



Maternal Education and Responsive Feeding: Associations with Knowledge, Attitudes, and Skills among Mothers of Children Aged 6–24 Months

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Abstract

Responsive feeding involves caregivers recognizing and responding appropriately to children's hunger and satiety cues. Maternal education may influence health literacy; however, its association with responsive feeding-related outcomes remains unclear. To analyze the association between maternal educational level and mothers' knowledge, attitudes, and skills regarding responsive feeding among mothers of children aged 6–24 months in West Lombok Regency, Indonesia. This observational analytic study employed a cross-sectional design involving 60 mothers selected through purposive sampling. Data were collected following an educational session using a booklet and Daily Eating Guide Card covering responsive feeding principles, hunger and satiety cues, supportive mealtime environments, and feeding difficulties. Participants completed the card for seven days, followed by a posttest. Maternal educational level was the independent variable, while knowledge, attitudes, and skills were the dependent variables. Data were analyzed using descriptive statistics and Spearman's rank correlation test, with a significance level of 0.05. Most respondents had elementary or junior high school education (83.3%). Good knowledge and positive attitudes regarding responsive feeding were demonstrated by 61.7% and 81.7% of respondents, respectively. Regarding skills, 48.3% demonstrated good skills, 36.7% fair skills, and 15.0% poor skills. No significant associations were found between maternal educational level and knowledge ($r = 0.050$, $p = 0.703$), attitudes ($r = -0.212$, $p = 0.104$), or skills ($r = -0.106$, $p = 0.420$). Maternal educational level was not significantly associated with knowledge, attitudes, or skills regarding responsive feeding. These findings suggest that other factors may contribute to responsive feeding outcomes. Continuous education using accessible, practical, and context-appropriate educational media may help strengthen responsive feeding practices among mothers.

Keywords: Maternal Educational Level; Knowledge; Attitudes; Skills; Responsive Feeding

INTRODUCTION

The period from 6 to 24 months is a critical stage for child growth, development, and the establishment of eating behaviors. At around 6 months of age, complementary feeding begins because breast milk alone is no longer sufficient to meet the increasing nutritional requirements of infants. During this period, the World Health Organization (WHO) recommends responsive feeding as an important component of

appropriate complementary feeding. Responsive feeding emphasizes recognizing children's hunger and satiety cues and responding to these cues in a sensitive and developmentally appropriate manner (WHO, 2023).

Responsive feeding involves reciprocal interactions between caregivers and children during feeding. Caregivers are encouraged to feed children slowly and patiently, encourage them to eat without force, respond appropriately to signs of hunger and

satiety, and use mealtimes as opportunities for communication and learning ((WHO, 2023; Killion et al., 2024). The implementation of responsive feeding may also be shaped by various contextual factors, including caregiver beliefs, previous experience, the mealtime environment, and the broader social context (Eidhin et al., 2025). Thus, responsive feeding is a multidimensional behavior that cannot necessarily be explained by a single maternal characteristic.

Maternal educational attainment has traditionally been considered an important social determinant that may influence health literacy, access to health information, and child-feeding behavior. However, the relationship between formal education and feeding-related outcomes is not necessarily consistent across populations. A recent scoping review reported substantial variation in mothers' knowledge, attitudes, and practices related to complementary feeding across different settings, suggesting that formal educational attainment represents only one component of a broader behavioral and social context (Dwijayanti et al., 2024). In Indonesia, previous studies have also reported improvements in maternal knowledge, attitudes, self-efficacy, and feeding practices following structured nutrition education and practical demonstrations (Manuputty & Sumarmi, 2024; Rachmah et al., 2023; Mardani et al., 2024). These findings highlight the potential importance of exposure to health information and educational support in shaping maternal feeding-related outcomes.

Nevertheless, previous evidence does not establish that maternal educational attainment alone determines responsive feeding-related outcomes. Studies evaluating nutrition education have primarily examined the effectiveness of educational interventions or complementary feeding practices, rather than specifically examining whether maternal educational level remains associated with knowledge, attitudes, and skills after mothers have received responsive feeding

education. Consequently, differences in formal educational attainment may not fully explain variation in responsive feeding-related outcomes among mothers who have received similar educational exposure.

The research gap addressed in this study is the limited evidence regarding the association between maternal educational attainment and responsive feeding-related knowledge, attitudes, and skills among mothers who have received responsive feeding education, particularly in community health settings in West Lombok Regency, Indonesia. Unlike studies that primarily assess the effectiveness of educational interventions, the present study focuses on maternal educational level as an individual characteristic and examines its association with three separately measured outcomes: knowledge, attitudes, and responsive feeding skills, based on post-education assessment.

The conceptual basis of this study is that maternal educational attainment may be related to mothers' ability to access, understand, and use health information, which may be reflected in their knowledge, attitudes, and skills regarding responsive feeding. However, health literacy, access to information, parenting experience, family support, and other potential explanatory factors were not directly measured in the present study. Therefore, these factors are considered theoretical pathways or contextual factors rather than variables tested in the statistical analysis. In addition, because the present study uses a cross-sectional design and analyzes post-education assessment data, the observed associations should not be interpreted as causal relationships.

This study aimed to analyze the association between maternal educational level and mothers' knowledge, attitudes, and skills regarding responsive feeding among mothers of children aged 6-24 months in West Lombok Regency, Indonesia.

The conceptual framework was developed based on the theoretical assumption that maternal

educational attainment may be associated with mothers' ability to access and understand health information, which may subsequently be reflected in their knowledge, attitudes, and responsive feeding skills. However, the present study specifically measured maternal educational level, knowledge, attitudes, and skills. Health literacy, access to information, parenting experience, family support, and other potential pathways were not measured.

Theoretical pathway	Status in the present study
Maternal educational level → health literacy / access to information → knowledge → attitudes → responsive feeding skills/practices	Maternal educational level → knowledge, attitudes, and skills were measured. Health literacy, information access, parenting experience, family support, and other potential mediating or contextual factors.

Figure 1. Conceptual framework of the study. The theoretical pathway illustrates potential relationships proposed based on previous literature. The statistical analysis in the present cross-sectional study was limited to the association between maternal educational level and each of the three measured outcomes-knowledge, attitudes, and responsive feeding skills-and does not establish causal or mediating relationships.

METHOD

This study used an observational analytic cross-sectional design. The analysis examined the association between maternal educational level and mothers' knowledge, attitudes, and responsive feeding skills based on post-education assessment data. The study did not aim to evaluate the effectiveness of the responsive feeding education program or to assess changes attributable to the education.

The study was conducted among mothers of children aged 6-24 months in West Lombok Regency, Indonesia, in 2026. Data collection was conducted

within the service area of Lingsar Health Center in June 2026.

The study population consisted of mothers with children aged 6-24 months who participated in a responsive feeding education program. A total of 60 respondents who met the predetermined eligibility criteria and had complete data were included in the study. Participants were selected using purposive sampling based on the inclusion and exclusion criteria.

The inclusion criteria were: (1) mothers who had children aged 6-24 months with stunting; (2) mothers who were able to read and write; (3) mothers who were the primary caregivers of the child; and (4) mothers who were willing to participate as respondents until the completion of the research process. The exclusion criteria were: (1) mothers who withdrew from the study; and (2) mothers who moved outside the research area during the study period.

Before the assessment, all participants received the same responsive feeding education session. The education was delivered directly by the researchers using a booklet and a *Daily Eating Guide Card*.

Before the educational session, participants completed a pretest questionnaire to assess their baseline knowledge. The researchers then delivered a responsive feeding education session using a booklet and *Daily Eating Guide Card*. The educational materials covered the concept of responsive feeding, recognition of children's hunger and satiety cues, creation of a pleasant and supportive mealtime environment, and strategies for addressing common feeding difficulties in young children.

Following the education session, participants were instructed to use and complete the *Daily Eating Guide Card* for seven days to guide and record their daily responsive feeding practices. The posttest was administered seven days after the education session, after participants had completed the *Daily Eating Guide Card*. The posttest used the same assessment

instrument to assess mothers' knowledge, attitudes, and responsive feeding skills following the educational program.

The education session and assessment procedures were conducted by the researchers. The total duration of the education and initial assessment process was approximately 1.5 hours, excluding the seven-day period during which participants completed the *Daily Eating Guide Card*.

The independent variable was maternal educational level, categorized as low (elementary and junior high school) and high (senior high school and university). The dependent variables were mothers' knowledge, attitudes, and responsive feeding skills.

Knowledge and responsive feeding skills were categorized as good, fair, and poor, while attitudes were categorized as positive or negative according to the respective total questionnaire scores. Data were collected using a structured questionnaire developed based on the responsive feeding educational materials.

Responsive feeding skills were assessed using questionnaire-based responses rather than direct observation of caregiver-child feeding interactions. Therefore, the skill measure represents assessed or reported responsive feeding skills and may not fully reflect actual feeding behavior in the home environment. The absence of direct behavioral observation is acknowledged as a limitation of the study.

Prior to data collection, the researchers obtained ethical approval from the Health Research Ethics Committee of Poltekkes Kemenkes Mataram (Komisi Etik Penelitian Kesehatan Politeknik Kesehatan Mataram). The researchers also obtained the necessary research permits from the relevant authorities and the study site. Before participation, each eligible respondent was provided with an explanation of the study objectives, procedures, potential benefits, and their rights as research participants. Written informed

consent was obtained from all respondents prior to data collection. Participation was voluntary, and respondents were informed that they could withdraw from the study at any time without any consequences.

Data were analyzed using IBM SPSS Statistics version 26. Descriptive analysis was used to summarize maternal educational level and the distributions of knowledge, attitudes, and responsive feeding skills using frequencies and percentages.

Spearman's rank correlation test was used to assess the association between maternal educational level and each of the three responsive feeding-related outcomes: knowledge, attitudes, and skills. Statistical significance was set at $p < 0.05$ with a 95% confidence level.

The p-value for the association between maternal educational level and knowledge should be reported consistently across the Abstract, Table 5, Results, and Discussion. The final value should be based on the original SPSS output.

RESULT AND DISCUSSION

Respondent Characteristics

A total of 60 mothers of children aged 6-24 months who met the predetermined inclusion and exclusion criteria were included in the analysis. Most respondents had low educational attainment, consisting of elementary and junior high school education (50; 83.3%), while 10 respondents (16.7%) had completed senior high school or university education.

Table 1. Distribution of Respondents by Maternal Educational Level

Characteristics	n	%
Low education (elementary and junior high school)	50	83,3
High education (senior high school and university)	10	16,7
Total	60	100,0

The distribution shows that the study population was predominantly composed of mothers with low formal educational attainment. Maternal educational level was categorized as low for elementary and junior high school education and high for senior high school and university education.

If additional demographic variables such as maternal age, child age, parity, occupation, household income, marital status, previous nutrition education, access to health information, number of children, or previous parenting experience were collected, they may be presented as descriptive characteristics in a separate table. These variables were not included in the present association analysis and therefore were not treated as confounding variables.

Knowledge Regarding Responsive Feeding

Table 2. Distribution of Mothers' Knowledge Regarding Responsive Feeding

Knowledge Category	n	%
Good	37	61,67
Fair	19	31,67
Poor	4	6,66
Total	60	100,0

Most mothers demonstrated good knowledge regarding responsive feeding, with 37 respondents (61.67%) classified as having good knowledge. 19 respondents (31.67%) had fair knowledge, while 4 respondents (6.66%) had poor knowledge.

The relatively high proportion of mothers with good knowledge indicates that adequate knowledge of responsive feeding was common in the assessed sample. However, because the present analysis was based on a post-education assessment and did not compare baseline measurements or a non-educated comparison group, the observed distribution should not be interpreted as evidence that the education program caused an improvement in knowledge.

Previous literature has reported variation in maternal knowledge regarding complementary feeding

and has highlighted the potential contribution of information exposure and other contextual factors (Dwijayanti et al., 2024). In the present study, however, sources of information and previous exposure to nutrition education were not analyzed. Therefore, the observed knowledge distribution cannot be attributed to a particular source of information.

Attitudes Toward Responsive Feeding

Table 3. Distribution of Mothers' Attitudes Toward Responsive Feeding

Attitude Category	n	%
Positive	49	81,67
Negative	11	18,33
Total	60	100,0

Most respondents had positive attitudes toward responsive feeding. A total of 49 mothers (81.67%) were classified as having positive attitudes, whereas 11 mothers (18.33%) had negative attitudes.

The predominance of positive attitudes indicates that favorable attitudes toward responsive feeding were common in the assessed population. Nevertheless, this finding should be interpreted descriptively. Because no baseline attitude measurement or comparison group was included in the present analysis, it cannot be determined whether the educational session contributed to the observed attitude distribution.

Previous studies have reported changes in maternal attitudes and feeding-related outcomes following nutrition education and other educational approaches (Nafista et al., 2023; Rachmah et al., 2023). However, differences in study design, population, intervention, and outcome measurement mean that these findings cannot be directly interpreted as evidence of an educational effect in the present study.

Responsive Feeding Skills

Table 4. Distribution of Mothers' Responsive Feeding Skills

Skill Category	n	%
Good	29	48,33
Fair	22	36,67
Poor	9	15,00
Total	60	100,0

The largest proportion of respondents had good responsive feeding skills (29; 48.33%), followed by fair skills (22; 36.67%) and poor skills (9; 15.00%).

These findings indicate that almost half of the mothers had good assessed responsive feeding skills, although a substantial proportion remained in the fair or poor categories. Responsive feeding involves interactive and behavioral processes between caregivers and children, including appropriate responses to hunger and satiety cues and the creation of a supportive mealtime environment (Killion et al., 2024).

In the present study, responsive feeding skills were assessed using a structured questionnaire rather than direct observation of mother-child feeding interactions. Therefore, the results represent questionnaire-assessed or self-reported skills and may not fully reflect actual feeding behavior in daily life. Previous literature suggests that responsive feeding behavior may be influenced by caregiver characteristics, child factors, and the mealtime environment (Redsell et al., 2021; Killion et al., 2024). These factors were not directly assessed in the present study.

Table 5. Association Between Maternal Educational Level and Knowledge Regarding Responsive Feeding

Variables	Spearman rho	p-value
Education – Knowledge	0,050	0,703

Spearman's rank correlation analysis showed a very weak positive correlation between maternal educational level and responsive feeding knowledge (Spearman's $\rho = 0.050$). The association was not statistically significant based on the p-value obtained from the original statistical analysis ($p = 0,703$; $\alpha = 0.05$).

This finding indicates that, within the present sample, maternal educational level was not significantly associated with mothers' assessed knowledge regarding responsive feeding. The very small correlation coefficient also indicates that the observed relationship between the two variables was weak.

The absence of a statistically significant association does not indicate that educational attainment is unrelated to knowledge in all populations. Maternal knowledge may be influenced by multiple factors, including access to health information, previous educational exposure, caregiving experience, and the availability of health services. Previous studies have similarly emphasized the importance of information and educational support in maternal nutrition-related knowledge (Dwijayanti et al., 2024; Mardani et al., 2024; Rachmah et al., 2023). Because these factors were not measured or included in the present analysis, their contribution to the observed finding cannot be determined.

Table 6. Association Between Maternal Educational Level and Attitudes Toward Responsive Feeding

Variables	Spearman rho	p-value
Education – Attitude	-0,212	0,104

There was a weak negative correlation between maternal educational level and attitudes toward responsive feeding (Spearman's $\rho = -0.212$), but the association was not statistically significant ($p = 0.104$). Thus, the present study did not provide sufficient statistical evidence of an association between maternal

educational level and attitudes toward responsive feeding among the participating mothers.

This finding is consistent with the possibility that maternal attitudes toward child feeding are influenced by multiple factors beyond formal educational attainment. Previous studies have reported that maternal attitudes and feeding-related practices may be influenced by exposure to health education, nutrition information, caregiving experience, and the social and family environment (Nafista et al., 2023; Manuputty & Sumarmi, 2024). In particular, Manuputty & Sumarmi (2024) reported changes in maternal attitudes following nutrition education, indicating that exposure to relevant information and educational support may contribute to maternal attitudes toward child-feeding practices. Similarly, Nafista et al. (2023) found improvements in maternal attitudes following an educational intervention related to child feeding.

The findings of the present study should nevertheless be interpreted differently from intervention studies because the present analysis focused on the association between formal educational attainment and attitudes rather than on the effectiveness of an educational intervention. The absence of a statistically significant association may indicate that differences in formal educational attainment alone do not adequately explain variation in mothers' attitudes toward responsive feeding within this sample. Other factors, such as previous exposure to nutrition information, caregiving experience, family environment, and access to health information, may also be relevant. However, these factors were not measured or analyzed in the present study and therefore cannot be established as explanations for the observed finding.

The relatively high proportion of mothers with positive attitudes in the present sample (49; 81.67%) may also indicate that favorable attitudes toward

responsive feeding were common across respondents. However, because sources and frequency of previous health information were not assessed, it cannot be determined whether exposure to Posyandu activities, health education, digital media, or other information sources contributed to this pattern.

These findings suggest that maternal educational attainment should not be considered the sole basis for understanding mothers' attitudes toward responsive feeding. Health education delivered through accessible communication, practical examples, and context-appropriate materials may remain relevant for mothers across different educational backgrounds. Further studies should examine additional factors, including previous nutrition education, access to health information, caregiving experience, and family support, to better understand variations in maternal attitudes toward responsive feeding.

Table 7. Association Between Maternal Educational Level and Responsive Feeding Skills

Variables	Spearman rho	p-value
Education – Skills	-0,106	0,420

Maternal educational level showed a very weak negative correlation with questionnaire-assessed responsive feeding skills (Spearman's $\rho = -0.106$). The association was not statistically significant ($p = 0.420$). Therefore, the present study did not demonstrate a statistically significant association between maternal educational level and responsive feeding skills in the assessed sample.

The finding suggests that differences in formal educational attainment were not accompanied by a statistically significant difference in questionnaire-assessed responsive feeding skills. Responsive feeding skills involve practical application and interaction during mealtimes and may therefore be influenced by factors beyond formal education, including caregiving experience, exposure to practical guidance, and the

characteristics of the child and feeding environment (Killion et al., 2024).

Practical education and demonstrations may support the acquisition of feeding-related skills; however, the present study did not examine the independent effects of these approaches. In addition, because skills were assessed using a questionnaire rather than direct observation, the findings should be interpreted as assessed or reported skills rather than objectively observed feeding performance.

The principal finding of this study was that maternal educational level was not significantly associated with knowledge, attitudes, or questionnaire-assessed responsive feeding skills among the 60 participating mothers. The correlations were very weak for knowledge ($\rho = 0.050$) and skills ($\rho = -0.106$), while the correlation with attitudes was weak ($\rho = -0.212$). None of the observed associations reached the predefined significance level of $\alpha = 0.05$.

These findings provide context-specific evidence from West Lombok Regency regarding the relationship between formal maternal educational attainment and responsive feeding-related outcomes following exposure to responsive feeding education. The findings also indicate that formal educational attainment alone may not adequately describe differences in mothers' knowledge, attitudes, or assessed skills regarding responsive feeding.

From a maternal and child health program perspective, responsive feeding information may need to be communicated in ways that are accessible to mothers with different educational backgrounds. At the service-delivery level, health education may be supported by clear explanations, practical examples, visual materials, counseling, and demonstrations. These implications are based on the observed distribution of outcomes and the broader literature; they should not be interpreted as evidence that the

educational program caused improvement in the present sample.

Several limitations should be considered when interpreting the findings. First, the present analysis used a cross-sectional approach based on a post-education assessment; therefore, it cannot establish whether the education program caused changes in knowledge, attitudes, or responsive feeding skills. Second, the analysis examined maternal educational level as the primary independent variable and did not assess other potentially relevant factors, such as maternal age, parity, household income, previous nutrition education, access to health information, parenting experience, or family support. Consequently, the contribution of these factors to the observed outcomes could not be determined.

Third, responsive feeding skills were assessed using a questionnaire rather than direct observation of mother-child feeding interactions. The results may therefore reflect perceived or reported skills and may not fully represent actual feeding practices. Fourth, purposive sampling and the relatively small sample size, particularly the imbalance between the low- and high-education groups (50 versus 10 mothers), may limit the generalizability of the findings and the ability to detect small associations.

Finally, the study was conducted within a specific community health service area in West Lombok Regency. Therefore, the findings should be interpreted within the characteristics of the study population and setting and should not be generalized to all mothers of children aged 6-24 months without consideration of differences in population and context.

CONCLUSION

Most respondents had low maternal educational attainment. Good knowledge, positive attitudes, and good questionnaire-assessed responsive feeding skills were common among the participating mothers.

However, maternal educational level was not significantly associated with knowledge, attitudes, or responsive feeding skills among mothers of children aged 6-24 months in West Lombok Regency.

These findings indicate that formal maternal educational attainment alone did not show a statistically significant relationship with the three responsive feeding outcomes assessed in this study. The findings should be interpreted within the context of the study population and cross-sectional design and should not be interpreted as evidence that maternal educational attainment has no relevance to responsive feeding outcomes in other populations.

Further research should involve larger and more diverse samples and examine additional factors that may be relevant to responsive feeding outcomes, including access to health information, previous nutrition education, caregiving experience, family support, and other contextual characteristics. Studies specifically evaluating the effectiveness of responsive feeding education should use an appropriate pretest–posttest design with a comparison group. In addition, direct observation or validated behavioral assessment tools are recommended to obtain a more objective assessment of responsive feeding skills.

Responsive feeding education delivered through Puskesmas and Posyandu may be provided to mothers across different educational backgrounds. Educational materials should use clear and accessible language and may be supported by practical examples, visual materials, counseling, and demonstrations to facilitate understanding and application of responsive feeding principles.

The findings also suggest that formal educational attainment alone should not be used as the sole basis for identifying mothers who may require additional responsive feeding support. Health workers may consider individual information needs and other relevant contextual factors when providing counseling

and education. Future program evaluations should consider assessing previous exposure to nutrition education, access to health information, caregiving experience, and family support to better identify factors associated with maternal responsive feeding outcomes.

DECLARATION

Author Contributions:

RRDF contributed to the conceptualization, methodology, data collection, formal analysis, interpretation of the findings, and preparation of the original manuscript. MUN, SA, and N contributed to the methodology, interpretation of the findings, and critical revision of the manuscript for important intellectual content. All authors reviewed and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

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Ethical Considerations:

Ethical approval was obtained from the Health Research Ethics Committee of the Mataram Health Polytechnic, Ministry of Health, Indonesia, under reference number DP.04.03/F.XLVIII.14/570/2024, dated November 12, 2024. The study was approved in accordance with the ethical principles outlined in the Nuremberg Code and the Declaration of Helsinki. Participants were informed about the study objectives and procedures, the voluntary nature of participation, confidentiality protections, and their right to withdraw from the study at any time. Informed consent was obtained from all participants before data collection, including questionnaire completion and interviews.

Competing Interests:

The authors declare that they have no competing interests.

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Availability of Data and Materials:

The datasets generated and analyzed during the current study are not publicly available because they contain potentially identifiable participant information. De-identified data may be made available by the corresponding author upon reasonable request and subject to ethical and institutional approval.

Consent for Publication:

The participants provided informed consent for the use of de-identified interview quotations in scientific publications. No directly identifiable personal information is presented in this manuscript.

Clinical Trial Number:

Not applicable. This study used an observational analytic cross-sectional design and did not involve a clinical intervention.

Generative AI:

During the preparation and revision of this manuscript, the authors used AI-assisted technology solely for language editing, including improving grammar, spelling, sentence structure, and English-language clarity. The authors critically reviewed and verified all AI-assisted revisions and take full responsibility for the accuracy, integrity, and originality of the manuscript. AI-assisted technology was not used for participant recruitment, data collection, statistical analysis, qualitative coding, interpretation of the findings, or scientific decision-making.

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