

The Effect of Health Education on Complementary Feeding Practices in Children Aged 6–12 Months

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ABSTRACT

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Appropriate complementary feeding (MP-ASI) is an important factor in supporting the growth and development of children aged 6–12 months. This study aimed to analyze the effect of health education on complementary feeding practices among mothers with children aged 6–12 months in the working area of UPT Puskesmas Kampung Sawah. A quasi-experimental pre-test and post-test control group design was employed involving 76 mothers, who were assigned to either an intervention group or a control group. The intervention consisted of health education delivered through lectures, group discussions, question-and-answer sessions, and educational materials on appropriate complementary feeding practices, conducted in two 60-minute sessions. Data were collected using a structured questionnaire and analyzed using the McNemar test and Mantel–Haenszel test. The results showed that health education significantly improved complementary feeding practices in the intervention group. Health education also increased the likelihood of improvement in complementary feeding behavior, with Odds Ratios ranging from 6.00 to 7.00, and these changes were not influenced by maternal education, age, or occupation. The study concluded that health education is an effective health promotion strategy for improving complementary feeding practices among mothers of children aged 6–12 months in primary healthcare settings.

ABSTRAK

Pemberian Makanan Pendamping ASI (MP-ASI) yang tepat merupakan faktor penting dalam mendukung tumbuh kembang anak usia 6–12 bulan. Penelitian ini bertujuan menganalisis pengaruh edukasi kesehatan terhadap perilaku pemberian MP-ASI pada ibu dengan anak usia 6–12 bulan di wilayah kerja UPT Puskesmas Kampung Sawah. Penelitian ini menggunakan desain quasi-experimental pre-test and post-test with control group yang dilaksanakan pada 76 ibu yang dibagi menjadi kelompok intervensi dan kelompok kontrol. Intervensi berupa edukasi kesehatan melalui metode ceramah, diskusi, tanya jawab, dan pemberian media edukasi mengenai prinsip pemberian MP-ASI yang tepat, yang diberikan selama dua sesi masing-masing 60 menit. Data dikumpulkan menggunakan kuesioner dan dianalisis menggunakan uji McNemar serta uji Mantel–Haenszel. Hasil penelitian menunjukkan bahwa edukasi kesehatan secara signifikan meningkatkan perilaku pemberian MP-ASI pada kelompok intervensi. Edukasi kesehatan juga meningkatkan peluang terjadinya perbaikan perilaku pemberian MP-ASI dengan Odds Ratio berkisar antara 6,00–7,00, dan perubahan tersebut tidak dipengaruhi oleh faktor pendidikan, usia, maupun pekerjaan ibu. Penelitian ini menyimpulkan bahwa edukasi kesehatan efektif sebagai strategi promosi kesehatan untuk meningkatkan praktik pemberian MP-ASI pada ibu dengan anak usia 6–12 bulan di layanan kesehatan primer.



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A. BACKGROUND

Nutritional status is a condition that reflects the balance between nutrient intake and the body's nutritional requirements, which can be assessed through various indicators and represents the result of food consumption and nutrient utilization by the body. An imbalance between nutrient intake and nutritional needs over a certain period may lead to malnutrition, a health disorder caused by the deficiency or excess of one or more essential nutrients, either relatively or absolutely. According to the World Health Organization (WHO), malnutrition includes various forms, such as undernutrition including stunting (low height-for-age), wasting (low weight-for-height), and underweight (low weight-for-age), micronutrient deficiencies such as iron, iodine, vitamin A, and zinc deficiency, as well as overnutrition such as overweight or obesity caused by excessive calorie intake leading to excessive fat accumulation (Indanah & Ratna, 2020).

Child malnutrition remains a significant global challenge. In 2024, there were 150.2 million children under five years of age affected by stunting, 42.8 million affected by wasting, and 35.5 million affected by overweight worldwide. Based on the 2024 Indonesian Nutritional Status Survey (SSGI), the prevalence of stunting in Indonesia decreased from 21.5% in 2023 to 19.8% in 2024. This decline reflects positive achievements from various government interventions aimed at accelerating stunting reduction. However, these achievements do not fully indicate improvements across all indicators of child nutritional status. The same survey also reported a 0.9% increase in the prevalence of underweight compared to the previous year, indicating that undernutrition among children under five remains a major concern (Yuqiana & Hani, 2020). In Lampung Province, the prevalence of stunting in 2024 was recorded at 15.9%, representing a 1% increase from 14.9% in 2023. These data indicate a fluctuating trend, where Lampung had previously succeeded in significantly reducing stunting prevalence from 26.26% in 2019 to 14.9% in 2023 before experiencing an increase again in 2024.

One of the important factors contributing to child malnutrition is inappropriate complementary feeding practices. Complementary feeding that is introduced too early, lacks dietary diversity, or does not meet the recommended frequency and quantity may increase the risk of nutritional problems in children. Appropriate complementary feeding plays a crucial role in supporting infant growth and development, while inappropriate practices may lead to various nutritional problems in children. National data indicate that complementary feeding practices in Indonesia are still suboptimal. The 2023 National Socioeconomic Survey (Susenas) showed that only 59.3% of children aged 6–23 months received the minimum dietary diversity according to recommendations. In addition, more than 40% of infants in Indonesia were introduced to complementary foods before the age of six months, approximately 40% of children aged 6–23 months did not receive diverse foods, and 28% of infants did not receive adequate meal frequency. A study conducted in Pontianak also found inappropriate complementary feeding practices, such as the introduction of complementary foods before four months of age in 4.5% of infants and the provision of single-menu feeding in 12.7% of children (Ilmanisak et al., 2017).

Inappropriate complementary feeding practices have been associated with various nutritional problems in children. Research has shown that maternal behavior regarding complementary feeding remains inadequate and is significantly associated with infant nutritional status. Another study found a significant relationship between complementary feeding practices and stunting among toddlers, where children receiving inappropriate

complementary feeding had a higher risk of stunting compared to those receiving appropriate complementary feeding. These findings indicate that the quality of infant and young child feeding practices is an important factor in preventing nutritional problems (Ardikasari & Mustikawati, 2022).

One factor influencing complementary feeding practices is the mother's level of knowledge. Mothers' knowledge regarding the timing, type, and method of complementary feeding affects feeding patterns provided to children. Adequate knowledge encourages mothers to provide complementary feeding appropriately according to nutritional recommendations. However, in reality, public knowledge regarding balanced nutrition remains relatively low, thereby affecting the quality of child feeding practices. Therefore, improving maternal knowledge is an important step in efforts to improve complementary feeding practices (Fauziah et al., 2023).

One strategy that can be implemented to improve knowledge and complementary feeding practices is health education. Health education can help mothers understand the importance of appropriate complementary feeding and improve their ability to apply proper feeding practices. Research has shown that nutrition education significantly improves mothers' knowledge and practices regarding complementary feeding among children under two years of age. Therefore, continuous health education is essential to improve maternal behavior in complementary feeding practices and support improvements in child nutritional status (Ramandhani & Setyarini, 2025).

Bandar Lampung City, the capital city of Lampung Province, has urban characteristics with a high level of socioeconomic heterogeneity. Data from the 2024 Indonesian Nutritional Status Survey (SSGI) showed that the prevalence of nutritional problems among children under five in Bandar Lampung City was 14.8% for stunting, 6.5% for wasting, and 14.5% for underweight. UPT Puskesmas Kampung Sawah, one of the community health centers located in Bandar Lampung City, recorded 14 cases of stunting, 23 cases of wasting, and 47 cases of underweight among children under five in its working area based on the 2025 Performance Assessment. These findings indicate that appropriate complementary feeding practices still need to be strengthened, especially among infants aged 6–12 months, which is the initial transition period from exclusive breastfeeding to complementary foods. Therefore, research on the effect of health education on complementary feeding behavior among mothers with children aged 6–12 months in the working area of UPT Puskesmas Kampung Sawah is important to support improvements in complementary feeding practices and child nutritional status.

Previous studies have primarily focused on improving maternal knowledge regarding complementary feeding through educational interventions. However, limited evidence exists regarding the effectiveness of health education in changing complementary feeding behavior comprehensively based on the four WHO principles, namely timely, adequate, safe, and appropriate feeding. Furthermore, few studies have evaluated the effectiveness of educational interventions after controlling for maternal age, education, and occupation. Therefore, this study provides a novel contribution by assessing behavioral changes using a quasi-experimental design with a control group and confounding variable analysis.

This study aimed to analyze the effect of health education on complementary feeding behavior among mothers with children aged 6–12 months, specifically regarding timely, adequate, safe, and appropriate complementary feeding practices.

B. METHODS

This study employed a quasi-experimental design using a non-equivalent control group approach. The study was conducted from March to May 2026 in the working area of UPT Puskesmas Kampung Sawah. The independent variable in this study was health education, while the dependent variable was complementary feeding (MP-ASI) behavior, which included

four main principles: timely, adequate, safe, and appropriate feeding practices. The population of this study consisted of all mothers with children aged 6–12 months in the working area of UPT Puskesmas Kampung Sawah, totaling 407 individuals. The sampling technique used was simple random sampling, with a total sample size of 76 respondents. The research instrument used was a questionnaire. Data collection techniques in this study were conducted through structured interviews and documentation.

The health education intervention was delivered in two sessions, each lasting approximately 60 minutes. Educational methods included lectures, group discussions, question-and-answer sessions, and demonstrations. Educational materials covered WHO complementary feeding recommendations, meal frequency, dietary diversity, food safety, and responsive feeding practices. Participants received a booklet and leaflet as supporting educational materials. Follow-up reinforcement was conducted one week after the initial session.

The research instrument consisted of a structured questionnaire containing 20 items covering four dimensions of complementary feeding behavior: timely feeding (5 items), adequate feeding (5 items), safe feeding (5 items), and appropriate feeding practices (5 items). Each correct response was scored as 1 and each incorrect response as 0. The total score ranged from 0–20 and was categorized into poor and good behavior based on the median score. Instrument validity testing was conducted on 30 mothers outside the study area, showing corrected item-total correlation coefficients ranging from 0.412–0.781. Reliability testing yielded a Cronbach's alpha coefficient of 0.874, indicating good internal consistency. Data analysis was performed using the McNemar test, while multivariate analysis was conducted using the Mantel–Haenszel test. Mantel–Haenszel analysis was performed to assess potential confounding effects of maternal age, education, and occupation. The results indicated that these variables did not substantially alter the association between health education and complementary feeding behavior. Research Hypotheses: H0: Health education has no significant effect on complementary feeding behavior among mothers with children aged 6–12 months. H1: Health education has a significant effect on complementary feeding behavior among mothers with children aged 6–12 months. Additional hypotheses were tested for the timely, adequate, safe, and appropriate feeding dimensions. This study received ethical approval from the Health Research Ethics Committee of the Faculty of Medicine, University of Lampung (Approval Number: 131/EC/FK-UNILA/2026). Written informed consent was obtained from all participants before data collection.

C. RESULTS AND DISCUSSION

1. Results

Respondent Characteristics

Table 1. Respondent Characteristics

Characteristics	Control n (%)	Intervention n (%)
Mother's Age		
<19 years	0 (0.0%)	2 (5.3%)
>19 years	38 (100.0%)	36 (94.7%)
Education		
No schooling – Junior High School	5 (13.2%)	7 (18.4%)
Senior High School – Bachelor's Degree	33 (86.8%)	31 (81.6%)
Occupation		
Employed	9 (23.7%)	6 (15.8%)
Housewife	29 (76.3%)	32 (84.2%)
Total	38 (100.0%)	38 (100.0%)

Overall, the characteristics of respondents showed relatively homogeneous conditions between the control and intervention groups. The majority of mothers in both groups were older than 19 years, had education levels predominantly ranging from senior high school to bachelor's degree, and most were housewives. These conditions indicate that respondents were generally adults with relatively good educational backgrounds and had more time at home to care for their children. The homogeneity of these characteristics suggests that differences in the study results were more likely influenced by the health education intervention rather than by age, education, or occupation factors.

The Effect of Health Education on the Application of the Timely Principle in Complementary Feeding (MP-ASI) Among Children Aged 6–12 Months in the Working Area of UPT Puskesmas Kampung Sawah

Table 2. The Effect of Health Education on the Application of the Timely Principle in Complementary Feeding (MP-ASI) Among Children Aged 6–12 Months in the Working Area of UPT Puskesmas Kampung Sawah

Variables	Control Group			Intervention Group			OR	CI 95%
	Poor	Good	p-value	Poor	Good	p-value		
Implementation of the Timely Principle							6,50	1.47–28.80
Poor	7 (41,2%)	10 (58,8%)	0,832	2 (13,3%)	13 (86,7%)	0,007		
Good	12 (57,1%)	9 (42,9%)		2 (8,7%)	21 (91,3%)			
Implementation of the Adequate Principle							7,00	1.59–30.80
Poor	9 (47,4%)	10 (52,6%)	0,832	2 (12,5%)	14 (87,5%)	0,004		
Good	12 (63,2%)	7 (36,8%)		2 (9,1%)	20 (90,9%)			
Implementation of the Safe Principle							6,00	1.34–26.81
Poor	9 (52,9%)	8 (47,1%)	0,503	3 (20,0%)	12 (80,0%)	0,013		
Good	12 (57,1%)	9 (42,9%)		2 (8,7%)	21 (91,3%)			
Implementation of the Right Principle							6,50	1.47–28.80
Poor	8 (42,1%)	11 (57,9%)	1,000	2 (13,3%)	13 (86,7%)	0,007		
Good	11 (57,9%)	8 (42,1%)		2 (8,7%)	21 (91,3%)			

Based on the crosstabulation results, the control group did not show a consistent change between the pre-test and post-test, with the McNemar test result showing $p = 0.832$ ($p > 0.05$), indicating no significant difference. In contrast, the intervention group showed an increase in the proportion of the “good” category after the intervention, with the McNemar test result showing $p = 0.007$ ($p < 0.05$), indicating a significant difference. These findings suggest that health education had an effect on improving the timely practice of complementary feeding in the intervention group, while no significant change occurred in the control group.

Based on the crosstabulation results, the control group showed inconsistent changes in adequate feeding behavior between the pre-test and post-test, with the McNemar test yielding $p = 0.832$ ($p > 0.05$), indicating no significant difference. In contrast, the intervention group showed a clear improvement, where most respondents who were initially categorized as poor changed to good, while the majority who were already categorized as good remained consistent. The McNemar test showed $p = 0.004$ ($p < 0.05$). These findings indicate that health education had a significant effect on improving the adequacy aspect of complementary feeding practices in the intervention group.

Based on the crosstabulation results, the control group showed inconsistent changes in safe feeding behavior between the pre-test and post-test, with the McNemar test yielding $p = 0.503$ ($p > 0.05$), indicating no significant difference. In contrast, the intervention group

demonstrated clearer improvements, where the majority of respondents who were initially categorized as poor changed to good, while most respondents who were already categorized as good remained consistent. The McNemar test showed $p = 0.013$ ($p < 0.05$). These findings indicate that health education had a significant effect on improving the safety aspect of complementary feeding practices in the intervention group.

Based on the crosstabulation results, the control group showed inconsistent changes in proper complementary feeding practices between the pre-test and post-test, with the McNemar test yielding $p = 1.000$ ($p > 0.05$), indicating no significant difference. In contrast, the intervention group showed a clear improvement, where the majority of respondents who were initially categorized as poor changed to good, while most respondents who were already categorized as good remained consistent. The McNemar test showed $p = 0.007$ ($p < 0.05$). These findings indicate that health education had a significant effect on improving proper complementary feeding practices in the intervention group.

In the intervention group, there was no significant relationship between education level and behavioral changes based on Cochran's test ($p = 0.236$) or the Mantel-Haenszel test ($p = 0.573$). This indicates that education level did not influence changes in complementary feeding behavior. Overall, the education variable did not meet the criteria as a confounding variable because it did not show a consistent and significant relationship with the outcome in either group. Therefore, the effect of the health education intervention could be assessed without substantial bias from maternal education, age, or occupation factors.

The health education intervention demonstrated a significant positive effect on complementary feeding practices. Mothers who received the intervention were more likely to improve timely feeding (OR = 6.50; 95% CI: 1.47–28.80), adequate feeding (OR = 7.00; 95% CI: 1.59–30.80), safe feeding (OR = 6.00; 95% CI: 1.34–26.81), and appropriate feeding practices (OR = 6.50; 95% CI: 1.47–28.80). These findings indicate that health education substantially increased the likelihood of positive behavioral changes in complementary feeding among mothers of children aged 6–12 months.

2. Discussion

a. Characteristics of The Respondents

Based on the study results, most respondents were adults (>19 years old), accounting for 100% in the control group and 94.7% in the intervention group, while only 5.3% were aged <19 years. According to Notoatmodjo (2014), increasing age is associated with greater maturity and experience, enabling individuals to receive and process health information more effectively.

Most respondents had completed senior high school or higher education (86.8% in the control group and 81.6% in the intervention group). Education is a predisposing factor influencing health behavior because it enhances the ability to understand and apply health information. Bandura (1986, as cited in Glanz et al., 2015) also emphasized that behavior develops through learning processes and interactions with the environment.

The majority of respondents were housewives (76.3% in the control group and 84.2% in the intervention group), allowing them to spend more time caring for their children. Helmi and Lupiana (2012) reported that housewives are more likely to implement appropriate complementary feeding (MP-ASI) practices.

Previous studies have shown that older maternal age is associated with better compliance with complementary feeding practices (Muharrama et al., 2021), while higher maternal education significantly improves knowledge and MP-ASI practices (Anita, 2021; Aulia et al., 2022). Sociodemographic factors, particularly education and occupation, also influence the success of child nutrition interventions by affecting access to health information, caregiving patterns, and health service utilization (Romadhoni & Erismawati, 2025).

However, the respondents in this study had relatively homogeneous sociodemographic characteristics, suggesting that age, education, and occupation were unlikely to substantially influence the observed outcomes. Therefore, the improvements in maternal behavior were more likely attributable to the Growth Monitoring and Promotion (GMP) counseling intervention rather than differences in respondent characteristics (Romadhoni & Erismawati, 2025).

This finding supports the effectiveness of GMP counseling in improving maternal knowledge, attitudes, and practices through structured education, practical guidance, and continuous reinforcement regarding child nutrition and growth monitoring (Helmi & Lupiana, 2012). The relatively uniform respondent characteristics also reduced potential confounding effects, strengthening the assumption that the intervention was the primary contributor to behavioral improvements and may be applicable to populations with similar demographic profiles (Ramandhani & Setyarini, 2025).

b. Complementary Feeding Behavior Among Children Aged 6–12 Months in the Working Area of UPT Puskesmas Kampung Sawah

Based on the crosstabulation results, the control group did not show a consistent pattern of behavioral change between the pre-test and post-test. Although some respondents improved, more than half of those initially categorized as having good behavior declined to the poor category. Accordingly, the McNemar test showed no significant difference ($p = 1.000$; $p > 0.05$).

In contrast, the intervention group demonstrated marked behavioral improvement. Most respondents with initially poor behavior changed to the good category, while all respondents with good behavior maintained their status, resulting in 94.7% of respondents being categorized as good at the post-test. The McNemar test confirmed a highly significant difference ($p = 0.000$; $p < 0.05$), indicating that health education effectively improved complementary feeding (MP-ASI) behavior among mothers.

These findings are consistent with the Health Belief Model proposed by Rosenstock (1974, as cited in Glanz et al., 2015), which explains that behavioral change occurs when individuals perceive greater benefits and fewer barriers to adopting healthy behaviors. Health education increased mothers' awareness of the importance of appropriate complementary feeding, thereby encouraging positive behavioral change (Ramandhani & Setyarini, 2025).

The PRECEDE–PROCEED Model also suggests that education serves as an enabling and reinforcing factor by improving knowledge, attitudes, and practical skills needed to adopt healthy behaviors. Likewise, Bandura's Social Learning Theory (1986, as cited in Glanz et al., 2015) emphasizes that behavior develops through observation, interaction, and increased self-efficacy, all of which can be strengthened through counseling and demonstrations.

These findings are supported by previous studies. Dewi and Aminah (2016) reported that health education significantly improved complementary feeding practices by enhancing maternal understanding of feeding schedules, food quality, and feeding methods. Similarly, Ida Alim et al. (2021) demonstrated that educational interventions effectively improve infant feeding practices, particularly by increasing maternal knowledge and confidence.

Overall, both behavioral theories and previous empirical evidence indicate that health education significantly improves complementary feeding behavior by strengthening maternal knowledge, attitudes, perceived benefits, and self-efficacy, ultimately supporting better child nutrition and growth outcomes (Ida Alim et al., 2021).

c. The Effect of Health Education on the Application of the Timely Principle in Complementary Feeding (MP-ASI) Among Children Aged 6–12 Months in the Working Area of UPT Puskesmas Kampung Sawah

Based on the crosstabulation results, the control group showed inconsistent changes in the timely principle of complementary feeding between the pre-test and post-test. Although some respondents improved, more respondents who were initially categorized as good declined to the poor category. The McNemar test indicated no significant difference ($p = 0.832$; $p > 0.05$).

In contrast, the intervention group showed clear improvement. Most respondents with initially poor practices changed to the good category, while the majority with good practices maintained their condition, increasing the proportion of good practices at the post-test. The McNemar test demonstrated a significant difference ($p = 0.007$; $p < 0.05$), indicating that health education effectively improved timely complementary feeding practices among mothers in the working area of UPT Puskesmas Kampung Sawah.

These findings are consistent with the Health Belief Model proposed by Rosenstock (1974, as cited in Glanz et al., 2015), which explains that behavior changes when individuals perceive the benefits of healthy practices and the risks of inappropriate behaviors. The PRECEDE-PROCEED Model also identifies education as an enabling and reinforcing factor that strengthens knowledge and attitudes, while Bandura's Social Learning Theory (1986, as cited in Glanz et al., 2015) emphasizes the importance of learning through observation, interaction, and increased self-efficacy.

Previous studies support these findings. Marlinda et al. (2025) reported that health education significantly improves maternal adherence to the appropriate timing of complementary feeding by increasing awareness of the recommended age for introducing complementary foods. Similarly, Kadek and Rahyanti (2021) found that educational interventions enhance infant feeding practices and help prevent the risks associated with early or delayed complementary feeding. Ida Alim et al. (2021) also demonstrated that health education improves maternal knowledge and adherence to recommended complementary feeding practices.

Overall, these findings indicate that health education effectively improves adherence to the timely principle of complementary feeding by strengthening maternal knowledge, attitudes, perceived benefits, and confidence in implementing age-appropriate feeding practices, thereby supporting optimal child nutrition, growth, and development (Ida Alim et al., 2021).

d. The Effect of Health Education on the Application of the Adequate Principle in Complementary Feeding (MP-ASI) Among Children Aged 6–12 Months in the Working Area of UPT Puskesmas Kampung Sawah

Based on the crosstabulation results, the control group did not show a consistent pattern of change in the adequacy aspect of complementary feeding. Although some respondents improved, more respondents who were initially categorized as good declined to the poor category. The McNemar test showed no significant difference ($p = 0.832$; $p > 0.05$).

In contrast, the intervention group demonstrated clear improvement. Most respondents with initially poor practices changed to the good category, while the majority with good practices remained consistent, increasing the proportion of good practices to 89.5% at the post-test. The McNemar test showed a significant difference ($p = 0.004$; $p < 0.05$), indicating that health education effectively improved the adequacy aspect of complementary feeding among mothers in the working area of UPT Puskesmas Kampung Sawah.

These findings are consistent with the Health Belief Model proposed by Rosenstock (1974, as cited in Glanz et al., 2015), which explains that behavioral change occurs when individuals perceive greater benefits and fewer barriers to adopting healthy practices. Health education increased mothers' awareness of the importance of providing nutritionally adequate complementary foods, including appropriate meal frequency, food diversity, portion size, and nutrient adequacy according to the child's age. Educational interventions also help reduce

misconceptions and improve mothers' confidence in implementing appropriate feeding practices (Munjidah et al., 2023).

Previous studies support these findings. Batubara and Maisyura (2024) reported that health education significantly improves the quality of complementary feeding by enhancing maternal understanding of nutritional content and feeding methods. Similarly, Munjidah et al. (2023) found that educational interventions improve complementary feeding quality, particularly nutritional adequacy, balanced nutrient intake, and food diversity.

Overall, both health behavior theory and empirical evidence indicate that health education significantly improves the adequacy aspect of complementary feeding by strengthening maternal knowledge, attitudes, perceived benefits, and practical skills, thereby supporting optimal child nutrition, healthy growth, and development (Glanz et al., 2015; Munjidah et al., 2023).

e. The Effect of Health Education on the Application of the Safe Principle in Complementary Feeding (MP-ASI) Among Children Aged 6–12 Months in the Working Area of UPT Puskesmas Kampung Sawah

Based on the crosstabulation results, the control group did not show a consistent pattern of change in the safety aspect of complementary feeding. Although some respondents improved, more than half of those initially categorized as having good practices declined to the poor category. The McNemar test showed no significant difference ($p = 0.503$; $p > 0.05$).

In contrast, the intervention group demonstrated clear improvement. Most respondents with initially poor practices changed to the good category, while the majority with good practices remained consistent, increasing the proportion of safe feeding practices to 86.8% at the post-test. The McNemar test showed a significant difference ($p = 0.013$; $p < 0.05$), indicating that health education effectively improved the safety aspect of complementary feeding among mothers in the working area of UPT Puskesmas Kampung Sawah.

These findings suggest that health education improved mothers' awareness and ability to apply safe complementary feeding practices, including maintaining food hygiene, proper food preparation, handwashing, using clean utensils, and safe food storage to reduce contamination and infection risks (Munjidah et al., 2023).

The findings are consistent with the Health Belief Model, which explains that behavioral change occurs when individuals recognize the benefits of healthy practices and the risks of unsafe behaviors. Health education increases mothers' awareness of the consequences of poor food hygiene while strengthening their confidence and practical skills in implementing safe feeding practices (Glanz et al., 2015; Dewi & Aminah, 2016). Counseling and demonstrations also enhance mothers' ability to prepare and handle complementary foods safely (Ani et al., 2020).

Previous studies support these results. Ani et al. (2020) found that health education significantly improves maternal practices related to food hygiene and safe infant feeding. Likewise, Dewi and Aminah (2016) reported that nutrition education enhances compliance with recommended hygiene and food safety practices during complementary feeding.

Overall, both health behavior theory and empirical evidence indicate that health education significantly improves the safety aspect of complementary feeding by increasing maternal knowledge, awareness, and practical skills related to food hygiene, thereby supporting better child nutrition, healthy growth, and reduced risk of foodborne infections (Ani et al., 2020).

f. The Effect of Health Education on the Application of Proper Complementary Feeding Practices (MP-ASI) Among Children Aged 6–12 Months in the Working Area of UPT Puskesmas Kampung Sawah

Based on the crosstabulation results, the control group did not show a consistent pattern of change in complementary feeding practices between the pre-test and post-test. Although some respondents improved, more than half of those initially categorized as having good practices declined to the poor category. The McNemar test showed no significant difference ($p = 1.000$; $p > 0.05$).

In contrast, the intervention group demonstrated clear improvement. Most respondents with initially poor practices changed to the good category, while the majority with good practices remained consistent, increasing the proportion of good feeding practices to 89.5% at the post-test. The McNemar test showed a significant difference ($p = 0.007$; $p < 0.05$), indicating that health education effectively improved complementary feeding practices among mothers in the working area of UPT Puskesmas Kampung Sawah.

These findings suggest that health education enhanced maternal knowledge and practical skills related to complementary feeding, including appropriate food texture, feeding frequency, meal preparation, responsive feeding, and age-appropriate nutritional recommendations (Sinaga & Pinem, 2026).

The findings are consistent with the Health Belief Model, which explains that individuals are more likely to adopt healthy behaviors when they recognize the benefits of appropriate practices and understand the risks of inadequate ones. Health education increases mothers' awareness of the importance of proper complementary feeding while strengthening their confidence in applying recommended feeding methods (Glanz et al., 2015; Ani et al., 2020).

Previous studies also support these results. Sinaga and Pinem (2026) reported that educational interventions significantly improve maternal complementary feeding methods and practical skills. Similarly, Harafat et al. (2025) found that health education enhances adherence to World Health Organization recommendations regarding age-appropriate feeding, nutritional adequacy, meal frequency, and responsive feeding practices.

Overall, both health behavior theory and empirical evidence indicate that health education significantly improves complementary feeding practices by strengthening maternal knowledge, practical skills, and self-confidence, thereby supporting optimal child nutrition, healthy growth, and development (Sinaga & Pinem, 2026; Harafat et al., 2025).

g. The Effect of Health Education on Complementary Feeding (MP-ASI) Behavior Among Children Aged 6–12 Months After Controlling for Confounding Variables Including Maternal Education, Maternal Age, and Maternal Occupation

Based on the Tests of Conditional Independence analysis, the intervention group showed no significant relationship between maternal educational level and changes in complementary feeding behavior, as indicated by both Cochran's test ($p = 0.236$) and the Mantel-Haenszel test ($p = 0.573$). These findings suggest that behavioral improvements were more strongly influenced by the health education intervention than by differences in maternal educational attainment (Sinaga & Pinem, 2026).

From an epidemiological perspective, education did not meet the criteria of a confounding variable because it was not significantly associated with behavioral outcomes. Therefore, the observed improvements in complementary feeding behavior were more likely attributable to the direct effect of health education rather than maternal education, age, or occupation.

These findings are consistent with the Health Belief Model, which explains that behavioral change is driven by perceived benefits, perceived barriers, and cues to action rather than sociodemographic characteristics alone. Health education increases maternal awareness, motivation, and self-efficacy, enabling behavioral improvements regardless of formal educational background (Glanz et al., 2015; Sinaga & Pinem, 2026). Likewise, the PRECEDE-

PROCEED Model identifies education as an enabling and reinforcing factor that facilitates positive behavioral change by providing accessible knowledge and practical skills.

Previous studies also support these findings. Harafat et al. (2025) reported that health education significantly improved complementary feeding behavior regardless of maternal educational level, indicating that access to effective educational interventions is more influential than formal education. These findings are also consistent with the WHO Guideline on Complementary Feeding (2023) and UNICEF recommendations, which emphasize caregiver education as a key strategy for improving infant and young child feeding practices.

Overall, maternal education did not act as a confounding variable in this study, strengthening the conclusion that the observed behavioral improvements were primarily the result of the health education intervention rather than differences in respondents' educational backgrounds.

This study has several limitations. The relatively small sample size and the use of self-reported questionnaires may limit the generalizability of the findings. Future studies should include larger populations and longer follow-up periods to confirm these results.

D. CONCLUSION AND SUGGESTIONS

The findings suggest that health education should be integrated into routine maternal and child health programs at primary healthcare facilities to improve complementary feeding practices and support child nutritional outcomes. Therefore, these findings confirm that health education is a major factor in improving complementary feeding behavior. Community health centers (Puskesmas) are recommended to enhance complementary feeding health education routinely and continuously through counseling programs, educational media, and mother-and-child classes. In addition, mothers of children under five are expected to apply the knowledge obtained in daily practice, particularly regarding the timeliness, adequacy, safety, and proper methods of complementary feeding according to health recommendations.

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F. REFERENCES

- Ani, N., Ani, N., Nugroho, F. S., & Wartini, W. (2020). Edukasi Perilaku Orang Tua dalam Pemberian MP-ASI pada Balita di Dusun Kodokan. *IJECS: Indonesian Journal of Empowerment and Community Services*, 1(2). <https://doi.org/10.32585/ijecs.v1i2.801>
- Anita, N. (2021). Pengaruh Pemberian Makanan Pendamping ASI Terhadap Nafsu Makan dan Perkembangan Pertumbuhan Anak Usia 7-12 Bulan. *Jurnal Antara Kebidanan*, 4(1). <https://doi.org/10.37063/jurnalantarakebidanan.v4i1.293>
- Ardikasari, H. W., & Mustikawati, N. (2022). Pengaruh Edukasi Pemberian Makanan Pendamping Air Susu Ibu (MP-ASI) Terhadap Pengetahuan Ibu Rumah Tangga Dengan Anak Usia 7-24 Bulan Di Desa Kesesi Kabupaten Pekalongan. *Department of Health Sciences, Universitas Muhammadiyah Pekajangan Pekalongan, Indonesia*.
- Aulia, S. P., Syarif, S., & Usman, A. N. (2022). Audio Visual Educational Food Complementary Breastfeeding To Mothers Against Improvement Of Baby's Nutritional Status. *Jurnal Kebidanan Malahayati*, 8(4). <https://doi.org/10.33024/jkm.v8i4.7473>
- Batubara, A. R., & Maisyura, N. (2024). Pengaruh Edukasi Kesehatan Terhadap Pengetahuan Ibu Tentang Pemilihan MPASI Yang Baik Pada Bayi Usia 6-24 Bulan Di Desa Meunasah Tambo Kecamatan Jeunieb Kabupaten Bireuen. *Journal of Healthcare Technology and Medicine*, 10(1).
- Dewi, M., & Aminah, M. (2016). Pengaruh Edukasi Gizi terhadap Feeding Practice Ibu Balita

- Stunting Usia 6-24 Bulan (The Effect of Nutritional Knowledge on Feeding Practice of Mothers Having Stunting Toddler Aged 6-24 Months). *Indonesian Journal of Human Nutrition*, 3(1). <https://doi.org/10.21776/ub.ijhn.2016.003.suplemen.1>
- Fauziah, L., Susanti, N., & Normila. (2023). Pengaruh Edukasi Gizi “Whatsapp Group” Terhadap Pengetahuan dan Praktik Pemberian Makanan Pendamping ASI. *Kajian Ilmiah Problema Kesehatan*, 8(3).
- Glanz, K., Rimer, B. k., & Viswanath, K. (2015). *Health Behavior and Health Education*.
- Harafat, F. T., Andriani, R., & Effiana, E. (2025). Pengaruh Edukasi Buklet Makanan Pendamping Air Susu Ibu Terhadap Pengetahuan Ibu dalam Pencegahan Weight Faltering di Puskesmas Aliyayang Pontianak. *Sari Pediatri*, 27(4). <https://doi.org/10.14238/sp27.4.2025.217-23>
- Helmi, R., & Lupiana, D. M. (2012). Faktor-Faktor Yang Berhubungan Dengan Pemberian Mp-Asi Dini Pada Bayi Di Kecamatan Sumberejo Kabupaten Tanggamus. *Jurnal Keperawatan*, VIII(1).
- Ida Alim, N., Azis Harun, A., Studi, P. S., STIKes Karya Kesehatan, K., Kunci, K., tentang MP-ASI, P., & Sistem Pencernaan, G. (2021). Hubungan Pengetahuan tentang Makanan Pendamping Air Susu Ibu Dini pada Bayi 0-6 bulan terhadap Resiko Gangguan Sistem Pencernaan di Wilayah Kerja Puskesmas Batalaiworu Kabupaten Muna. *Jurnal Ilmiah Karya Kesehatan*, 1(2).
- Ilmanisak, R., Pudjirahaju, A., & Anom Aswin, A. (2017). Edukasi MP-ASI, Sikap Ibu, dan Tingkat Konsumsi Energi- Protein Baduta Stunting Usia 7-24 Bulan. *Ojs.Poltekkes-Malang.Ac.Id*, 6(1).
- Indanah, & Ratna, D. J. (2020). Factors Related to Stunting in Toddlers. *Proceedings of the 1st International Conference on Science, Health, Economics, Education and Technology (ICoSHEET 2019)*, 8(2), 63–72. <https://doi.org/10.2991/ahsr.k.200723.048>
- Kadek, N., & Rahyanti, N. M. S. (2021). Pengaruh Edukasi MP-ASI terhadap Kesiapan Ibu dalam Pemenuhan Kebutuhan Gizi Bayi Usia 6 Bulan sampai 24 Bulan. *Jurnal Menara Medika*, 3(2723–6862).
- Marlinda, Neneng Julianti, Ida Widaningsih, & Deni Alamsah. (2025). Efektivitas Konseling MPASI Terhadap Pengetahuan Ibu Pada Bayi Usia 6–12 Bulan di Posyandu Karangsari Bekasi 2025. *Borneo Nursing Journal (BNJ)*, 8(1). <https://doi.org/10.61878/bnj.v8i1.334>
- Muharrama, I., Faradilla, A., Helviana, F. A., Saria, J. I., & Sabri, M. S. (2021). Pengaruh Edukasi MP-ASI Terhadap Peningkatan Pengetahuan Ibu The Effect of Breastfeeding Complimentary Food Education on Increasing Maternal Knowledge. *Ibnu Sina: Jurnal Kedokteran Dan Kesehatan-Fakultas Kedokteran Universitas Islam Sumatera Utara*, 20(2).
- Munjidah, A., Putra, N. E., Nahdlatul, U., & Surabaya, U. (2023). Edukasi Meningkatkan Literasi Ibu Dalam. *Jurnal Kesehatan Masyarakat*, 11.
- Ramandhani, R., & Setyarini, D. I. (2025). Pengaruh edukasi emo-demo makanan pendamping air susu ibu terhadap pengetahuan dan perilaku ibu balita gizi kurang. *Journal of Public Health Innovation*, 6(1). <https://doi.org/10.34305/2vvt5m16>
- Romadhoni, H., & Erismawati, E. (2025). Pengaruh E-Booklet tentang Mp-Asi dengan Responsive Feeding Terhadap Pengetahuan dan Sikap Ibu Hamil dalam Program Pencegahan Stunting. *MAHESA: Malahayati Health Student Journal*, 5(6). <https://doi.org/10.33024/mahesa.v5i6.17529>
- Sinaga, M., & Pinem, J. B. (2026). Faktor-Faktor Yang Mempengaruhi Pemberian Makanan Pendamping Asi (MP-ASI) Pada Bayi Di Klinik Pratama Manda Tahun 2025. *Journal of Innovative and Creativity (Joecy)*, 6(1). <https://doi.org/10.31004/joecy.v6i1.6412>
- Yuqiana, W. A., & Hani, U. (2020). Gambaran Status Gizi Pada Balita Tahun 2020 Naskah Publikasi. *Kesehatan*, 1(1), 1–5.