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Factors Associated with Maternal Behavior in Complementary Feeding Practices among Mothers of Children aged 6–24 months

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ABSTRACT

This issue is important to address because appropriate complementary feeding (MP-ASI) plays a crucial role in supporting child growth and development as well as preventing stunting. Maternal behavior in complementary feeding practices significantly determines the quality of nutritional intake during the child's critical growth period. However, complementary feeding practices are still influenced by various factors, including cognitive and sociodemographic aspects. Therefore, it is important to examine whether these factors are associated with maternal behavior within the context of primary health care services. This study aimed to analyze the relationship between maternal characteristics–namely knowledge, attitude, age, education, and occupation–and complementary feeding practices among children aged 6–24 monthsin the working area of Gambirsari Public Health Center, Surakarta. This study used a quantitative approach with a cross-sectional design. The study subjects consisted of mothers with children aged 6–24 months. The sample was selected using a purposive sampling technique. The variables examined included independent variables (maternal knowledge, attitude, age, education, and occupation) and the dependent variable (complementary feeding behavior). Data were collected using a structured questionnaire covering respondent characteristics, knowledge, attitudes, and feeding practices. Data analysis was performed using the Fisher's Exact test with a 95% significance level (α = 0.05). A total of 34 mothers participated in the study. Most respondents demonstrated good complementary feeding behavior (94.1%), while all respondents had good knowledge (100%). No statistically significant association was observed between maternal attitude (p=0.595), age (p=0.437), education (p=0.795), occupation (p=0.792), and complementary feeding behavior. Knowledge could not be analyzed because all respondents were classified in the same category. Based on the findings of this study, continuous efforts are recommended to improve the quality of education and support provided to mothers regarding complementary feeding practices. Such efforts should not only focus on enhancing maternal knowledge but also take into account other factors beyond individual characteristics that may influence feeding behaviors. Furthermore, future studies are encouraged to explore additional factors that were not examined in the present study, such as family support, cultural influences, and access to health information.

INTRODUCTION

According to the World Health Organization (WHO) (2024) complementary feeding (MP-ASI) is a critical component of infant and young child nutrition because it provides the nutrients required to support optimal growth and development after six months of age while breastfeeding continues. Appropriate complementary feeding practices are essential to ensure adequate dietary intake during a child's critical growth period and to prevent malnutrition and stunting.

Despite global progress in child nutrition, inappropriate infant and young child feeding practices remain a major public health challenge. Approximately 148 million children under five years of age were affected by stunting globally in 2022, with inadequate feeding practices recognized as one of the contributing factors (WHO, 2023). The United Nations Children's Fund (UNICEF) (2024) also reported that many children aged 6–23 months do not meet the minimum standards for dietary diversity and meal frequency, increasing the risk of undernutrition and impaired development.

In Indonesia, stunting remains a priority public health concern. Data from the Indonesian Health Survey (SKI) 2023 indicate that improving infant and young child feeding practices, including appropriate complementary feeding, remains essential for supporting child growth and preventing

malnutrition (Kementerian Kesehatan Republik Indonesia (Kemenkes RI), 2024). At the local level, complementary feeding practices continue to be an important concern within primary health care services, including the working area of Gambirsari Community Health Center, Surakarta, where community-based nutrition programs play a role in promoting appropriate feeding practices and preventing stunting.

Failure to address inappropriate complementary feeding practices may have broad implications for child health, including an increased risk of stunting, impaired growth and development, and a decline in the quality of human resources in the future. According to Green and Kreuter's PRECEDE-PROCEED model, health-related behaviors are influenced by predisposing, enabling, and reinforcing factors. Predisposing factors include individual characteristics that motivate behavior, such as knowledge, attitudes, beliefs, age, and educational background. In the context of complementary feeding, maternal knowledge and attitudes may influence mothers' decisions regarding the timing, frequency, and appropriateness of complementary feeding practices.

Enabling factors refer to conditions that facilitate or hinder the adoption of health behaviors, including access to health services, nutrition information, food availability, and economic resources. Reinforcing factors include social influences that support or maintain behavior, such as family support, community norms, health workers, and peer encouragement. In the present study, the variables assessed were limited to maternal knowledge, attitudes, age, education, and occupation, which primarily represent predisposing factors. Enabling and reinforcing factors were not measured and therefore could not be evaluated in relation to complementary feeding behavior.

Several factors have been reported to influence maternal complementary feeding practices, including cognitive, sociodemographic, and sociocultural factors. Complementary feeding behavior is a complex phenomenon shaped by the interaction of individual and environmental influences.

Maternal Knowledge and Attitudes toward Complementary Feeding

Knowledge and attitudes are recognized as important predisposing factors influencing health behavior. Adequate maternal knowledge regarding the timing, frequency, nutritional adequacy, and safety of complementary feeding is associated with more appropriate feeding practices and improved child outcomes (Herlina et al., 2021; Mauliza et al., 2021). Likewise, positive maternal attitudes may facilitate the adoption of recommended feeding practices and nutrition education (Prajayanti, 2022; Puspitasari et al., 2023). However, knowledge and attitudes alone may not always translate into appropriate behavior because other contextual factors may also play a role.

Sociodemographic Characteristics

Maternal age, education, and occupation have frequently been associated with complementary feeding practices. Higher education may improve mothers' ability to access and apply health information, while age and employment status may influence caregiving experience, decision-making, and available resources. Several studies have reported significant associations between these characteristics and complementary feeding behavior (Celebier, et al., 2025). Nevertheless, findings remain inconsistent across different populations and settings.

Sociocultural and Environmental Factors

Complementary feeding behavior is also influenced by sociocultural and environmental factors, including cultural beliefs, family traditions, social norms, and family support. These factors may affect maternal decisions regarding the timing and type of complementary foods introduced to children (Fransiska & Sugiatini, 2023). In addition, family support, health education, and access to nutrition information have been identified as important enabling and reinforcing factors that facilitate appropriate complementary feeding (Lowery Caitlin, et al., 2022).

Despite growing evidence, findings regarding factors associated with complementary feeding behavior remain inconsistent. Most studies have focused on identifying significant associations between maternal characteristics and feeding practices, whereas limited evidence is available from primary health care settings. Therefore, a research gap remains regarding the extent to which maternal characteristics are associated with complementary feeding behavior in community health center contexts, where local social, cultural, and health service factors may influence maternal practices.

At the local level, complementary feeding practices remain an important concern within primary health care services, including the working area of Gambirsari Community Health Center, Surakarta. During the study period, community-based health services in Surakarta were strengthened through the implementation of Integrated Primary Care (Integrasi Layanan Primer/ILP), which expanded the role of Posyandu as a comprehensive community health service (Radio Republik Indonesia (RRI), 2025). In the working area of Gambirsari Community Health Center, routine Posyandu activities continued to be conducted regularly, and one of the Posyandu under its supervision was designated as a pilot site for the ILP program beginning in January 2025 (Radar Solo, 2025). Furthermore, Gambirsari Community Health Center provides nutrition services, maternal and child health services (KIA-KB), and child growth and development monitoring (DDTK), which support efforts to improve child nutrition and health outcomes (Gambirsari Community Health Center, 2025). These ongoing programs indicate that mothers have access to nutrition-related health services and information; however, variations in complementary feeding behavior may still occur and warrant further investigation.

This study aimed to analyze the association between maternal knowledge, attitudes, age, education, and occupation and complementary feeding behavior among mothers of children aged 6–24 months in the working area of Gambirsari Community Health Center, Surakarta.

This study contributes local evidence from a primary health care setting demonstrating that maternal complementary feeding behavior may not be adequately explained by individual characteristics alone, suggesting the importance of broader contextual influences such as family support, cultural norms, and access to health information.

METHODS

Participant characteristics and research design

This study employed a quantitative analytic design using a cross-sectional approach. The cross-sectional design was selected to examine the association between maternal

characteristics and complementary feeding (MP-ASI) behavior at a single point in time without any intervention

The independent variables in this study included maternal knowledge, attitudes, age, education, and occupation, while the dependent variable was complementary feeding (MP-ASI) behavior. The study was conducted in the working area of the Gambirsari Community Health Center, Surakarta, Central Java. Data collection was carried out in April 2025.

Sampling procedures

The research population consisted of all mothers with children aged 6–24 months in the research area. A non-probability sampling approach using purposive sampling was employed. Eligible mothers who met the inclusion criteria were recruited during Posyandu activities in the working area of Gambirsari Community Health Center until the end of the data collection period.

Sample size, power, and precision

A total of 34 respondents participated in this study. The sample comprised all eligible mothers who met the inclusion criteria and agreed to participate during the data collection period.

Inclusion criteria

a. mothers with infants aged 6–24 months.
b. Willing to participate in the study and provide informed consent.
c. willing to participate in all stages of the study until completion.

Exclusion criteria

a. Unwilling to participate in the study and provide informed consent.
b. Mothers who withdrew from the study before data collection was completed.
c. Mothers who did not complete the questionnaires.

Data were collected using a structured questionnaire consisting of several sections, including respondent characteristics, knowledge, attitudes, and complementary feeding (MP-ASI) practices. This study received ethical approval from the Research Ethics Committee of Universitas Kusuma Husada Surakarta, Indonesia (Ethical Clearance No. 2878/UKH.L.02/EC/VI/2025; June 11, 2025). All respondents provided written informed consent before participation. Participation was voluntary, and confidentiality and anonymity were maintained throughout the study.

Data collection was conducted by the researchers during Posyandu activities in the working area of Gambirsari Community Health Center. Eligible mothers were approached directly and invited to participate. After providing informed consent, respondents completed the questionnaires independently. Researchers were available to clarify questionnaire items when needed. To minimize response bias, respondents were informed that participation was voluntary and that their responses would remain confidential and would not affect access to health services.

Measures and covariates

Data were collected using a structured questionnaire consisting of four sections:

1. Respondent characteristics (age, education, occupation, child age, and place of birth).
2. Maternal knowledge regarding complementary feeding, consisting of 30 true/false items.
3. Maternal attitudes toward complementary feeding, measured using a Likert-scale questionnaire ranging from strongly agree to strongly disagree.
4. Complementary feeding behavior, assessed through indicators related to the timing, frequency, quantity, variety, and appropriateness of complementary feeding practices.

Knowledge, attitude, and behavior scores were categorized into good and poor categories based on predetermined scoring criteria. Prior to data collection, the questionnaire underwent validity and reliability testing. The validity test was conducted using Pearson Product Moment correlation, and all items met the minimum validity criteria (r-count > r-table). All questionnaire items showed significant item-total correlation coefficients ranging from 0.3480 to 0.836, which exceeded the critical r-table value of 0.339 ($n = 34$, $\alpha = 0.05$), indicating satisfactory validity. Reliability testing using Cronbach's alpha demonstrated acceptable internal consistency (knowledge $\alpha = 0.925$, attitude $\alpha = 0.916$, behavior $\alpha = 0.824$).

Data analysis

Data were processed through editing, coding, and tabulation procedures and analyzed using SPSS version 25. Descriptive statistics were used to summarize respondent characteristics and study variables. Bivariate analysis was conducted to examine the association between maternal characteristics and complementary feeding behavior.

Bivariate analysis was performed using Fisher's exact test to determine the association between maternal knowledge, attitudes, and complementary feeding (MP-ASI) practices. Fisher's exact test was applied due to the small sample size. Statistical significance was set at $p < 0.05$.

The knowledge variable could not be statistically analyzed because all respondents were classified in the same category (100% good knowledge), resulting in no variability in the data and preventing the calculation of association statistics. Statistical significance was determined at a 95% confidence level with a significance threshold of $p < 0.05$.

RESULTS OF STUDY

The distribution of the main study variables was highly homogeneous. Almost all respondents demonstrated good complementary feeding behavior (94.1%), and all respondents were categorized as having good knowledge (100%). Only two respondents were classified as having poor complementary feeding behavior.

This study involved 34 respondents who were mothers with children aged 6–24 months in the working area of the Gambirsari Community Health Center, Surakarta City. The characteristics of the respondents in this study included age, level of education, occupation, knowledge, attitudes, and complementary feeding (MP-ASI) practices.

Based on Table 1, of the 34 respondents, the majority demonstrated good behavior (94.1%), good knowledge (100%), and positive attitudes (88.2%). Most mothers were aged 20–35 years (73.5%), with the highest proportion having completed senior high school (55.9%), and the majority were homemakers (67.6%). Most children were in the 13–24

months age group (58.8%), and the majority of respondents had delivered in hospitals (79.4%).

Table 1 Sample Characteristics (Categorical Data)

	Variables	f	%
Maternal Behavior	Good	32	94.1
	Poor	2	5.9
Maternal Knowledge	Good	34	100
	Poor	0	0
Maternal Attitude	Positive	30	88.2
	Negative	4	11.8
Maternal Age	<20 years	0	0
	20-35 years	25	73.5
	>35 years	9	26.5
Maternal Education	Primary School	1	2.9
	Junior High School	5	14.7
	Senior High School	19	55.9
	Diploma	2	5.9
	Bachelor's Degree	7	20.6
Maternal Occupation	Housewife	23	67.6
	Civil Servant	1	2.9
	Private Employee	10	29.4
Child's Age	6-7 months	4	11.7
	8-9 months	5	15.7
	10-12 months	5	14.7
	13-24 months	20	58.8
Place of Birth	Hospital	27	79.4
	Midwife	3	8.8
	Community Health Center	4	11.8

Table 2 presents the association between maternal characteristics and complementary feeding practices among mothers of children aged 6–24 months. Overall, most respondents demonstrated good complementary feeding behavior, with 32 mothers (94.1%) classified as having good behavior and only 2 mothers (5.9%) classified as having poor behavior. This distribution indicates that complementary feeding practices among respondents were generally favorable, although the very small number of respondents in the poor behavior category limits the strength of comparative analysis across maternal factors.

As shown in Table 2, all respondents were categorized as having good maternal knowledge. Among them, 32 respondents (94.1%) demonstrated good complementary feeding behavior, while 2 respondents (5.9%) demonstrated poor behavior. Because all respondents were in the same knowledge category, statistical analysis could not be performed for this variable. This finding suggests that the knowledge variable had no variability in the sample, making it impossible to determine whether maternal knowledge was statistically associated with complementary feeding behavior.

Regarding maternal attitude, Table 2 shows that most respondents had a positive attitude, and the majority of them also demonstrated good complementary feeding behavior. Specifically, 28 respondents (82.4%) with positive attitudes showed good behavior, while 2 respondents (5.9%) showed poor behavior. Meanwhile, all respondents with negative attitudes were categorized as having good behavior. The p-value of 1.000 indicates that there was no statistically significant association between maternal attitude and complementary feeding behavior. This result suggests that, in this sample, a positive attitude did not necessarily differentiate mothers with good and poor complementary feeding practices.

For maternal age, most respondents were aged 20–35 years, and 24 respondents (70.6%) in this age group demonstrated good complementary feeding behavior. Among mothers aged >35 years, 8 respondents (23.5%) showed good behavior and 1 respondent (2.9%) showed poor behavior. The p-value of 0.465 indicates no statistically significant association between maternal age and complementary feeding behavior. Thus, maternal age did not appear to be a distinguishing factor in feeding practices among respondents in this study.

Table 2. Association between Maternal Characteristics and Complementary Feeding Practices among Mothers of Children (n = 34)

Maternal Factors	Category	Good Behavior n (%)	Poor Behavior n (%)	Total n (%)	p-value
Maternal Knowledge	High	32 (94.1)	2 (5.9)	34 (100.0)	
	Moderate	0 (0.0)	0 (0.0)	0 (0.0)	Not analyzed[a]
	Low	0 (0.0)	0 (0.0)	0 (0.0)	
Maternal Attitude	Positive	28 (82.4)	2 (5.9)	30 (88.2)	1.000
	Negative	4 (11.8)	0 (0.0)	4 (11.8)	
Maternal Age	<20 years	0 (0.0)	0 (0.0)	0 (0.0)	
	20–35 years	24 (70.6)	1 (2.9)	25 (73.5)	0.465
	>35 years	8 (23.5)	1 (2.9)	9 (26.5)	
Maternal Education	Primary School	1 (2.9)	0 (0.0)	1 (2.9)	
	Junior High School	3 (8.8)	2 (5.9)	5 (14.7)	
	Senior High School	15 (44.1)	0 (0.0)	15 (44.1)	0.061
	Diploma	4 (11.8)	0 (0.0)	4 (11.8)	
	Bachelor's Degree	9 (26.5)	0 (0.0)	9 (26.5)	
Maternal Occupation	Housewife	22 (64.7)	1 (2.9)	23 (67.6)	
	Civil Servant	1 (2.9)	0 (0.0)	1 (2.9)	0.549
	Private Employee	9 (26.5)	1 (2.9)	10 (29.4)	
Total		**32 (94.1)**	**2 (5.9)**	34 (100.0)	

Note. Percentages are calculated based on the total sample size (n = 34). [a]Statistical analysis was not performed for the knowledge variable because all respondents were classified in the same category, namely good knowledge, resulting in no variability in the data. The p-value is presented for each maternal factor in relation to complementary feeding behavior.

Table 2 also shows that maternal education had a p-value of 0.061, which is above the conventional significance threshold of 0.05. Although this result was not statistically significant, it shows a pattern that requires cautious interpretation. Poor complementary feeding behavior was found only among mothers with junior high school education, while mothers in other education categories demonstrated good behavior. However, because the sample size was small and several education categories contained very few respondents, this pattern should not be interpreted as a definitive relationship.

With regard to maternal occupation, most respondents were housewives, and 22 respondents (64.7%) in this category demonstrated good complementary feeding behavior. Poor behavior was found among 1 housewife (2.9%) and 1 private employee (2.9%). The p-value of 0.549 indicates that maternal occupation was not significantly associated with complementary feeding behavior. This suggests that employment status did not substantially differentiate complementary feeding practices in this sample.

In summary, Table 2 indicates that maternal attitude, age, education, and occupation were not significantly associated with complementary feeding practices among mothers of children aged 6–24 months. Maternal knowledge could not be statistically analyzed because all respondents had good knowledge. These findings should be interpreted with caution because the data distribution was highly imbalanced, particularly with only two respondents classified as having poor complementary feeding behavior. Therefore, the absence of significant associations may reflect limited variability and small sample size rather than the absence of meaningful relationships in the broader population.

DISCUSSION

An important methodological consideration in this study is the potential ceiling effect. Almost all respondents demonstrated good knowledge and good complementary feeding behavior, leaving very limited variability for statistical analysis. Under such circumstances, statistical tests may have insufficient ability to detect meaningful differences between groups even when such differences exist in the population.

Based on the study findings, no significant associations were observed between the examined variables and complementary feeding (MP-ASI) practices. This finding provides an important perspective, indicating that factors theoretically considered influential do not always demonstrate consistent relationships within specific empirical contexts. The demographic characteristics identified in this study were comparable to those reported by Roslina (2021), where most mothers providing complementary feeding were within the productive age group and had secondary-level education.

The absence of an association between maternal attitudes and complementary feeding practices suggests that positive attitudes do not necessarily translate into consistent appropriate practices. Theoretically, attitudes are considered an important determinant of behavior, as described in health behavior models which propose that attitudes can influence individual actions (Notoatmodjo, 2010). However, in practice, the relationship between attitudes and behavior is not always direct. These findings indicate the possibility that other factors may play a more dominant role in influencing maternal behavior, such as habits, prior experiences, or environmental influences.

This result differs from several previous studies that reported a significant relationship between attitudes and complementary feeding practices (Prajayanti, 2022). The discrepancy may be attributed to variations in research context, including differences in respondent characteristics and social environments. In this study, most respondents exhibited positive attitudes and good practices, resulting in limited data variability. Tamara et al. (2023) reported that maternal attitudes toward complementary feeding were closely related to previous exposure to health education and community practices. Such conditions may affect statistical analysis, as relationships between variables become more difficult to detect when data distribution is relatively homogeneous.

Similarly, no significant association was found between maternal age and complementary feeding practices. Although age is often associated with maturity and parenting experience, most respondents in this study were within the productive age range, leading to minimal variation. This limited variation may explain the absence of meaningful differences in feeding practices across age groups.

The findings also indicate no significant relationship between maternal education level and complementary feeding practices, suggesting that formal education is not always a determining factor in health practices. While education may enhance an individual's ability to understand information, its translation into behavior is influenced by various other factors. This finding contrasts with previous studies that reported a relationship between education and complementary feeding practices (Rezaeizadeh, et al., 2024). Widiyawati et al. (2022) also suggested that access to health information and community-based education may play a greater role than formal education alone. The absence of statistically significant associations may reflect contextual factors such as access to information; however, it may also be influenced by methodological limitations, including the small sample size, low variability of responses, and highly imbalanced outcome categories.

A similar pattern was observed for maternal occupation, where no significant association with complementary feeding practices was identified. Although occupation is theoretically linked to time availability and caregiving capacity, most respondents in this study were homemakers, resulting in an uneven distribution of occupational categories. Additionally, working mothers may receive family support or employ time-management strategies, thereby minimizing the impact of occupation on feeding practices. Similar findings were reported by Kaulina & Permatasari (2025) who found that maternal occupation was not always directly associated with complementary feeding practices due to the influence of family support and caregiving adaptation.

The knowledge variable could not be statistically analyzed because all respondents demonstrated a good level of knowledge, indicating data homogeneity. While knowledge is theoretically a key factor in shaping behavior, these findings suggest that uniformly high knowledge levels do not necessarily produce sufficient variability in behavior for statistical analysis. This implies that even when knowledge is adequate, other factors remain influential in determining complementary feeding practices. These findings differ from those reported by Widi Andrian et al. (2021), who reported that maternal knowledge was closely associated with appropriate complementary feeding behavior.

Overall, the findings indicate no significant relationship between maternal characteristics and complementary feeding practices. Because enabling and reinforcing factors were not measured in this study, the findings should not be

interpreted as evidence supporting or refuting the PRECEDE-PROCEED model. Similarly, Octaviyanti et al. (2021) emphasized that complementary feeding behavior is influenced by multiple interacting factors, including maternal characteristics, environmental conditions, and access to health information. The Green and Kreuter model highlights that, in addition to predisposing factors such as knowledge and attitudes, enabling and reinforcing factors also play crucial roles in shaping behavior (Notoatmodjo, 2010).

Furthermore, the Transcultural Nursing approach suggests that health practices are influenced by cultural values and social environments (Leininger, 2002). In this study context, established norms or community practices related to complementary feeding may have contributed to relatively uniform maternal behavior, regardless of individual characteristics.

These findings imply the need for more comprehensive health interventions that go beyond improving knowledge or attitudes, by also addressing social and environmental factors. Health education programs at the primary healthcare level should be tailored to community conditions and involve family and community support systems to effectively promote appropriate complementary feeding practices.

In conclusion, this study demonstrates that complementary feeding practices constitute a complex phenomenon that cannot be explained by one or two variables alone. A multidimensional approach is required to better understand and improve complementary feeding practices effectively.

STUDY LIMITATION

This study has several limitations that should be considered when interpreting the findings. First, the cross-sectional design only allows the identification of associations between variables at a single point in time and does not permit conclusions regarding causal relationships. Second, data were collected using self-report questionnaires, which may be subject to recall bias and social desirability bias, potentially influencing the accuracy of respondents′ answers regarding complementary feeding practices.

Third, the study involved a relatively small sample size (n = 34), which may have limited the statistical power to detect significant associations between maternal characteristics and complementary feeding behavior. Fourth, the knowledge variable showed no variation, as all respondents were categorized as having good knowledge. This homogeneity prevented statistical testing of the relationship between knowledge and complementary feeding behavior and reduced the variability necessary for identifying meaningful associations.

In addition, only two respondents were classified as having poor complementary feeding behavior, resulting in a highly imbalanced outcome distribution. This condition may have affected the robustness of the statistical analysis and contributed to the absence of significant findings. Finally, because the study was conducted in a single primary health care setting with a limited number of participants, the findings may not be generalizable to other populations or regions with different sociodemographic and cultural characteristics.

Future studies are recommended to employ larger and more diverse samples, use validated measurement instruments, and include additional variables such as family support, cultural beliefs, social norms, access to health information, and children's nutritional status to provide a more comprehensive understanding of factors influencing complementary feeding practices.

CONCLUSIONS AND RECOMMENDATION

Based on the study findings, it can be concluded that most mothers demonstrated good complementary feeding (MP-ASI) practices among children aged 6–24 months in the working area of the Gambirsari Community Health Center. Bivariate analysis showed no significant association between maternal attitudes, age, education, and occupation and complementary feeding practices. There was no variation in the maternal knowledge variable for a Fisher′s Exact test, so the p-value could not be calculated. Therefore, an analysis of the relationship between knowledge and complementary feeding behavior could not be conducted. Therefore, no empirical conclusion regarding the association between knowledge and complementary feeding behavior can be drawn from this study.

These findings suggest that although most respondents exhibited relatively homogeneous characteristics, complementary feeding practices were generally within the good category. In this sample, insufficient statistical evidence was found to demonstrate associations between maternal characteristics and complementary feeding behavior. The findings should be interpreted cautiously considering the small sample size and homogeneous distribution of responses.

The findings of this study have several practical implications for primary health care services, community health volunteers, and family-based nutrition promotion programs. For Community Health Centers (Puskesmas), nutrition education programs should move beyond merely increasing maternal knowledge and place greater emphasis on strengthening practical complementary feeding skills, including age-appropriate food texture, meal frequency, dietary diversity, portion size, food safety, and responsive feeding practices. Health promotion strategies should also incorporate family-centered approaches that address contextual factors influencing maternal behavior.

For Posyandu cadres, regular counseling and growth-monitoring activities can be utilized as opportunities to provide practical guidance and individualized support to mothers regarding complementary feeding practices. Cadres may also play an important role in identifying feeding-related challenges faced by families and facilitating referrals or follow-up education when needed.

For family-based interventions, efforts to improve complementary feeding practices should involve not only mothers but also other family members, including fathers and grandparents, who often influence child-feeding decisions. Strengthening family support and promoting positive feeding practices within the household may contribute to sustaining appropriate complementary feeding behaviors and improving child nutritional outcomes.

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DECLARATION

Ethics Approval and Consent to Participate

This study was conducted in accordance with the ethical principles for research involving human participants. Ethical approval was obtained from the Research Ethics Committee of Universitas Kusuma Husada, Surakarta, Indonesia, with ethical clearance number 2878/UKH.L.02/EC/VI/2025 dated June 11, 2025. Written informed consent was obtained from all participants prior to data collection. Participation in this study was voluntary, and the confidentiality of respondents' information was strictly maintained.

Consent for publication

Not applicable.

Availability of data and materials

The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

Conflicts of interest Statement

The authors declare that there are no conflicts of interest related to this study.

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Artificial Intelligence-Assisted Technology

The authors used artificial intelligence-assisted technology only for limited language improvement and grammatical editing. The authors reviewed and edited the content carefully and take full responsibility for the content of the publication.

Authors' contributions.

Athanasia Budi Astuti and Sri Mulyanti contributed to the conceptualization and design of the study, data collection, data analysis, interpretation of findings, and manuscript preparation. Athanasia Budi Astuti served as the principal investigator and coordinated the overall research implementation.

ABOUT THE AUTHORS

Athanasia Budi Astuti completed her doctoral (PhD) studies at Management and Science University Malaysia, with a dissertation focused on the effectiveness of bio-energy power exercise on blood pressure among individuals with hypertension in the community in Java, Indonesia. She is currently a nursing lecturer at the Health Polytechnic of the Ministry of Health Surakarta (Poltekkes Kemenkes Surakarta).

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