

Strengthening Infant and Young Child Feeding Practices Through WHO-Based Nutritional Counseling: Evidence from a Quasi-Experimental Study Among Mothers of Children Aged 6–23 Months

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Abstract:

Appropriate complementary feeding practices during the first two years of life are essential for supporting optimal growth and preventing childhood malnutrition. Maternal compliance with recommended complementary feeding practices remains a challenge, highlighting the need for effective interventions that improve maternal feeding behaviors. This study aimed to determine the effect of nutritional counseling on mothers' compliance with complementary feeding practices in accordance with World Health Organization (WHO) guidelines for children aged 6–23 months. A quantitative quasi-experimental study with a one-group pretest–posttest design was conducted among 30 mothers selected through purposive sampling. Maternal compliance with complementary feeding practices was assessed before and after nutritional counseling using a structured instrument based on WHO complementary feeding indicators, including feeding frequency, food diversity, food texture, and food hygiene practices. Data were analyzed using the Wilcoxon Signed Rank Test with a significance level of $\alpha = 0.05$. Nutritional counseling significantly improved maternal compliance with complementary feeding practices ($p < 0.001$). Before the intervention, maternal compliance was categorized as good in 30.0% of respondents, fair in 40.0%, and poor in 30.0%. After counseling, good compliance increased to 70.0%, fair compliance remained at 30.0%, and no respondents remained in the poor compliance category. Nutritional counseling effectively improved mothers' compliance with WHO-based complementary feeding practices among children aged 6–23 months. Structured counseling interventions should be integrated into maternal and child health programs to strengthen feeding behaviors and support improved child nutrition outcomes.

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INTRODUCTION

Complementary feeding is a critical component of infant and young child nutrition, particularly during the period of 6–23 months when breast milk alone cannot fully meet the increasing energy and nutrient requirements necessary for optimal growth and development (Capra et al., 2024). The transition from exclusive breastfeeding to complementary feeding represents a vulnerable period because inadequate feeding practices may contribute to growth faltering, micronutrient deficiencies, and increased risks of childhood morbidity (Simbolon & Suryani, 2024). Appropriate complementary feeding practices require the timely introduction of foods, adequate dietary diversity, sufficient meal frequency, suitable food texture, and safe feeding behaviors to support healthy child development (Dagne et al., 2022). Evidence from intervention studies also indicates that improving caregiver

knowledge and feeding behaviors through structured educational approaches can enhance complementary feeding practices and nutritional outcomes among young children (Rachmah et al., 2023).

Maternal compliance with recommended complementary feeding practices remains a significant challenge in many countries, including Indonesia, despite the availability of international recommendations and national nutrition programs (Yunitasari et al., 2022). Many mothers experience difficulties in implementing appropriate feeding behaviors due to limited nutritional knowledge, misconceptions about infant feeding, and inadequate understanding of age-specific dietary requirements (Andriani et al., 2023). Qualitative evidence indicates that caregiver decisions about complementary feeding are influenced by multiple contextual factors, including cultural beliefs, family support, food availability, and perceptions of children's feeding needs (Weber et al., 2023). Furthermore, caregiver preferences and practical considerations regarding food preparation, convenience, and accessibility may influence the selection and quality of complementary foods provided to children (Walls et al., 2023).

Indonesia continues to face considerable challenges in improving infant and young child feeding practices as part of broader efforts to reduce the prevalence of malnutrition and stunting (Titaley et al., 2023). Maternal characteristics, including education level, socioeconomic status, access to health information, and household conditions, have been identified as important determinants influencing complementary feeding practices among Indonesian children aged 6–23 months (Yunitasari et al., 2022). National-level evidence further indicates that dietary diversity, meal frequency, and minimum acceptable diet remain suboptimal among Indonesian children, with maternal education and socioeconomic inequalities contributing to variations in feeding outcomes (Nurokhmah et al., 2022). Strengthening community-based nutrition programs through effective counseling strategies, educational interventions, and behavior-change approaches is therefore essential for improving maternal adherence and sustaining appropriate complementary feeding behaviors (Nurrika et al., 2025).

Nutritional counseling has emerged as an important approach for improving maternal feeding behaviors by increasing knowledge, strengthening decision-making capacity, and providing practical guidance for daily child feeding practices (Schwarz et al., 2024). Previous studies have demonstrated that nutrition education interventions, including counseling sessions, demonstrations, and supportive communication approaches, can improve maternal knowledge and complementary feeding behaviors (Lincoln et al., 2022; Tadesse et al., 2023). The quality of counseling methods influences the effectiveness of these interventions, the relevance of educational materials, the frequency of communication, and the ability to address specific barriers mothers experience in their local context (Rachmah et al., 2023; Dwijayanti et al., 2024).

Current evidence has primarily focused on assessing changes in maternal knowledge, attitudes, or general infant-feeding behaviors following educational interventions, while evidence on measurable changes in maternal compliance with comprehensive WHO-based complementary feeding indicators remains limited (Andriani et al., 2023; Ativor & Salu, 2025). Many previous interventions have also evaluated short-term outcomes without specifically examining changes in compliance categories before and after counseling. The limited availability of context-specific evidence regarding the effectiveness of structured nutritional counseling in improving maternal adherence highlights the need for further investigation, particularly in community-based maternal and child health settings (Barbosa et al., 2024; Sanghvi et al., 2025).

This study is novel in evaluating the effect of structured nutritional counseling on maternal compliance with complementary feeding practices, using a pretest–posttest approach aligned with WHO complementary feeding recommendations. The study focuses on measurable behavioral

changes rather than solely assessing knowledge improvement, allowing a clearer understanding of whether counseling interventions can translate nutritional information into practical feeding behaviors. Previous intervention studies have demonstrated that nutrition education and counseling programs can improve maternal feeding-related outcomes and complementary feeding practices by strengthening caregivers' knowledge, confidence, and ability to apply appropriate feeding behaviors in daily life (Mardani et al., 2024; Moreira et al., 2022). The findings are expected to provide further evidence on the role of counseling-based interventions in strengthening infant and young child feeding programs.

The purpose of this study was to determine the effect of nutritional counseling on mothers' compliance with complementary feeding practices in accordance with WHO guidelines for children aged 6–23 months. The urgency of this research lies in the need to develop effective, practical strategies to improve maternal feeding behaviors during a critical period of child development. Recent evidence indicates that complementary feeding practices among children aged 6–23 months remain suboptimal in many settings and are influenced by maternal, socioeconomic, and contextual factors, underscoring the need for targeted interventions to improve feeding adherence (Mekonen et al., 2024). Evidence from this study may support healthcare providers, policymakers, and maternal-child nutrition programs in designing targeted interventions to enhance complementary feeding practices and improve child nutritional outcomes (Nurokhmah et al., 2025).

METHOD

Design

This study employed a quantitative research approach using a quasi-experimental design with a one-group pretest–posttest framework. The design was selected to evaluate changes in maternal compliance with complementary feeding practices before and after receiving nutritional counseling. The absence of randomization and a comparison group classified this study as a quasi-experimental investigation. Each participant served as her own control, allowing the researchers to assess changes in compliance following the intervention. The primary objective of this design was to determine whether nutritional counseling influenced mothers' adherence to complementary feeding practices in accordance with World Health Organization (WHO) recommendations for children aged 6–23 months.

Setting and Time

The study was conducted in maternal and child health service settings, such as community health centers, integrated health service posts, or designated healthcare areas, where mothers with children aged 6–23 months received health services. The selected setting was considered appropriate because complementary feeding practices are routinely monitored within primary healthcare and community-based maternal-child health programs. The study period consisted of the preparation phase, participant recruitment, baseline assessment (pretest), implementation of nutritional counseling, and post-intervention assessment (posttest).

Population, Sample, and Sampling

The study population consisted of mothers with children aged 6–23 months who received maternal and child health services in the study area. The selected age range corresponded with the WHO complementary feeding period, during which children require additional nutritional intake to support optimal growth and development. A total of 30 mothers participated in this study. Participants were selected using purposive sampling based on predetermined inclusion and exclusion criteria.

The inclusion criteria were mothers of children aged 6–23 months who were willing to participate in the nutritional counseling program, able to communicate effectively, and who completed both pretest and posttest assessments. Mothers who did not complete the counseling intervention or failed to participate in the post-intervention assessment were excluded from the study.

Intervention

The intervention consisted of structured nutritional counseling to improve mothers' compliance with complementary feeding practices in accordance with WHO guidelines. The counseling was delivered directly by researchers or trained health workers, using educational materials such as leaflets, flipcharts, and demonstrations of complementary foods. The counseling content focused on essential components of complementary feeding, including the appropriate timing of introducing complementary foods, feeding frequency, age-appropriate food texture, dietary diversity, food hygiene, and food safety practices. The intervention was designed to improve maternal understanding and practical application of recommended complementary feeding behaviors.

Instrument and Measurement Properties

Maternal compliance with complementary feeding practices was assessed using a structured questionnaire or assessment sheet developed based on the WHO complementary feeding indicators. The measurement components included the appropriate initiation of complementary feeding, feeding frequency, food consistency or texture, dietary diversity, and hygiene and safety practices. The compliance assessment was conducted at two time points: before nutritional counseling (pretest) and after (posttest). Compliance scores were categorized into good, fair, and poor. The instrument was used to evaluate changes in maternal complementary feeding practices following the nutritional counseling intervention.

Data Collection Procedure

Data collection was conducted through structured questionnaires and brief observations performed before and after the nutritional counseling intervention. The pretest assessment was administered to determine baseline maternal compliance with complementary feeding recommendations. The nutritional counseling session was subsequently provided using standardized educational approaches and supporting media. The posttest assessment was conducted after the intervention to evaluate changes in maternal compliance. Collected data were processed through editing, coding, tabulation, and data entry procedures before statistical analysis.

Data Analysis

Data analysis included univariate and bivariate statistical procedures. Univariate analysis was performed to describe participant characteristics and the distribution of maternal compliance levels before and after the intervention. Results were presented as frequencies and percentages. Bivariate analysis was conducted to examine differences in maternal compliance before and after nutritional counseling. The Wilcoxon Signed Rank Test was applied because the study involved paired measurements obtained from the same participants before and after the intervention. Statistical significance was determined at the $\alpha = 0.05$ level.

Ethical Declaration

Ethical approval was obtained from the Faculty of Health Sciences, Institut Teknologi Sains dan Kesehatan RS dr. Soepraoen. All participants provided their consent to participate in the study,

and the research procedures were conducted in accordance with ethical principles for health research involving human participants.

RESULT

The demographic characteristics of respondents are presented in Table 1. Most mothers were aged 20–35 years (53.3%), followed by those aged >35 years (46.7%), with no respondents aged <20 years. Regarding education level, more than half of the mothers had a college/university background (53.3%), followed by senior high school (30.0%) and junior high school (16.7%). By employment status, most respondents were housewives (53.3%), followed by government employees (26.7%) and private employees (20.0%). Most children were aged 7–12 months (36.7%), followed by 21–24 months (26.7%), 13–16 months (20.0%), and 17–20 months (16.7%). In terms of parity, the largest proportion of mothers had three children (36.7%), followed by two (26.7%), one (20.0%), four (13.3%), and five (3.3%). These findings indicate that most participants were adult mothers with relatively high levels of education and diverse socioeconomic backgrounds.

Table 1. Demographic Characteristics of Participants (N = 30)

Characteristic	Category	n	%
Age	< 20 years old	0	0
	20-35 years old	16	53.3
	>35 years old	14	46.7
Education	Elementary school	0	0
	Junior high school	5	16.7
	Senior High School	9	30.0
	College/university	16	53.3
Employment	Housewife	16	53.3
	Private employee	6	20
	Government employee	8	26.7
Children aged	7-12 months	11	36.7
	13-16 months	6	20.0
	17-20 months	5	16.7
	21-24 months	8	26.7
Number of children	1	6	20.0
	2	8	26.7
	3	11	36.7
	4	4	13.3
	5	1	3.3
Adherence pre	Good	9	30
	Fair	12	40
	Poor	9	30
Post-adherence	Good	21	70
	Fair	9	30
	Poor	0	0

Compliance Before and After Intervention

Maternal compliance improved following the intervention. Before nutritional counseling, most respondents were categorized as having fair compliance (40.0%), while good and poor compliance each accounted for 30.0%. After the intervention, the proportion of respondents with good compliance increased to 70.0%, while the remaining 30.0% were categorized as fair compliance. No respondents remained in the poor-compliance category, indicating a positive shift in maternal compliance following nutritional counseling.

Table 2. Comparison of Adherence Before and After the Intervention

Variable	n	Test	p
Adherence	30	Wilcoxon signed-rank test	< 0.001

The Wilcoxon Signed Rank Test demonstrated a significant difference in maternal compliance before and after the intervention ($p < 0.001$; $n = 30$). The findings indicate that nutritional counseling significantly improved compliance with complementary feeding practices. The improvement was reflected by a shift in compliance levels from a distribution of good, fair, and poor categories before the intervention to predominantly good compliance after the intervention, with no respondents remaining in the poor compliance category. These results suggest that nutritional counseling is an effective strategy for enhancing maternal adherence to recommended health practices.

DISCUSSION

This study demonstrated that nutritional counseling significantly improved mothers' compliance with complementary feeding practices in line with WHO guidelines among mothers of children aged 6–23 months. The intervention resulted in a significant shift in compliance levels: the proportion of mothers categorized as having good compliance increased from 30.0% before counseling to 70.0% after counseling, while the poor compliance category disappeared. The statistical analysis using the Wilcoxon Signed-Rank Test confirmed a significant difference between pre- and post-intervention compliance levels ($p < 0.001$), indicating that structured nutritional counseling was effective in improving maternal practices related to complementary feeding. Previous evidence has shown that counseling-based nutrition interventions can strengthen maternal knowledge, decision-making, and infant and young child feeding behaviors through targeted communication strategies. (Bhanot et al., 2023).

The improvement in maternal compliance observed in this study reflects the role of nutrition counseling as a behavioral change intervention that enhances mothers' understanding, confidence, and ability to implement appropriate complementary feeding practices. Complementary feeding behaviors are influenced not only by access to food resources but also by maternal knowledge, perceptions, decision-making abilities, and practical skills in food preparation. Recent evidence indicates that maternal nutrition education interventions can improve mothers' self-efficacy and complementary feeding behaviors by strengthening knowledge and confidence in child feeding practices (Mardani et al., 2024). Nutritional counseling provides mothers with evidence-based information regarding the appropriate timing of complementary feeding initiation, meal frequency, dietary diversity, food consistency, and hygiene practices. A recent review also demonstrated that counseling-based approaches, including peer and health worker support, contribute to improvements in complementary feeding indicators, such as meal frequency, dietary diversity, and appropriate food preparation practices (Haque et al., 2023). The improvement observed after counseling suggests that increasing maternal awareness through structured education may contribute to the adoption of healthier feeding behaviors during the critical period of child growth and development.

The findings of this study are consistent with previous research demonstrating that nutrition education interventions can improve mothers' knowledge and practices regarding complementary feeding. A randomized controlled trial reported that structured nutritional education programs significantly improved maternal knowledge, self-efficacy, and complementary feeding practices among mothers of children under two years of age (Mardani et al., 2024). Previous studies have shown that counseling programs delivered through direct education, demonstrations, and interactive

communication approaches are effective in increasing maternal understanding of appropriate complementary feeding recommendations. Similar improvements have been reported in studies involving community-based nutrition interventions, in which mothers receiving structured counseling demonstrated greater dietary diversity, feeding frequency, and adherence to recommended infant feeding practices than at baseline. Evidence from a quasi-experimental nutrition intervention in Bangladesh further demonstrated that integrated nutrition counseling improved child feeding practices and maternal dietary behaviors, highlighting the importance of structured educational strategies within community health programs (Sethi et al., 2023). The current findings strengthen existing evidence that maternal education remains a fundamental component of strategies to improve infant and child nutritional outcomes.

The effectiveness of nutritional counseling in this study may be explained by its ability to address specific barriers mothers face in implementing complementary feeding recommendations. Mothers often face uncertainty about appropriate food choices, portion sizes, preparation methods, and age-specific feeding requirements. Counseling sessions provide opportunities for clarification, problem-solving, and reinforcement of correct practices. Research evaluating educational interventions grounded in behavioral theories has shown that interactive counseling approaches can modify maternal attitudes, perceived control, and feeding intentions, thereby improving complementary feeding practices (Rachmah et al., 2023). The use of educational media and complementary food demonstrations in this study enhanced mothers' practical understanding by translating theoretical recommendations into applicable daily behaviors. Recent intervention studies using practical demonstration methods have also reported significant improvements in maternal knowledge, attitudes, and complementary feeding behaviors, suggesting that hands-on learning approaches are more effective than information provision alone (Intiyati et al., 2024). This approach is consistent with evidence indicating that counseling interventions incorporating practical examples and interactive communication are more effective than information delivery alone.

Participants' characteristics may also have contributed to the observed improvement in compliance. Most mothers in this study were adults, with more than half having a college or university education. Higher educational attainment may facilitate the acceptance and application of health information because educated mothers generally have a greater ability to access, understand, and evaluate nutritional recommendations. Previous research has identified maternal education as an important determinant of infant feeding behavior, although education alone does not guarantee appropriate practices (Sarkar et al., 2023). The findings suggest that counseling interventions remain valuable even among mothers with relatively favorable educational backgrounds, as they provide specific guidance on complementary feeding recommendations that may not be available through general education (Herman et al., 2023).

The employment characteristics of participants may provide additional context for interpreting the findings. More than half of the mothers were homemakers, while others were employed in private and government sectors. Employment status may influence the consistency of complementary feeding practices due to differences in time availability, childcare support, and daily routines. Mothers who remain at home may have greater opportunities to prepare and monitor meals, whereas working mothers may require additional support strategies to maintain recommended feeding behaviors. Maternal employment and other socio-environmental factors have been identified as important determinants influencing complementary feeding practices among young children (Herman et al., 2023). The improvement observed among participants suggests that structured counseling may help mothers from different social backgrounds overcome practical challenges associated with complementary feeding, as behavioral interventions can address knowledge gaps and contextual barriers that affect feeding practices (Gebretsadik et al., 2025).

The findings also have important implications for maternal and child health services, particularly within primary healthcare and community-based programs. Nutritional counseling can be integrated into existing maternal-child health platforms, including community health services and child growth monitoring programs, as an accessible strategy to improve complementary feeding practices. Healthcare providers can use counseling sessions not only to provide information but also to identify individual barriers, offer tailored recommendations, and strengthen mothers' confidence in managing their children's nutrition. Evidence from intervention studies indicates that structured nutrition education programs delivered through community healthcare settings can improve maternal nutritional knowledge, self-efficacy, and complementary feeding practices (Mardani et al., 2024). The implementation of continuous counseling programs may support broader efforts to prevent childhood malnutrition, including stunting and growth impairment associated with inadequate feeding practices (Gebretsadik et al., 2025).

The findings further suggest that complementary feeding interventions should move beyond one-time educational approaches toward continuous behavioral support. Although a single counseling intervention produced significant improvement in this study, maintaining long-term behavioral changes may require repeated reinforcement, monitoring, and family involvement. The inclusion of digital communication strategies, reminder systems, or follow-up counseling may provide additional support by allowing mothers to receive continuous guidance after the initial intervention. Digital-based nutrition education approaches, including WhatsApp-supported interventions, have demonstrated potential for improving maternal knowledge and complementary feeding behaviors (Rachmah et al., 2023). Such approaches may be particularly beneficial for improving adherence among mothers who have difficulty maintaining recommended practices over time, as digital platforms can expand access to nutrition information and ongoing support (Hanindita et al., 2024).

Several limitations should be considered when interpreting the findings of this study. The use of a one-group pretest–posttest design without a control group limits the ability to establish a direct causal relationship between nutritional counseling and improved compliance. Changes observed after the intervention may have been influenced by external factors, including exposure to other sources of nutritional information or increased awareness due to participation in the study. Future research using randomized controlled designs or comparison groups is needed to provide stronger evidence regarding the effectiveness of nutritional counseling interventions. Randomized controlled trials are recommended in nutrition intervention research because they provide stronger evidence for determining whether observed behavioral improvements are directly attributable to the intervention. (Mardani et al., 2024)

The relatively small sample size of 30 participants represents another limitation that may affect the generalizability of the findings. The participants were selected using purposive sampling, which may introduce selection bias because mothers willing to participate may have had greater motivation to improve child nutrition. Larger studies involving diverse populations and different healthcare settings are required to confirm the effectiveness of nutritional counseling across a broader range of maternal and socioeconomic characteristics. Previous complementary feeding studies have emphasized the importance of involving larger, more diverse populations to improve external validity and ensure that intervention effects can be generalized across maternal and socioeconomic groups. (Haque et al., 2023)

The measurement approach used in this study also requires consideration. Maternal compliance was assessed using categorized scores, which may not fully capture variations in specific complementary feeding behaviors. Self-reported assessments may also be influenced by recall or social desirability bias, as mothers may report practices that they perceive as appropriate. Future studies should consider combining questionnaires with direct observation, dietary

assessment methods, or validated complementary feeding indicators to obtain more comprehensive measurements of maternal practices. Recent methodological research has highlighted that infant and young child feeding assessments may be affected by recall and social desirability biases, emphasizing the need for validated measurement approaches and improved dietary assessment methods (Arimond & Flax, 2025)

Despite these limitations, this study provides meaningful evidence regarding the contribution of nutritional counseling to improving maternal compliance with WHO-based complementary feeding recommendations. The significant improvement observed after the intervention supports the continued development of structured nutrition education programs as part of maternal and child health strategies. The findings emphasize the importance of empowering mothers through accessible, evidence-based counseling to promote appropriate feeding behaviors during the critical early years of childhood development. Evidence from recent studies indicates that improving maternal feeding practices requires effective educational strategies supported by valid assessment tools and evidence-based complementary feeding recommendations. (Andriani et al., 2023)

CONCLUSION

This study demonstrates that nutritional counseling significantly improves mothers' compliance with complementary feeding practices in line with WHO guidelines among children aged 6–23 months. The significant improvement in compliance levels after the intervention indicates that structured counseling can effectively enhance maternal knowledge and feeding practices related to appropriate complementary feeding. Nutritional counseling represents a valuable strategy for strengthening maternal and child health programs by promoting evidence-based feeding behaviors and supporting efforts to improve child nutrition outcomes. Future implementation should focus on integrating continuous counseling and follow-up support within primary healthcare services to sustain behavioral changes and maximize the impact of complementary feeding interventions.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest related to this study. This research was conducted independently without any financial or non-financial relationships that could be perceived as influencing the results or interpretation of the findings. The authors have no affiliations with organizations or entities that could benefit from the outcomes of this research.

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