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Associations between Maternal Health Literacy, Health-Seeking Behavior, and Maternal and Child Health Service Utilization: A Cross-Sectional Study

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Background and Objective: In Indonesia, many women who are planning to conceive or have already given birth lack sufficient knowledge of health-related issues and seldom take the initiative to seek medical help. These two problems have prevented local pregnant and postnatal women from accessing the necessary medical services. This study aims to clarify the specific associations between the five domains of maternal health cognition, their behaviors of actively seeking health services, and the actual utilization of maternal and child health services.

Materials and Methods: A cross-sectional study was conducted for this research, which collected relevant information from a group of people at the same time point for analysis. A total of 589 mothers were included, whose children were all aged between 0 and 59 months, with the youngest being newly born and the oldest less than five years old. The study used questionnaires to assess these mothers' level of health cognition, covering the cognitive domains of prenatal care, vaccination, breastfeeding, child growth monitoring, and Posyandu-related content. It also measured whether they would take the initiative to seek health help, as well as their actual utilization of health services. All collected data were analyzed using the generalized structural equation model (binomial logit model) in the STATA 17 software.

Results: Multivariable analysis revealed that ANC literacy (B=0.72; p=0.008; OR=2.05; 95% CI=1.21-3.48), immunization literacy (B=0.42; p=0.037; OR=1.53; 95% CI=1.03-2.27), breastfeeding literacy (B=0.58; p=0.007; OR=1.79; 95% CI=1.17–2.74), child growth monitoring literacy (B=0.51; p=0.036; OR=1.66; 95% CI=1.03-2.67), Posyandu literacy (B=0.76; p=0.008; OR=2.14; 95% CI=1.23-3.75), and health seeking behavior (B=0.49; p=0.017; OR=1.62; 95% CI=1.09-2.42) were significantly associated with maternal and child health service utilization. GSEM showed a statistically significant association between child growth monitoring literacy and health-seeking behavior.

Conclusion: Among mothers of children aged 0-59 months, a number of maternal health literacy and health-seeking behaviour categories were substantially correlated with the use of maternal and child health services.

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Introduction

Maternal and child health service utilization is an important component of maternal and child health programs because it reflects mothers' access to and engagement with essential preventive, promotive, and healthcare services (1). What exactly do these services include? They cover prenatal check-ups during pregnancy, childhood vaccinations for children, breastfeeding support to help mothers successfully breastfeed, growth and development monitoring to track children's physical development, as well as community-based service programs that have been implemented, such as Posyandu. If the public can continuously and correctly utilize these services, they will be able to practically access preventive care that guards against illnesses in advance, learn practical health knowledge, detect emerging health problems at an early stage, and promptly connect with qualified medical staff if they require assistance (2). However, if these services fail to be fully utilized by the public, a host of adverse risks will emerge: health problems cannot be detected in a timely manner, access to preventive care will decrease, the optimal window for early intervention when problems first arise will be missed, and opportunities for early intervention that could have been seized will be wasted in vain (3,4).

To expand access to maternal and child health services for more people, Indonesia has launched a series of measures, including strengthening primary healthcare, expanding medical insurance coverage, and optimizing prenatal checkups during pregnancy, and has also restarted the Posyandu program (5). The core goal of these measures is to lower the threshold for maternal and child health services, so that more people in need can access and utilize them. Despite all these expansion efforts, the actual number of people who use these services still fails to meet expectations: while the service coverage has indeed expanded, and all eligible people can reach the services, the number of people who are willing to actively use the services has not kept up with the projected scale. What holds many people back are gaps between different population groups that cannot be easily eliminated: some are trapped by economic conditions and cannot afford the costs of seeking medical care, some have limited education and cannot understand the notification requirements for the services, and others live in extremely remote areas; even with local service sites established, traveling back and forth takes too much time and effort. To improve service utilization, planners of relevant future projects must first clarify a core question: can mothers understand the related health information (6,7).

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Typically, it is not that mothers are unwilling to use the services, but that they simply cannot comprehend the health instructions, medical consultation guidelines and other content provided to them, so they naturally cannot follow the requirements step by step, and thus are unable to use the services smoothly. This issue relies on maternal health literacy to address, which is defined as a mother's ability to obtain, organize, and understand basic medical information, and use that information to maintain her own and her child's health (8). It means being able to find reliable health information on one's own, sort through chaotic information to make sense of it, truly understand what the content describes, and finally use that knowledge to care for the health of herself and her child. This ability is a necessary condition for disease prevention and smooth access to appropriate medical services; without this ability, even if services are right in front of them, it is difficult to figure out how to use them properly. Existing studies have confirmed that mothers with higher health literacy master more health knowledge, are more willing to follow health recommendations, and will actively seek out the medical services they need (9).

The health literacy of pregnant and postpartum women is not a single capability, but rather covers several distinct aspects (10), , specifically including understanding of prenatal care, vaccination, breastfeeding, growth and development monitoring, and integrated healthcare services (11,12). The capabilities in these aspects are not isolated from one another; they work together to help mothers identify the health needs of themselves and their children, comprehend the benefits of various medical services, and make decisions to improve their health status. Precisely because these capabilities each have their own focus, the extent to which different dimensions of health literacy correlate with pregnant and postpartum women's actual utilization of medical services may vary (13).

The five literacy domains examined in this study were selected because they represent distinct but complementary areas of maternal and child health care. ANC literacy concerns understanding of antenatal care and pregnancy-related warning signs. Immunization literacy concerns vaccination benefits, schedules, and safety. Breastfeeding literacy concerns recommended breastfeeding practices and management of breastfeeding difficulties. Child growth monitoring literacy concerns understanding and interpretation of child growth indicators. Posyandu literacy concerns awareness of the functions, schedules, benefits, and services provided through community-based integrated health posts. Although these domains share an overarching maternal health literacy construct, their content is context-specific and may therefore demonstrate different associations with health service utilization. At the same time, the conceptual overlap among these domains may result in correlations between predictors, which should be considered when interpreting their simultaneous inclusion in the analytical model.

In addition to the ability to understand health information, an individual's behavior in seeking and utilizing health services is also a factor that may be associated with health service utilization (14). Health seeking behavior is the combination of efforts made by individuals to seek health information, consult appropriate health professionals and/or use appropriate health facilities.Taking some practice or action that a person believes will

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reduce their stress level for example (15). These behaviours are driven by many factors, including knowledge and experience with health risks and personal ability to process available information about a certain piece of healthcare. Mothers who are proactive in seeking assistance and information related to health tend to use the health services more actively than mothers whose activity is lower (16).

Most previous studies on this topic focused on a single dimension for analysis, and refused to collate related contents for a collective review; they either separated the health outcomes of mothers and children to focus solely on the maternal health status, or only tracked children's growth data, and never incorporated the health needs of both maternal and child generations into a unified framework for discussion. To date, very few studies have simultaneously included ANC, vaccination, breastfeeding, growth monitoring, and Posyandu literacy into their scope of investigation. All of the aforementioned items are directly linked to the health of mothers and children, yet no one has gathered them for in-depth exploration; even the public's level of understanding of the Posyandu service has never been included in research synchronously.

There is also a near-complete lack of exploration of the impacts the combination of these factors on Indonesian mothers' care-seeking behaviors and service utilization. In addition, few studies have examined whether the integration of these contents would ultimately make Indonesian mothers more willing to actively access health services, or affect the frequency with which they use various medical resources. Only by analyzing these domains together can we gain a comprehensive understanding of which specific component of health literacy drives people's utilization of these medical services.

The purpose of this study is to accumulate useful reference information for the future promotion of maternal and child health-related work, and help subsequent work define its direction more accurately. The survey subjects selected for this study are mothers in Indonesia who have children aged 0 to 59 months; that is, mothers whose children are under 5 years old, and relevant information is collected only from this group. The core work to be carried out in the study is to clarify the correlations between several elements. The first is the level of these mothers' awareness of several specific health issues, the second is their behavior of actively seeking health assistance, and the third is their actual usage of various health services. Once the correlations between these elements are clarified, tangible references can be provided for follow-up promotion work of maternal and child health. There are five categories of specific health awareness that the mothers mentioned in the study are assessed on, which are: ANC, vaccination, breastfeeding, child growth and development monitoring, and awareness related to Posyandu.

Materials and Methods

Research Design

This study was conducted between February and May 2026. It is a cross-sectional analytical observational study. This type of study does not interfere with the daily lives of research subjects; it only observes and collects relevant information within the same research cycle,

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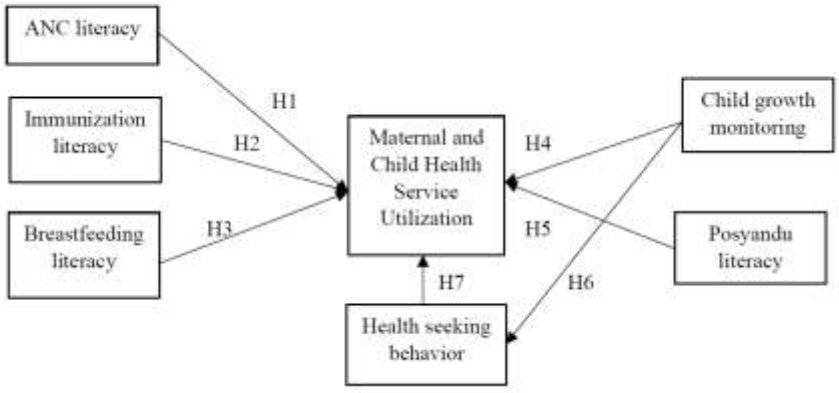
and then carries out analysis. The subjects selected for this study are all mothers who have children under 5 years old at home. The core purpose of this study is to clarify the correlation among three factors: the first is maternal health literacy; that is, whether mothers can understand and apply all kinds of health-related knowledge; the second is maternal healthcare-seeking behavior; that is, the behavior of mothers actively seeking medical help whether they encounter health problems; the third is the utilization of maternal and child care services; that is, whether these mothers will actively use those medical and care-related services specifically provided for pregnant, lying-in women and young children.

Population and Sample

The study population includes mothers aged 18 years or older having one or more children of 0-59 months receiving maternal and child health services at Puskesmas in Kediri and Malang, Indonesia from February to May 2026. A total of 2500 mothers with children under 6 months were selected from both types of health facilities using multistage proportional random sampling: 9 Puskesmas were arbitrarily chosen after which 25 Posyandu proportionally selected. Inclusion criteria were to speak Bahasa Indonesia and provide a written consent; participants with missing data received exclusion. For the unknown population, calculated using Cochran (95% confidence level, p=0.50, 5% margin of error), a minimum necessary sample was 385. The final analytical sample was comprised of 589 mothers, which met the minimum number to conduct these planned multivariable logistic regression and generalized structural equation modeling analyses.

Conceptual Framework and Hypothesis

This study is based on the Health Literacy Framework and Andersen's Behavioral Model. Ultimately, it verifies the correlations among three groups of factors. The first group consists of antecedent factors that influence maternal health literacy, that is, all conditions that affect a maternal woman's ability to understand and apply health-related knowledge. The second group is the behavior of maternal women taking the initiative to seek health assistance, the actions maternal women take to proactively seek medical support to safeguard their own and their child's health. The third group is the actual utilization of maternal and child healthcare services, certain situations where mothers and children can access and use medical and healthcare services. The conceptual framework illustrating the hypothesized relationships among these factors is presented in **Figure 1**.



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Figure 1. Model of the relationship among maternal health literacy, health seeking behavior, and maternal and child health (MCH) service utilization

The following hypotheses are tested in this study:

H1: ANC literacy is statistically associated with maternal and child health service utilization.

H2: Immunization literacy is statistically associated with maternal and child health service utilization.

H3: Breastfeeding literacy is statistically associated with maternal and child health service utilization.

H4: Child growth monitoring literacy is statistically associated with maternal and child health service utilization.

H5: Posyandu literacy is statistically associated with maternal and child health service utilization.

H6: Child growth monitoring literacy is statistically associated with health-seeking behavior.

H7: Health-seeking behavior is statistically associated with maternal and child health service utilization.

Research Variables and Instruments

This research consists of seven main variables. The dependent variable is Maternal and Child Health Service Utilization. Independent variables include ANC literacy, immunization literacy, breastfeeding literacy, child growth monitoring literacy, and Posyandu literacy. The health seeking behavior variable is positioned as the behavior variable in the Generalized Structural Equation Model.

ANC Literacy

ANC literacy is measured through the mother's ability to understand the purpose of pregnancy checkups, antenatal visit schedules, benefits of ANC, pregnancy red flags, and actions to take when complications occur during pregnancy.

Immunization Literacy

Mothers were assessed based on health status in relation to immunization literacy which is reflected with the understanding of benefits, schedule and safety for vaccine side effects (direct or indirect) as well diseases that can be prevented by immunization.

Breastfeeding Literacy

Mother's participation is identified by her knowledge about exclusive breastfeeding, benefits of breast feeding, correct technique and frequency of lactation problem handling difficulties.

Child Growth Monitoring Literacy

Child growth monitoring literacy is measured through the mother's ability to understand child growth indicators, the use of the Healthy Towards Healthy Card (KMS), monitoring weight and height, and interpreting the child's growth results.

Posyandu Literacy

Posyandu literacy is measured based on the mother's understanding of the function of the Posyandu, the types of services available, the schedule of Posyandu activities, the benefits of the Posyandu, and the role of the Posyandu in maternal and child health.

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Health Seeking Behavior

This variable (health seeking behavior) was calculated based on mothers who searched for health information, mothers who consulted with the health workers and those used health facilities, following the advice of healthcare providers as well as whom get medical services when having a problem in relation to his/her life. Health-seeking behavior and maternal and child health service utilization were treated as conceptually distinct constructs. Health-seeking behavior referred to mothers' actions in searching for health information, consulting health workers, following professional advice, and seeking care when health problems occurred, whereas service utilization referred to reported use of specified maternal and child health services.

Maternal and Child Health Service Utilization

This study conducted statistics on the utilization of maternal and child health services, and all the collected evidence was based on real usage records self-reported by mothers. There were six categories of services involved, which were prenatal examinations during pregnancy, childhood vaccination, breastfeeding consultation, awareness of children's growth and development monitoring, Posyandu services, and postnatal care. This assessment aimed to only verify whether they had used these services, and it never asked for any subjective opinions of the respondents regarding the services. A unified five-point scoring system was used to record information during collection.

All the scores filled in by mothers were first aggregated into a total score representing the utilization of services, and then the total scores were divided into two categories: one was low utilization of services and the other was high utilization. This binary result with only two classifications was used as a dependent variable in the two analytical methods of multivariable analysis and generalized structural equation modeling.

Scoring and Classification of Study Variables

The study variables were scored and classified according to the predefined scoring and classification criteria established for each respective instrument. Because the literacy domains represent different areas of maternal and child health knowledge and skills, the classification terminology was retained according to the scoring criteria of each instrument rather than using a single uniform label across all domains. Accordingly, ANC literacy was classified as adequate or inadequate, immunization literacy as good or poor, breastfeeding literacy as good or poor, child growth monitoring literacy as competent or not competent, and Posyandu literacy as aware or unaware. Health-seeking behavior was classified as active or passive, while maternal and child health service utilization was classified as low or high. For consistency throughout the manuscript, the names of the study variables were standardized as ANC literacy, immunization literacy, breastfeeding literacy, child growth monitoring literacy, Posyandu literacy, health-seeking behavior, and maternal and child health service utilization. The category labels were retained according to the predefined scoring and classification criteria of the respective instruments.

Validity and Reliability Tests

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A total of three experts led the questionnaire assessment, with distinct research directions: maternal and child health, child health, and public health for the general population. Their first task was to confirm whether the content of the questionnaire could accurately measure the intended outcomes, which was referred to as "content validity" in the field. Three specialized industry indicators were used in the assessment: I-CVI, S-CVI/Ave, and S-CVI/UA. Relevant results are summarized in **Table 1**. A total of 7 assessment tools were used, all of which met the requirements. Not only did all tools demonstrate excellent validity, but every item within each tool also aligned well with the topic being assessed, with correlation fully meeting the standards. Among all the tools, the one used to measure Breastfeeding Literacy scored the highest, achieving a full score of 1.000 on both indicators. The lowest-scoring tool was the one used to measure Child Growth Monitoring Literacy, with an S-CVI/Ave of 0.933 and an S-CVI/UA of 0.800.

Table 1. Content Validity of the Questionnaire

No	Construct/Questionnaire	Number of Items	S-CVI/Ave	S-CVI/UA	Interpretation
1	ANC Literacy	9	0.963	0.889	Excellent content validity
2	Immunization Literacy	12	0.972	0.917	Excellent content validity
3	Breastfeeding Literacy	9	1.000	1.000	Excellent content validity
4	Child Growth Monitoring Literacy	5	0.933	0.800	Excellent content validity
5	Posyandu Literacy	15	0.978	0.933	Excellent content validity
6	Health Seeking Behavior	8	0.958	0.875	Excellent content validity
7	MCH Service Utilization	9	0.963	0.889	Excellent content validity

All measurement tools used in the research were first evaluated by experts. After confirming that they were problem-free, we recruited 30 mothers to test these tools; all characteristics of these mothers fully matched the target population of this study. They ran through the entire process in advance to test whether the tools were practical to use. To test whether a tool is effective, an objective criterion is required. We used Cronbach's alpha coefficient, which is specifically designed to assess the internal consistency of a tool. It measured whether all items in the same tool could stably measure the same construct, and whether inconsistent responses across items existed. Before formally calculating the coefficient, we set a qualification threshold in advance: as long as Cronbach's alpha coefficient is ≥ 0.70, it indicates that the reliability of the tool meets the standard and can be used with confidence. The results of the reliability analysis are presented in **Table 2**.

Table 2. Reliability Test Results of the Study Instruments

No	Construct/Questionnaire	Number of Items	Cronbach's Alpha	Criteria	Conclusion
1	ANC Literacy	9	0.880	≥0.70	Reliable
2	Immunization Literacy	12	0.905	≥0.70	Reliable
3	Breastfeeding Literacy	9	0.946	≥0.70	Reliable
4	Child Growth Monitoring Literacy	5	0.847	≥0.70	Reliable
5	Posyandu Literacy	15	0.950	≥0.70	Reliable
6	Health Seeking Behavior	8	0.737	≥0.70	Reliable
7	MCH Service Utilization	9	0.727	≥0.70	Reliable

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Data Collection

The data collection for this entire study was carried out between February and May 2026. The personnel responsible for collecting data were all specially trained enumerators, who traveled to the two pre-selected locations, Puskesmas and Posyandu, to conduct face-to-face interviews with respondents using a uniformly designed questionnaire. All enumerators participating in data collection had first received a set of standardized unified training to ensure that all personnel followed completely consistent procedures and standards when conducting surveys.

Only mothers who meet the participation criteria were eligible to join this study. Before the official start of the interview, staff first explained all key information related to the study to them; what the core purpose of this study was, that their participation was completely voluntary, that they would not encounter any problems even if they withdrew midway, and that all personal information they provided would be kept strictly confidential. Once they fully understood the content and were willing to participate, they signed a written informed consent form to formally confirm their enrollment.

Enumerators were advised to adhere to the standardised questionnaire, only offer explanation when required, and refrain from influencing participants' answers. The field crew verified the consistency and completeness of completed surveys. Before data input, questionnaires with inconsistent or partial replies were examined and, if feasible, validated. To reduce recording and data input mistakes, data entry was then examined. The Bhakti Wiyata Kediri Institute of Health Sciences' Research Ethics Committee accepted the study (Number: 29/FTMK/EP/I/2026).

Data Analysis

STATA 17 was used for the data analysis. Participant characteristics were summarized with descriptive statistics including frequencies and percentages. They included bivariate Chi-square tests to check for associations between categorical independent variables and the binary outcome of maternal and child health service contrast ($p < 0.05$). Adjusted associations were derived using multivariable logistic regression to obtain odds ratios, 95% confidence intervals and p-values for the association of maternal health literacy domains, health-seeking behavior and service utilization. Hypothesized direct relationships between literacy domains, health-seeking behavior, and service utilization were then tested using generalized structural equation modeling (GSEM) (binomial family, logit link). All findings, however, indicate statistical associations rather than causal effects due to the cross-sectional design.

The five maternal health literacy domains, health-seeking behavior, and the use of maternal and child health services were the key subjects of the multivariable model. Although sociodemographic and healthcare-access factors were presented, the original hypothesized framework did not specify them as structural predictors, so they were excluded as covariates in the final structural model. Thus, it is impossible to rule out residual confounding caused by unmeasured or uncorrected features. Tolerance and variance inflation factor (VIF)

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statistics were used to evaluate multicollinearity among the independent variables. There was no serious multicollinearity if the tolerance value was more than 0.10 and the VIF value was less than 10. As an extra diagnostic, condition indices were also analysed.

The proposed relationships between maternal health literacy, health-seeking behavior, and mother and child health service consumption were investigated using generalized structural equation modeling (GSEM). Because the endogenous variables in the proposed model were binary and hence needed a generalized response distribution, GSEM was chosen. For the binary endogenous variables, a logit-linked binomial family was provided. The structural model contained direct correlations between the use of maternal and child health services and ANC literacy, vaccination literacy, breastfeeding literacy, child growth monitoring literacy, Posyandu literacy, and health-seeking behavior. Additionally, health-seeking behavior was identified as an explanatory variable for maternal and child health care consumption, while child growth monitoring literacy was identified as an explanatory variable for health-seeking behavior. The calculated model included the GSEM coefficients, standard errors, 95% confidence intervals, and p-values. Instead of being represented as standardized linear Generalized Structural Equation Model coefficients, the coefficients were interpreted on the logit scale. A two-sided p-value of less than 0.05 was used to determine statistical significance. Rather than representing causal pathways, the structural model was seen as a model of postulated statistical relationships. The current research did not quantify or evaluate any indirect or mediation effects.

Results

General profile of respondence

Table 3 summarizes the characteristics of the 589 mothers included in the final analytical sample. Participants with incomplete questionnaires or missing essential information required for the analysis were excluded according to the predefined exclusion criteria. Therefore, the descriptive and subsequent analytical results presented in this manuscript are based on the final analytical sample of 589 mothers. The majority of respondents were aged 20–34 years (72.5%) and were unemployed (68.8%). Most respondents were senior high school graduates (41.9%). Most household income was in the middle (44.3%). Fifty one (51.1%) and almost half of respondents had 2 to 3 children and around fourty eight (47.9%) of them had children aged between 24–59 months. Over half lived in urban areas with 56.7% being covered by health insurance (82.7%) and living within a 5 km radius of the nearest health facility (74.4%). More than half the respondents (69.6%) reported that they regularly attend Posyandu.

Table 3. Respondent characteristics

Variable	Category	n	%
Maternal age (years)	<20	38	6.5
	20-34	427	72.5
	≥35	124	21.0
Employment status	Employed	184	31.2
	Unemployed	405	68.8

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Education	Non-formal school	21	3.6
	Elemantary school	78	13.2
	Junior high school	117	19.9
	Senior high school	247	41.9
	University/college	126	21.4
Household income	Low	218	37.0
	Middle	261	44.3
	High	110	18.7
Number of children	1	203	34.5
	2-3	301	51.1
	≥4	85	14.4
Child age (months)	0-11	136	23.1
	12-23	171	29.0
	24-59	282	47.9
Place of residence	Urban	334	56.7
	Rural	255	43.3
Health insurance ownership	No	102	17.3
	Yes	487	82.7
Distance to health facility	<5km	438	74.4
	≥5 km	151	25.6
Participation in Posyandu	Irregular	179	30.4
	Regular	410	69.6

Bivariate Analysis

Table 4 presents the bivariate associations between the study variables and the use of maternal and child health services. Among mothers with adequate ANC literacy, 78.21% reported high maternal and child health service utilization, compared with 61.33% among those with inadequate ANC literacy. This association was statistically significant (p=0.002). For immunization literacy, 78.83% of mothers with good immunization literacy reported high service utilization, compared with 73.05% among mothers with poor immunization literacy. However, this association was not statistically significant (p=0.122). Among mothers with good breastfeeding literacy, 81.86% reported high maternal and child health service utilization, compared with 72.16% among mothers with poor breastfeeding literacy. This difference was statistically significant (p=0.009). Similarly, 83.43% of mothers classified as competent in child growth monitoring literacy reported high service utilization, compared with 73.10% among those classified as not competent. This association was statistically significant (p=0.011). For Posyandu literacy, 77.69% of mothers who were aware of Posyandu reported high maternal and child health service utilization, compared with 63.77% among mothers who were unaware of Posyandu. The association was statistically significant (p=0.017). In addition, 79.40% of mothers with active health-seeking behavior reported high service utilization, compared with 70.45% among those with passive health-seeking behavior. This association was also statistically significant (p=0.018).

Multicollinearity Assessment

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All independent variables showed tolerance values between 0.947 and 0.986, as shown in **Table 5**, which were higher than the widely recognized cutoff of 0.10. The related VIF values were significantly below the threshold of 10, ranging from 1.014 to 1.056. These results show that the predictors might be kept in the multivariable analysis without significant worry regarding duplication among the predictors because no serious multicollinearity was found among the independent variables.

Table 4. Bivariate Analysis of Factors Associated with Maternal and Child Health Service Utilization

Variable	Category	Maternal and Child Health Service Utilization				p value
		Low		High		
		n	%	n	%	
ANC literacy	Adequate	112	21.79	402	78.21	0.002
	Inadequate	29	38.67	46	61.33	
Immunization literacy	Good	65	21.17	242	78.83	0.122
	Poor	76	26.95	206	73.05	
Breastfeeding literacy	Good	43	18.14	194	81.86	0.009
	Poor	98	27.84	254	72.16	
Child growth monitoring literacy	Competent	28	16.57	141	83.43	0.011
	Not competent	113	26.90	307	73.10	
Posyandu literacy	Aware	116	22.31	404	77.69	0.017
	Unaware	25	36.23	44	63.77	
Health seeking behavior	Active	76	20.60	293	79.40	0.018
	Passive	65	29.55	155	70.45	

Table 5. Multicollinearity diagnostics among independent variables

No	Independent variable	Tolerance	VIF	Interpretation
1	ANC Literacy	0.984	1.016	No multicollinearity
2	Immunization Literacy	0.970	1.031	No multicollinearity
3	Breastfeeding Literacy	0.947	1.056	No multicollinearity
4	Child Growth Monitoring Literacy	0.971	1.030	No multicollinearity
5	Posyandu Literacy	0.986	1.014	No multicollinearity
6	Health Seeking Behavior	0.981	1.019	No multicollinearity

Multivariate Analysis

After controlling for the other variables in the model, multivariable logistic regression analysis revealed a statistically significant relationship between maternal and child health service utilization and ANC literacy, immunization literacy, breastfeeding literacy, child growth monitoring literacy, Posyandu literacy, and health-seeking behavior. Among the literacy domains included in the fitted model, Posyandu literacy had the largest estimated regression coefficient (B=0.76; p=0.008). Mothers classified as aware of Posyandu had higher odds of maternal and child health service utilization than mothers with poor Posyandu literacy (OR=2.14; 95% CI=1.23-3.75). ANC literacy was also statistically significantly associated with service utilization (B=0.72; p=0.008), with mothers with adequate ANC

literacy having higher odds of service utilization (OR=2.05; 95% CI=1.21-3.48). Mothers with good breastfeeding literacy had higher odds of service utilization than those with poor breastfeeding literacy (B=0.58; p=0.007; OR=1.79; 95% CI=1.17-2.74). Child growth monitoring literacy was also statistically significantly associated with service utilization (B=0.51; p=0.036), with competent mothers having higher odds of service utilization (OR=1.66; 95% CI=1.03-2.67). Health-seeking behavior was statistically significantly associated with service utilization (B=0.49; p=0.017), with mothers reporting active health-seeking behavior having higher odds of service utilization than those reporting passive behavior (OR=1.62; 95% CI=1.09-2.42). Immunization literacy was also statistically significantly associated with service utilization (B=0.42; p=0.037), with mothers with good immunization literacy having higher odds of service utilization than those with poor immunization literacy (OR=1.53; 95% CI=1.03-2.27). The results of the multivariable logistic regression analysis are presented in **Table 6**.

14 **Table 6. Multivariable Logistic Regression Analysis of Factors Associated with Maternal and Child Health Service Utilization**

Variable	B	SE	p	Exp(B)	95% CI	
					Lower	Upper
ANC literacy	0.72	0.27	0.008	2.05	1.21	3.48
Immunization literacy	0.42	0.20	0.037	1.53	1.03	2.27
Breastfeeding literacy	0.58	0.22	0.007	1.79	1.17	2.74
Child growth monitoring literacy	0.51	0.24	0.036	1.66	1.03	2.67
Posyandu literacy	0.76	0.29	0.008	2.14	1.23	3.75
Health seeking behavior	0.49	0.20	0.017	1.62	1.09	2.42

Generalized Structural Equation Model

15 5 39 66 30 7 28 The GSEM analysis was used to examine the hypothesized statistical associations among maternal health literacy, health-seeking behavior, and maternal and child health service utilization. A binomial family with a logit link was specified for the binary endogenous variables. The model showed positive associations between ANC literacy (coefficient=0.14, p=0.005), immunization literacy (coefficient=0.07, p=0.030), breastfeeding literacy (coefficient=0.10, p=0.005), child growth monitoring literacy (coefficient=0.08, p=0.038), Posyandu literacy (coefficient=0.15, p=0.005), and health-seeking behavior (coefficient=0.09, p=0.015) with maternal and child health service utilization. Child growth monitoring literacy was also positively associated with health-seeking behavior (coefficient=0.13, p=0.002). The coefficients were estimated on the logit scale and were not interpreted as standardized linear path coefficients. The detailed results of the GSEM analysis are presented in **Table 7**. The structural model was interpreted as representing hypothesized statistical associations rather than causal pathways. Therefore, the association between child growth monitoring literacy and health-seeking behavior was not interpreted as evidence of an indirect or mediation effect on maternal and child health service utilization. The hypothesized structural model and the observed statistical associations are illustrated in **Figure 2**.

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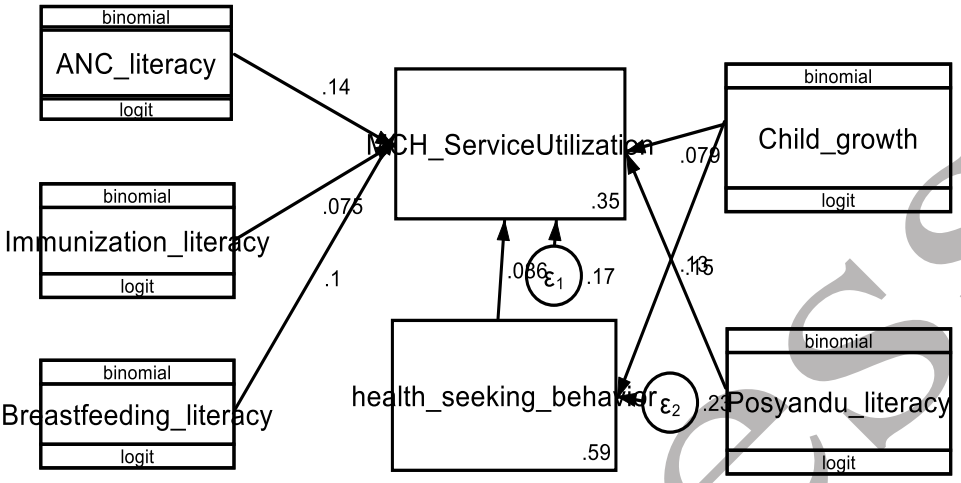


Figure 2. **Generalized structural equation model with hypothesized relationship (H1-H7) between exogenous variables and research endogenous variables**

Table 7. Generalized Structural Equation Model Estimates for the Hypothesized Associations

Hypothesized association			Coef.	SE	p value	95% CI	
						Lower	Upper
MCH Service Utilization	←	ANC literacy	0.14	0.05	0.005	0.04	0.25
	←	Immunization literacy	0.07	0.03	0.030	0.01	0.14
	←	Breastfeeding literacy	0.10	0.04	0.005	0.03	0.17
	←	Child growth monitoring literacy	0.08	0.04	0.038	0.00	0.15
	←	Posyandu literacy	0.15	0.05	0.005	0.04	0.25
	←	Health seeking behavior	0.09	0.04	0.015	0.02	0.16
Health seeking behavior	←	Child growth monitoring literacy	0.13	0.04	0.002	0.05	0.22

Discussion

The findings demonstrated a favorable correlation between ANC literacy and the use of mother and child health services. Compared to mothers with poor ANC literacy, mothers with appropriate ANC literacy had a greater percentage of high service consumption. If expectant mothers have a clear understanding of the goals to be achieved through prenatal care, the frequency of prenatal examinations at hospitals, the potential danger signals that may arise during pregnancy, and the tangible benefits these medical services can bring to themselves and their children, they will utilize relevant services more frequently. This finding is fully consistent with the health literacy paradigm, which emphasizes the ability to obtain, understand, and apply health information (17). Adequate knowledge of prenatal care may also be linked to increased use of suggested maternal health services, according to earlier research (18). Although the cross-sectional design precludes a causal interpretation,

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the observed connection in the current research indicates that ANC literacy is an essential area to take into account when analyzing mother and child health care consumption (19,20). The use of mother and child health services was significantly correlated with immunization literacy. Compared to mothers with low vaccine literacy, mothers with high immunization literacy had a greater percentage of high service usage; however, the link was not as strong as it was for a number of other literacy domains. Mothers who understand the benefits, recommended timing, and safety of immunization may be better positioned to recognize the importance of preventive health services (21). This interpretation is consistent with behavioral health theories in which knowledge is considered one of the factors that may shape health-related decisions and service use. Previous studies have reached consistent conclusions that a mother who completely understand about vaccination is less likely to believe misinformation related to vaccines and is willing to actively participate in any medical services that can prevent diseases in advance (22,23). In addition, mothers who themselves possess sufficient health knowledge are more receptive to other new health-related information (24). Nevertheless, the current cross-sectional data does not allow for the establishment of these processes.

The use of mother and child health services was positively correlated with breastfeeding literacy. Mothers with good breastfeeding literacy had a higher proportion of high service utilization than those with poor breastfeeding literacy (25). Knowledge regarding exclusive breastfeeding, appropriate breastfeeding techniques, and the management of breastfeeding difficulties may be relevant to mothers' recognition of the need for professional advice and maternal and child health services (26). Furthermore, in the process of interacting with medical staff about breastfeeding-related matters in daily life, in addition to resolving the immediate problem of feeding her child, the mother also gains the opportunity to learn more information related to maternal and child health (27).

Mothers who understand how to conduct growth monitoring for their children and are able to do this well use maternal and child health care services more frequently than others (28,29). They must first understand the indicators used to assess their children's growth status to detect potential health problems in their children in a timely manner, and thus truly place great importance on regularly conducting growth monitoring for their children (30). The aforementioned routine growth monitoring is crucial to detect problems that arise in children's development as early as possible (31,32). From the perspective of the Health Belief Model, recognition of potential health risks may be related to greater readiness to engage in preventive health actions. The present findings are consistent with this theoretical perspective because mothers with greater competence in child growth monitoring also demonstrated higher service utilization (33). However, the cross-sectional design does not establish whether greater literacy preceded service utilization or whether repeated contact with health services contributed to mothers' literacy.

The use of mother and child health services was substantially correlated with Posyandu literacy. Posyandu literacy had the highest estimated regression coefficient among the literacy domains included in the multivariable model. The size of this correlation, however,

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should not be taken as proof that Posyandu literacy was causally more significant than the other areas. The results may indicate a strong correlation between mothers' participation with community-based maternity and child health care and their comprehension of Posyandu activities, services offered, and service schedules (34). Growth monitoring, vaccination, dietary counseling, and health education are just a few of the maternal and child health services that Posyandu offers (35,36). Therefore, mothers' awareness and use of community-based services may depend on their familiarity with these tasks. The importance of community-based health services in promoting mother and child health care involvement has also been highlighted in earlier studies (37). Further research is needed to determine whether improving Posyandu literacy leads to increased service utilization or whether regular exposure to Posyandu services contributes to higher literacy.

During the period when mothers give birth to and raise their children, the medical expenses they spend on themselves and their children, as well as the maternal and child healthcare services they use, are closely correlated with whether they will proactively seek medical services. A mother who proactively visits a doctor and takes the initiative to obtain medical assistance will use a wider range of medical services than those mothers who wait for others to arrange care and do not proactively strive for medical resources (38). This observed pattern is consistent with Andersen's Behavioral Model (39), and the findings of other studies, which link proactive medical-seeking behavior to higher levels of engagement with medical services (40). The relationship between health-seeking behavior and treatment usage in the current research suggests that behavioral engagement is a crucial concept to take into account in addition to maternal health literacy. However, because both of these variables include using health information and services, it is also important to recognize their conceptual closeness. Therefore, it is not appropriate to take the observed connection as proof that health-seeking conduct on its own leads to higher service consumption.

This study conducted an analysis using a structural model and reached a clear conclusion: there is a significant correlation between children's growth monitoring literacy and their mothers' health-seeking behaviors. Simply put, these two factors consistently change in tandem in statistical data, with a very pronounced degree of correlation. This conclusion is fully consistent with the findings of previous research, which noted that mothers obtain information about their children's growth and development from medical staff, and this information influences their subsequent health-seeking behaviors (41). However, the results do not establish temporal ordering or show mediation since the current research utilized a cross-sectional design and the variables were evaluated simultaneously. As a result, rather than being proof of an indirect causal impact, the route should be seen as a hypothetical statistical connection.

Study Limitations and Strengths: This study has several core advantages that can support the credibility of the research. First, it incorporates all five domains of maternal health literacy — ANC, immunization, breastfeeding, child growth monitoring, Posyandu — into a single analytical framework. It can also disassemble the independent association between each domain and service utilization rate one by one, preventing the impacts of different

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domains from being mixed and indistinguishable. Second, it analyzes health service-seeking behavior as a variable in the model as well, without calculating it separately. This variable can be evaluated alongside the aforementioned five health literacy domains to assess their respective impacts, avoiding treating this variable as an isolated predictive factor to be handled separately. Third, the study collected a sample of 589 mothers. This sample size is sufficiently large to support multivariate analysis and yield rigorous and reliable research conclusions. When evaluating the results, a number of restrictions should be taken into account. First, temporal or causal links cannot be established due to the cross-sectional design. Therefore, it is impossible to ascertain whether frequent exposure to health services led to better literacy or if higher maternal health literacy preceded increased service consumption. Second, recollection and reporting bias may have affected the study's use of self-reported questionnaire data. Third, the five maternal health literacy domains represent related aspects of an overarching maternal health literacy construct and may therefore be correlated with one another. Fourth, health-seeking behavior and maternal and child health service utilization are conceptually related constructs because both involve engagement with health information and healthcare services. This potential conceptual overlap may contribute to the observed associations. Fifth, although the multivariable analysis adjusted for the variables included in the prespecified analytical model, residual confounding from unmeasured socioeconomic, demographic, health-system, and healthcare accessibility factors cannot be excluded.

Implications for Maternal and Child Health Promotion

The findings might have practical implications on maternal and child health promotion in community-based healthcare settings. The associations found suggest that maternal health education could benefit from focusing on certain areas of health literacy, such as understanding antenatal care, immunization, breastfeeding, child growth monitoring literacy, and Posyandu services. In particular, these domains may be considered by community-based health workers when providing health information and counseling to mothers. However, the implications are to be taken with caution as the current study does not evaluate the efficacy of any educational or behavioral intervention. Thus the findings provide considerations for health promotion practice rather than evidence that a particular intervention will improve maternal and child health service utilization.

Future Research Directions

Future studies should employ prospective or longitudinal approach to explain the temporal relationships between maternal health literacy, health-seeking behavior and mother and child health care consumption. There is a need for intervention and implementation studies to determine whether increases in particular maternal health literacy domains are followed by measurable changes in service utilization. Future research should also use clearly differentiated and validated measures of health seeking behavior and service utilization to reduce potential conceptual overlap of these constructs. In addition, other analytical models should incorporate a wider range of potential confounding factors, such as socioeconomic characteristics, health facility accessibility, prior healthcare experiences, and health-system

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factors. Studies of this nature would provide more evidence for the mechanisms behind the associations found in the present study.

Conclusion

Among Indonesian mothers of children aged 0–59 months, this research discovered statistically significant correlations between a number of maternal health literacy categories, health-seeking behavior, and maternal and child health care consumption. The multivariable analysis revealed a statistical relationship between mother and child health care use and ANC literacy, vaccination literacy, breastfeeding literacy, child growth monitoring literacy, Posyandu literacy, and health-seeking behavior. Posyandu literacy had the highest estimated regression coefficient among the literacy domains studied. In the proposed structural model, child growth monitoring literacy was also statistically associated with health-seeking behavior. However, these results should be taken as statistical connections, not causal correlations or proof of mediation because of the cross-sectional methodology. Although the results do not prove the efficacy of particular treatments, they may provide helpful considerations for mother and child health education and health promotion in community-based healthcare settings. To understand the temporal relationship between the variables, further longitudinal and intervention research are required.

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Consent for Publication: Not applicable.

Ethics Approval and Consent to Participate: This study was approved by the Research Ethics Committee of Bhakti Wiyata Institute of Health Sciences, Kediri (Approval Number: 29/FTMK/EP/I/2026). The study was conducted in accordance with the ethical principles of the Declaration of Helsinki, including respect for participants, protection of their rights and welfare, respect for privacy and confidentiality, and the requirement for voluntary informed consent.

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