneven maternal healthcare access despite sustained governmental investment in maternal and reproductive health programs. While national maternal mortality rates have gradually declined, the progress remains inconsistent across provinces, particularly between urban and rural communities. Women living in rural and geographically isolated areas frequently encounter transportation barriers, limited healthcare facilities, shortages of skilled birth attendants, and financial constraints that hinder timely healthcare utilization (Maganty et al., 2023; Oluyede et al., 2022; Chowdhury & Ravi, 2022; Alam et al., 2025). Furthermore, socio-cultural norms embedded within patriarchal family structures often restrict women's autonomy in making decisions regarding antenatal care, childbirth, postnatal services, and neonatal health. In many Indonesian households, decisions related to maternal healthcare expenditure, mobility, and service utilization remain heavily influenced by husbands or older family members, thereby reducing women's capacity to seek appropriate healthcare independently. Such conditions indicate that maternal health outcomes are not solely determined by healthcare availability but are also profoundly shaped by gendered power relations and women's decision-making autonomy (Olwanda et al., 2024; Gebeyehu et al., 2022; Bohren et al., 2024).

The utilization of essential maternal healthcare services, including antenatal care (ANC), skilled birth attendance, facility-based delivery, and postnatal care, has consistently been identified as one of the strongest determinants of maternal and neonatal survival (Lateef et al., 2024; Izulla et al., 2023). Studies have demonstrated that women who receive adequate ANC and deliver in healthcare facilities under professional supervision experience substantially lower risks of maternal complications, neonatal mortality, and long-term health problems. Nevertheless, disparities in healthcare utilization remain widespread across LMICs due to economic deprivation, educational inequalities, limited transportation access, and restrictive cultural beliefs (Malik & Akram, 2025; Mwangi et al., 2022). Previous research in Indonesia has similarly shown that women's ability to access maternal healthcare services is often constrained by limited decision-making authority within households, particularly in rural and low-income settings. Consequently, improving maternal health requires interventions that move beyond clinical service provision and address the social and behavioral determinants influencing women's healthcare-seeking behaviour (Aikpitanyi et al., 2024; Hashim et al., 2025; Geremew et al., 2025).

Within this context, maternal health education has emerged as an important intervention strategy aimed at improving maternal and neonatal outcomes. Maternal health education programs generally provide information regarding pregnancy risks, nutrition, danger signs, childbirth preparation, breastfeeding, immunization, and postnatal care. Existing studies suggest that women who participate in maternal health education programs tend to demonstrate greater awareness of pregnancy-related complications and stronger motivation to utilize maternal healthcare services. However, the significance of maternal health education extends beyond the simple transfer of biomedical knowledge. Increasingly, scholars argue that educational interventions may function as empowerment mechanisms that strengthen women's confidence, agency, and participation in health-related decision-making processes. In patriarchal societies where women's mobility and autonomy are often restricted, educational exposure may provide women with both the informational resources and

psychological capacity necessary to negotiate healthcare decisions within households.

A growing body of international literature has documented the relationship between women's empowerment and improved maternal health outcomes. Research conducted in South Asia and sub-Saharan Africa indicates that women with greater autonomy in household decision-making are more likely to utilize antenatal services, seek professional childbirth assistance, and ensure immunization for their children. Women's educational attainment has similarly been associated with lower maternal mortality, increased healthcare utilization, and improved neonatal survival. Moreover, evidence suggests that decision-making autonomy may mediate the relationship between educational interventions and maternal health outcomes, implying that empowerment constitutes a critical mechanism through which education influences healthcare behavior. Nevertheless, despite the expanding literature on maternal health and women's empowerment, several conceptual and empirical limitations remain unresolved (Besnier, 2023).

First, many previous studies have primarily focused on the direct relationship between maternal health education and healthcare utilization while paying insufficient attention to the mediating role of women's decision-making autonomy. Educational interventions are frequently evaluated in terms of knowledge acquisition or service coverage without adequately examining whether such programs strengthen women's bargaining power and agency within households. Second, existing research often treats women's empowerment as a secondary outcome rather than a central explanatory mechanism influencing maternal health behavior. Third, empirical studies examining the interconnected relationships between maternal health education, decision-making autonomy, and maternal health outcomes remain relatively limited in the Indonesian context. Although Indonesia has implemented various maternal health initiatives through community health centers (Puskesmas), midwifery programs, and community health workers, evidence regarding how educational interventions contribute to empowerment and subsequent health outcomes remains fragmented. Finally, many prior studies rely on descriptive or purely qualitative approaches, limiting the ability to quantitatively assess the pathways linking maternal health education, autonomy, and maternal healthcare utilization.

The present study addresses these gaps by examining the extent to which maternal health education contributes to women's decision-making autonomy and how such autonomy subsequently influences maternal health outcomes in Indonesia. Unlike previous studies that focus primarily on healthcare utilization, this research explicitly positions women's autonomy as a mediating variable connecting educational exposure and maternal health behavior. The study therefore advances the literature by integrating perspectives on maternal health education, gender empowerment, and healthcare utilization within a single analytical framework. The novelty of this research lies in its emphasis on empowerment as an operational mechanism rather than merely an indirect consequence of educational interventions. Furthermore, by focusing on the Indonesian context characterized by persistent regional disparities and patriarchal social structures, this study contributes empirical evidence from an LMIC setting where maternal health inequalities remain highly relevant. The findings are expected to contribute theoretically to discussions on empowerment-based health interventions and practically to the development of maternal health programs that integrate educational strategies with women's empowerment objectives to improve maternal and neonatal health outcomes sustainably.

METHODS

Research Design

This study employed a quantitative cross-sectional research design to examine the relationships between maternal health education, women's decision-making autonomy, and maternal health outcomes in Indonesia. A quantitative approach was considered appropriate because the study sought to measure associations among variables using statistical analysis and standardized indicators. Cross-sectional designs are widely applied in public health and maternal health research because they allow researchers to assess patterns of healthcare utilization, behavioral factors, and empowerment conditions within a specific population at a single point in time (Simonaet al., 2022). The conceptual framework positioned maternal health education as the independent variable, women's decision-making autonomy as the mediating variable, and maternal health outcomes as the dependent variables. In addition, socio-demographic characteristics such as age, education level, household income, and parity were incorporated as control variables to minimize contextual bias and strengthen analytical validity.

Research Setting and Context

The research was conducted in selected urban and rural communities in Indonesia, where disparities in maternal healthcare access and utilization remain evident despite continuous improvements in national maternal health programs. Indonesia provides a relevant empirical setting because maternal health inequalities are strongly influenced by geographic, economic, and socio-cultural factors. Rural communities frequently experience limited healthcare infrastructure, transportation difficulties, and restricted access to skilled maternal healthcare services, whereas urban areas generally demonstrate higher service availability and educational exposure. The study sites included communities served by local public health centers (*Puskemas*) and maternal health outreach programs coordinated by midwives and community health workers. These institutions routinely provide maternal health education concerning antenatal care, nutrition, pregnancy complications, safe childbirth, postnatal care, and neonatal immunization.

Population and Sampling Technique

The target population consisted of women of reproductive age between 15 and 49 years who had experienced pregnancy or childbirth within the previous two years. This criterion was established to ensure that respondents could accurately recall their maternal healthcare experiences while minimizing recall bias. The sampling frame was derived from community health center records documenting maternal healthcare service users and participation in maternal health education activities.

A stratified random sampling technique was applied to ensure proportional representation from both urban and rural communities. Stratification was considered necessary because maternal healthcare access and educational exposure vary considerably between geographic contexts. Within each stratum, eligible respondents were selected randomly and invited to participate voluntarily after providing informed consent. The final sample consisted of 305 respondents, which was considered adequate for inferential statistical analysis and regression modeling.

Data Collection Techniques and Instruments

Data were collected using a structured questionnaire adapted from standardized maternal health and demographic survey instruments, including items derived from the Demographic and Health Survey (DHS). The questionnaire consisted of four sections covering socio-demographic characteristics, maternal health education exposure, decision-making autonomy, and maternal health outcomes. Maternal

health education exposure was measured through indicators such as attendance frequency, participation intensity, and retention of maternal health information.

Women's decision-making autonomy was operationalized using a composite index assessing participation in decisions related to antenatal care, place of delivery, use of skilled birth attendants, postnatal services, and household financial allocation for healthcare. Responses were measured using a Likert-scale format in which higher scores represented greater autonomy. Maternal health outcomes were evaluated through indicators including completion of at least four antenatal care visits, facility-based delivery, postnatal care utilization within 48 hours after childbirth, and neonatal immunization status. Data collection was conducted through face-to-face interviews administered by trained enumerators over a three-month period to reduce non-response bias and support respondents with limited literacy.

Data Analysis Techniques

The collected data were coded, cleaned, and analyzed using statistical software. Descriptive statistics, including means, frequencies, percentages, and standard deviations, were first used to summarize respondent characteristics and variable distributions. Inferential statistical analyses were subsequently conducted to test the study hypotheses.

Independent sample *t*-tests were used to compare decision-making autonomy scores between women exposed and unexposed to maternal health education. One-way analysis of variance (ANOVA) was employed to examine differences in autonomy scores according to the frequency of educational session attendance. Multiple linear regression analysis was conducted to identify predictors of women's decision-making autonomy while controlling for socio-demographic variables. Logistic regression models were also utilized to assess the effects of maternal health education and autonomy on maternal health outcomes such as facility-based delivery and adequate antenatal care attendance. To evaluate the mediating role of decision-making autonomy, the study adopted the mediation analysis framework proposed by Hung et al. (2022), supported by bootstrapped confidence intervals. Statistical significance was determined at $p < 0.05$.

Validity and Reliability

To ensure content validity, the questionnaire was reviewed by three public health experts specializing in maternal and reproductive health research. Their recommendations were incorporated to improve conceptual clarity, contextual relevance, and question wording. A pilot study involving 30 women outside the primary research area was subsequently conducted to identify ambiguities and evaluate instrument comprehensibility.

Reliability testing focused on the internal consistency of the decision-making autonomy scale using Cronbach's alpha coefficients. The reliability values exceeded the recommended threshold of 0.70, indicating acceptable internal consistency. Furthermore, standardized interview procedures, enumerator training, and pilot testing contributed to enhancing data reliability and consistency throughout the research process.

RESULTS AND DISCUSSION

This section presents the empirical findings regarding the influence of maternal health education on women's decision-making autonomy and maternal health outcomes in Indonesia. The results are organized systematically into descriptive statistics, reliability and validity testing, inferential statistical analyses, mediation analysis, and maternal healthcare utilization outcomes. Before discussing the core analytical findings, the section first outlines respondent characteristics and the

distribution of key variables to provide contextual understanding of the study population. Subsequently, the analysis examines the relationships between maternal health education, women’s autonomy, and maternal health outcomes using multiple statistical procedures, including independent sample *t*-tests, ANOVA, multiple linear regression, logistic regression, and mediation analysis. All tables presented in this section are derived from the processed primary survey data collected from 305 respondents during the 2025 field survey.

Respondent Characteristics

The study involved 305 women of reproductive age who had experienced pregnancy or childbirth within the previous two years. Descriptive analysis was conducted to summarize respondents’ demographic and socio-economic characteristics.

Table 1. Socio-Demographic Characteristics of Respondents

Variable	Category	Frequency (N)	Percentage (%)
Age	<25 years	75	24.6
	25–34 years	166	54.4
	>35 years	64	21.0
Education	Primary	55	18.0
	Secondary	194	63.6
	Tertiary	56	18.4
Residence	Rural	161	52.8
	Urban	144	47.2
Household Income	Low	145	47.5
	Middle	118	38.7
	High	42	13.8
Maternal Health Education Participation	Yes	220	72.1
	No	85	27.9

Source: Primary survey data processed by the authors, 2025

The findings indicate that most respondents were between 25 and 34 years old and had completed secondary education. More than half of the respondents lived in rural areas, reflecting the persistent concentration of maternal health disparities in geographically underserved communities. Participation in maternal health education programs was relatively high, although attendance intensity varied substantially across respondents.

Descriptive Statistics of Research Variables

Descriptive statistics were further conducted to examine the distribution of the principal research variables.

Table 2. Descriptive Statistics of Research Variables

Variable	Minimum	Maximum	Mean	Standard Deviation
Maternal Health Education Sessions	0	6	2.84	1.71
Decision-Making Autonomy Score	8	25	17.68	4.03
ANC Visits	1	8	4.89	1.52
Postnatal Care Utilization	0	1	0.73	0.44
Neonatal Immunization Completeness	0	1	0.81	0.39

Source: Primary survey data processed by the authors, 2025

Table 2 shows that the average respondent attended approximately three maternal health education sessions. The mean autonomy score was 17.68, indicating moderate participation in household healthcare decision-making. The average number of antenatal care visits exceeded the WHO minimum recommendation, although disparities remained among respondents from low-income and rural households.

Validity and Reliability Testing

Instrument validity and reliability tests were conducted before the primary analysis to ensure measurement consistency and accuracy.

Table 3. Validity Test Results

Indicator	Corrected Item-Total Correlation	Critical Value	Status
ANC Decision Participation	0.684	0.30	Valid
Delivery Place Decision	0.712	0.30	Valid
Financial Healthcare Decision	0.659	0.30	Valid
Permission to Seek Healthcare	0.701	0.30	Valid
Postnatal Care Decision	0.676	0.30	Valid

Source: Primary survey data processed by the authors, 2025

All indicators exceeded the minimum corrected item-total correlation threshold of 0.30, indicating acceptable construct validity.

Table 4. Reliability Test Results

Variable	Cronbach's Alpha	Threshold	Status
Decision-Making Autonomy Scale	0.842	0.70	Reliable
Maternal Health Education Scale	0.791	0.70	Reliable
Maternal Health Outcome Scale	0.817	0.70	Reliable

Source: Primary survey data processed by the authors, 2025

The Cronbach's Alpha coefficients exceeded the recommended threshold of 0.70, confirming satisfactory internal consistency reliability.

Maternal Health Education and Decision-Making Autonomy

An independent sample *t*-test was conducted to examine differences in autonomy scores between women participating in maternal health education programs and those without participation.

Table 5. Independent Sample *t*-Test of Decision-Making Autonomy

Educational Participation	N	Mean Score	Standard Deviation	t-value	p-value
Participated	220	18.42	3.87	5.214	<0.001
Did not participate	85	15.71	4.11		

Source: Primary survey data processed by the authors, 2025

Women participating in maternal health education demonstrated significantly higher autonomy scores than women without educational exposure. The findings indicate that educational participation contributes positively to women's confidence and involvement in maternal healthcare decisions.

Frequency of Educational Participation and Autonomy

One-way ANOVA analysis was employed to determine whether autonomy scores differed according to attendance frequency.

Table 6. ANOVA Results for Educational Attendance Frequency

Frequency of Sessions	N	Mean Autonomy Score	Standard Deviation
None	85	15.71	4.11
1–2 Sessions	94	17.02	3.95
3–4 Sessions	78	18.67	3.44
≥5 Sessions	48	19.83	3.12

ANOVA Result: $F(3,301) = 14.662, p < 0.001$

Source: Primary survey data processed by the authors, 2025

The findings reveal a positive trend between educational attendance frequency and women’s autonomy. Women attending five or more sessions recorded the highest autonomy scores, suggesting that repeated educational engagement strengthens empowerment outcomes more effectively than occasional participation.

Regression Assumption Testing

Prior to regression analysis, several classical assumption tests were conducted.

Table 7. Multicollinearity Test

Variable	Tolerance	VIF
Maternal Health Education	0.781	1.281
Education Level	0.742	1.347
Household Income	0.803	1.245
Age	0.866	1.154

Source: Primary survey data processed by the authors, 2025

All VIF values remained below 10, indicating no multicollinearity issues among predictor variables.

Table 8. Normality Test

Test	Statistic	p-value	Interpretation
Kolmogorov–Smirnov	0.067	0.084	Normally distributed

Source: Primary survey data processed by the authors, 2025

The normality test confirmed that the residuals were normally distributed because the significance value exceeded 0.05.

Predictors of Women’s Decision-Making Autonomy

Multiple linear regression analysis was conducted to identify factors influencing women’s autonomy.

Table 9. Multiple Linear Regression Predicting Decision-Making Autonomy

Predictor Variable	B	Std. Error	Beta (β)	t-value	p-value
Maternal Health Education Participation	0.624	0.148	0.291	4.216	<0.001
Education Level	0.281	0.073	0.233	3.849	<0.001
Household Income	0.174	0.069	0.129	2.522	0.012
Age	0.109	0.044	0.117	2.477	0.014

Rural Residence	-0.215	0.092	-0.104	-2.337	0.020
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Source: Primary survey data processed by the authors, 2025

Maternal health education emerged as the strongest predictor of women’s autonomy. Women with higher educational attainment and greater household income also demonstrated significantly higher decision-making participation.

Maternal Health Outcomes

Logistic regression analysis was performed to examine the influence of educational participation and autonomy on maternal healthcare utilization.

Table 10. Logistic Regression Predicting Facility-Based Delivery

Predictor Variable	B	Std. Error	Odds Ratio (OR)	95% CI	p-value
Maternal Health Education Participation	0.941	0.281	2.563	1.48–4.44	<0.001
Decision-Making Autonomy	0.116	0.035	1.123	1.05–1.20	0.002
Education Level	0.087	0.041	1.091	1.02–1.18	0.015
Household Income	0.074	0.032	1.077	1.01–1.14	0.022

Source: Primary survey data processed by the authors, 2025

Women participating in maternal health education were approximately 2.56 times more likely to deliver in healthcare facilities than women without educational exposure. Women’s autonomy also significantly increased the likelihood of professional healthcare utilization.

Table 11. Logistic Regression Predicting Adequate ANC Attendance

Predictor Variable	Odds Ratio (OR)	p-value
Maternal Health Education Participation	2.118	<0.001
Decision-Making Autonomy	1.093	0.004
Education Level	1.071	0.019

Source: Primary survey data processed by the authors, 2025

Educational participation and autonomy significantly increased the probability of completing at least four antenatal care visits.

Table 12. Logistic Regression Predicting Postnatal Care Utilization

Predictor Variable	Odds Ratio (OR)	p-value
Maternal Health Education Participation	1.984	0.001
Decision-Making Autonomy	1.086	0.006

Source: Primary survey data processed by the authors, 2025

Women with higher autonomy and educational exposure were significantly more likely to access postnatal healthcare services within 48 hours after childbirth.

Mediation Analysis

Mediation analysis using the Baron and Kenny framework with bootstrapping procedures was conducted to examine whether women’s autonomy mediated the relationship between maternal health education and maternal health outcomes.

Table 13. Mediation Analysis Results

Pathway	Direct Effect	Indirect Effect	Total Effect	Bootstrapped 95% CI
Education → Autonomy → Facility-Based Delivery	0.412	0.197	0.609	0.114–0.283
Education → Autonomy → ANC Attendance	0.351	0.164	0.515	0.098–0.241

Source: Primary survey data processed by the authors (2025).

The mediation analysis confirmed that women's decision-making autonomy partially mediated the relationship between maternal health education and maternal health outcomes. This finding indicates that educational interventions improve healthcare utilization both directly and indirectly through empowerment mechanisms.

Maternal Health Education, Women's Autonomy, and Maternal Healthcare Utilization

The results of this study show that maternal health education is one of the factors that can contribute significantly to strengthen women's autonomy in decision making and use of maternal health services in Indonesia. The outcome shows that those women who attended maternal health education programmes had better levels of autonomy in seeking health care, and were more likely to use antenatal care services, child birth services and postnatal services in the facility. The results of this study corroborate the literature that has increasingly been accumulating that the quality of maternal health services received is not only determined by the availability of health services but also by various factors of women's empowerment, bargaining power of women's households and socio-cultural factors.

Positive correlation between maternal health education and women's autonomy is in line with the previous studies carried out in LMIC. In Indonesia, Damayanti et al. (2022) showed that the lack of access to health care is strongly linked to women's limited ability to independently access maternal health care in Indonesia. In the same way, Wafiq & Haq (2025) pointed out that empowerment-based interventions have the potential to contribute to greater women's involvement in household decision-making, especially in patriarchal social systems. The current study builds on this work by empirically proving that maternal health education acts as more than an information provision tool, it acts as a tool to empower and strengthen women's decision making power and confidence in healthcare decisions of mothers. This indicates that the educational exposure can influence the power structure within the family as it enhances the level of knowledge, communication and the ability to be viewed as legitimate in health related conversations by women.

The results also corroborate the international evidence that suggests that women's autonomy is associated with better maternal health outcomes. In past studies, women with more control over decisions regarding health services were found to be more likely to avail of antenatal and skilled birth attendance services and postnatal services in south Asia and sub-Saharan Africa. It can be seen that inadequate maternal health care utilization is still one of the major factors responsible for maternal deaths in developing countries, and early-life and maternal interventions are crucial in ensuring long-term social welfare outcomes, as argued by Kruk et al. (2022) and McDonald et al. (2022), respectively. Similar to these studies, the present study showed that women with higher autonomy scores had significantly higher utilization of professional maternal health services. This indicates the pathway of empowerment is an important link between educational intervention and health care behavior.

The identification of decision-making autonomy of women as a mediator between maternal health education and maternal health outcomes is one of the main contributions of this study. In addition to the direct associations between educational participation and healthcare use, previous studies have mainly focused on indirect influences of educational interventions on healthcare behaviour through empowerment processes, as illustrated by the present study. Mediation analysis indicated a partial mediation effect of women's autonomy as a mediator between maternal health education and facility-based delivery and antenatal care attendance (Gebeyehu et al., 2022; Kang et al., 2025). The discovery is important in theory as it combines frameworks of utilization of maternal health services with empowerment theory. The study thus contributes to the understanding of why and how to assess the impact of education programs in health care beyond knowledge acquisition, towards changing gendered decision making structures within households.

The findings suggest from a pragmatic standpoint that maternal health interventions need to include empowerment-focused approaches as well as messages on the biomedical level. The active involvement of women in a program of participation in healthcare decisions should be encouraged, as well as the involvement of the husband and family in maternal health-related discussions through Puskesmas, village midwives and community health workers. The better autonomy outcomes that were achieved at the second education sessions also indicate that repeated and regular education sessions are more effective than single interventions (Rickard et al., 2024; Teixeira et al., 2024). Therefore, the policy makers should give focus to long-term community-based strategies of maternal education where reproductive health awareness and gender empowerment are combined.

The study also raises key issues of structural inequity that impact on women's autonomy and access to healthcare. The findings of the rest of the study are confirmed by the negative effect of rural residence on decision making autonomy which pointed out the socio-cultural and infrastructural problems that rural women encounter when it comes to accessing health care. These findings are similar to earlier studies which reported that the level of health services for maternal care in rural areas is still less advanced than in urban areas in developing countries. Further, improving maternal healthcare facilities in rural areas will not be sufficient without tackling the issue of gender norms and the transportation issues that hinder women's access to care.

This study has certain limitations. The cross-sectional study design does not allow causal inferences to be drawn over time between the maternal health education and maternal empowerment outcomes. Secondly, the findings were based on self-reported answers to such surveys, which could have been subject to recall and social desirability bias. Thirdly, the research was conducted with the selected communities in Indonesia and the results could not be generalized in other socio-cultural contexts. But, further studies should be longitudinal or multi methods to gain insight into potential changes in women's autonomy over time and the impact of cultural norms on the maternal health-care decision making process in different areas.

Future research is needed to explore the role of men in the empowerment of maternal health care, digital health education platforms, and community-based participatory approaches, however. Comparative studies of the effectiveness of maternal health education programmes across provinces/countries may also help gain insight into how well socio-cultural differences are affecting the effectiveness of maternal health education programmes. Overall, the novelty of this study is integration of maternal health education, women's autonomy, and maternal healthcare utilization in one analytical framework, which reveals that empowerment is a very important process in which maternal education might affect maternal health outcomes in Indonesia.

CONCLUSION

The findings in this study prove that maternal health education plays a significant role in enhancing women's autonomy in decision making and utilization of maternal health services in Indonesia. Women who were engaged in maternal health education had better involvement in the decisions on healthcare and better utilization of maternal health services, including postnatal care, facility-based delivery and antenatal care. The results also support that the link between educational participation and maternal health outcomes is partially explained by women's autonomy, which suggests that empowerment is a key mechanism through which educational interventions are related to healthcare behaviors.

According to the theory, this study is expected to add to the body of literature by presenting maternal health education, women empowerment and maternal health care utilization in one single analytical framework. The results underscore the need for programmatic interventions for maternal health to integrate biomedical education with empowerment-based practices, especially in rural and socio-economically vulnerable populations. However, the current study is not without its limitations, such as the cross sectional design and the use of self-reported data that could be limiting causal interpretation and the amount of error in responses. Further research is needed that uses longitudinal and mixed method designs to investigate empowerment process and outcomes over time and to assess how empowerment is affected by cultural norms, male involvement, and digital maternal health interventions to enhance maternal health experiences.

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