Effectiveness of Flipchart-Based Education on Mothers' Knowledge and Attitudes Toward Complementary Feeding for Stunting Prevention in Bantul, Indonesia

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Abstract. Improving complementary feeding practices remains a central strategy for preventing stunting during early childhood, particularly in community-based health settings. This study assessed whether flipchart-based nutrition education offers greater improvements in maternal knowledge and attitudes toward complementary feeding than leaflet-based education. A quasi-experimental design was implemented among 60 mothers of infants aged 6–9 months attending community health posts in Bantul, Indonesia. Participants were assigned to either an intervention group that received flipchart-based nutrition education or a control group that received leaflet-based education. Maternal knowledge and attitudes were assessed using structured questionnaires administered before and after the intervention. Within-group changes were examined using the Wilcoxon signed-rank test, and post-intervention comparisons between groups were analyzed using the Mann–Whitney U test. Mothers who received flipchart-based education showed greater improvements in both knowledge and attitudes toward complementary feeding than those who received leaflet-based materials. The findings suggest that interactive and visually supported educational media may enhance the effectiveness of community nutrition education programs aimed at promoting appropriate complementary feeding practices during the early-life 1,000-day period.

Keywords: complementary feeding, stunting, nutrition education, flipchart, maternal attitudes, maternal knowledge

1 Introduction

Linear growth faltering during early childhood reflects cumulative challenges related to feeding practices, infection exposure, and caregiving conditions within the household environment. In many low and middle income settings, inappropriate complementary feeding remains a key contributor to persistent undernutrition beyond infancy (1,2).

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Strengthening maternal capacity during the complementary feeding period is therefore essential to support optimal child growth and reduce the risk of stunting.

The transition to complementary feeding marks a period when infants require nutritionally adequate, diverse, and age appropriate foods in addition to breast milk. When complementary feeding practices are suboptimal, children are more likely to experience growth faltering and other adverse nutritional outcomes (3). Interventions that support mothers in understanding and applying recommended feeding practices are particularly important during this critical developmental stage.

Mothers play a key role in determining complementary feeding practices through daily decisions regarding food selection, preparation, and feeding behaviors. Maternal knowledge and attitudes are important determinants of adherence to recommended feeding practices (4). However, in many community settings, mothers face constraints related to limited education, access to information, and opportunities for interaction with health workers, which may hinder the effective application of nutrition recommendations (5).

Nutrition education contributes to strengthening maternal understanding and attitudes toward feeding practices for infants and young children. Evidence from previous studies indicates that appropriately designed educational interventions can support better comprehension and encourage positive feeding behaviors (6,7). However, the impact of nutrition education is shaped not only by the substance of the messages delivered but also by the educational media through which the information is conveyed.

Leaflets are commonly used in community health services due to their low cost and ease of distribution. However, leaflet-based education often relies on text-based information and provides limited opportunities for interaction, which may reduce its effectiveness among mothers with diverse educational backgrounds (8). In contrast, flipchart-based education utilizes visual illustrations accompanied by guided explanations, allowing two-way communication between facilitators and participants. Visual and interactive learning approaches have been shown to improve comprehension, engagement, and retention of health information among adult learners (9,10).

In community-based health settings such as Posyandu, mothers' educational backgrounds and exposure to nutrition information vary considerably. Educational approaches that incorporate visual elements and interactive communication may therefore be more effective than text-based materials alone. Visual and interactive learning strategies have been shown to enhance comprehension, engagement, and confidence in applying health-related information among adult learners (9,11).

Flipchart-based education facilitates guided explanations, discussion, and clarification during educational sessions, allowing health workers to address misconceptions and adapt messages to participants' needs. Previous studies have demonstrated that flipchart-assisted nutrition education can improve knowledge and attitudes related to maternal and child nutrition in community settings (12,13). However, evidence directly comparing the effectiveness of flipchart-based and leaflet-based nutrition education for complementary feeding in Indonesia remains limited.

Accordingly, this study evaluated the impact of flipchart-based nutrition education, relative to leaflet-based education, on maternal knowledge and attitudes toward complementary feeding for stunting prevention. The results aim to guide the selection of

appropriate educational media for community-based maternal nutrition programs, particularly those addressing the early-life 1,000-day period.

2 Methods

A comparative quasi-experimental approach was employed to evaluate differences in maternal outcomes after exposure to two nutrition education modalities. The study was conducted at multiple community health posts (Posyandu) in Bantul District, Indonesia, within routine maternal and child health service activities.

Participants were mothers of infants aged 6–9 months and were recruited using purposive sampling based on predefined inclusion criteria. Eligible participants were primary caregivers who agreed to attend the educational sessions and provided written informed consent. Mothers who did not complete either the pre-intervention or post-intervention assessment were excluded from the analysis.

Sixty mothers met the eligibility criteria and were allocated into two groups. The intervention group (n = 30) received nutrition education delivered via flipchart media, whereas the control group (n = 30) received nutrition education delivered using leaflet media. Educational sessions were facilitated by trained health personnel using standardized materials. In the intervention group, flipcharts were utilized to present content through visual illustrations, guided explanations, and facilitated group discussions. In contrast, the control group received written educational materials in the form of leaflets containing information on complementary feeding.

Both groups received education on comparable topics, including principles of complementary feeding, age-appropriate food types and textures, feeding frequency, and basic hygiene practices. Education sessions were conducted in group settings and lasted approximately 30–45 minutes.

Maternal knowledge and attitudes related to complementary feeding were measured using structured questionnaires developed based on national complementary feeding guidelines. Knowledge was assessed through multiple-choice questions, while attitudes were measured using a Likert-scale format. Data were collected at two time points: prior to the intervention (pretest) and after the intervention (posttest).

Data were analyzed using statistical software. Descriptive analyses were conducted to summarize participant characteristics and baseline measurements. Changes in knowledge and attitude scores within each group were analyzed using the Wilcoxon signed-rank test, whereas post-intervention comparisons between the intervention and control groups were conducted using the Mann–Whitney U test. A p-value of less than 0.05 was considered statistically significant.

Ethical approval for the study was obtained from the Health Research Ethics Committee of Poltekkes Kemenkes Yogyakarta (Approval No. 142/EC/2025). Prior to participation, all respondents received a detailed explanation of the study procedures and objectives and provided written informed consent.

3 Results and Discussion

An overview of participants' baseline sociodemographic characteristics for both study groups is provided in Table 1.

Table 1. Baseline Sociodemographic Profiles of Study Participants

Variable	Interven-tion		Control	
	n	%	n	%
Maternal Age (years)				
<35	30	100	24	80
≥35	0	0	6	20
Educational Attainment				
Higher education	2	6.7	6	20
Secondary education	23	76.7	21	70
Primary education	5	16.7	3	10
Employment Status				
Not employed	13	43.3	14	46.7
Employed	17	56.7	16	53.3
Household Income Level				
≥ Locally established minimum wage	9	30	10	33.4
< Locally established minimum wage	21	70	20	66.7

Employment patterns were similarly distributed across the intervention and control groups, with comparable proportions of mothers who were employed and not employed. Regarding household income, most respondents in both groups reported income levels below the regional minimum wage, representing 70.0% of households in the intervention group and 66.7% in the control group.

Taken together, the absence of statistically significant differences in baseline sociodemographic characteristics indicates that both groups started from comparable conditions, thereby supporting the internal validity of the study and allowing post-intervention effects to be attributed primarily to the intervention rather than to confounding factors (2).

The predominance of mothers under 35 years of age in both groups reflects an age range commonly associated with active reproductive years and greater openness to health-related information (1). This demographic profile may facilitate engagement with nutrition education and the adoption of recommended complementary feeding practices. In addition, the high proportion of mothers with secondary education suggests a level of educational readiness that may support the uptake of nutrition messages, particularly when delivered through educational approaches that emphasize clarity, interaction, and practical application across diverse educational backgrounds (3). In this

context, educational approaches that simplify messages and encourage interaction may enhance comprehension across varying educational backgrounds.

Although employment status and household income are known to influence access to health information and food resources, the balanced distribution of these variables between groups suggests that their potential effects were similar across study arms. Lower household income has been consistently associated with increased vulnerability to undernutrition due to constraints in accessing nutritious foods and health services (1). Therefore, the comparable socioeconomic profiles observed in this study provide a suitable context for evaluating the effectiveness of practical and context-sensitive nutrition education strategies.

Taken together, the comparable baseline characteristics between groups indicate that subsequent differences in maternal knowledge and attitudes observed after the intervention were unlikely to be driven by underlying sociodemographic factors, thereby strengthening the interpretation of the intervention effects.

Table 2. Changes in Maternal Knowledge and Attitudes Following Nutrition Education

Outcome Variable	**Intervention Group (n=30)**			**Control Group (n=30)**		
	Pre-intervention	Post-intervention	p-value	Pre-intervention	Post-intervention	p-value
Knowledge Score (Median, Min–Max)	8 (6–10)	10 (9–10)	0,001	9 (6–10)	9 (7–10)	0,065
Attitude Score (Median, Min–Max)	42 (35–48)	46 (36–49)	0,001	44.5 (38–48)	44.5 (38–48)	0,002

Wilcoxon Signed-Rank Test

Within-group analysis of maternal knowledge and attitudes before and after the intervention is presented in Table 2. In the intervention group, mothers who received flipchart-based nutrition education showed statistically significant improvements in both outcomes. The median knowledge score increased from 8 (6–10) at baseline to 10 (9–10) after the intervention ($p = 0.001$). Similarly, the median attitude score increased from 42 (35–48) to 46 (36–49) following the intervention ($p = 0.001$).

In contrast, the control group, which received leaflet-based nutrition education, did not demonstrate a statistically significant change in maternal knowledge, with median scores remaining at 9 [from 9 (6–10) to 9 (7–10); $p = 0.065$]. However, a statistically significant improvement in maternal attitudes was observed in the control group, although the magnitude of change was limited, with the median attitude score remaining at 44.5 (38–48) before and after the intervention ($p = 0.002$).

Table 3. Post-Intervention Comparison of Maternal Outcomes Between Groups

Outcome Measure	Intervention Group (n=30)	Control Group (n=30)	p-value
Knowledge score (Median, Min–Max)	10 (9–10)	9 (7–10)	0.001
Attitude score (Median, Min–Max)	46 (36–49)	44.5 (38–48)	0.039

Mann–Whitney U Test

Post-intervention outcomes comparing the intervention and control groups are presented in Table 3. The Mann–Whitney U test revealed statistically significant differences in both maternal knowledge and attitudes after the intervention. Mothers who received flipchart-based nutrition education demonstrated higher median knowledge scores than those in the leaflet-based group (10 [9–10] vs. 9 [7–10]; p = 0.001). In a similar pattern, the median post-intervention attitude score was also greater in the intervention group compared with the control group (46 [36–49] vs. 44.5 [38–48]; p = 0.039).

These findings indicate that mothers who received flipchart-based nutrition education achieved significantly higher knowledge and more favorable attitudes toward complementary feeding compared with those who received leaflet-based education.

Post-intervention comparisons between the intervention and control groups demonstrated statistically significant differences in both maternal knowledge and attitudes, as shown in Table 3. Mothers who received flipchart-based nutrition education achieved higher median post-intervention knowledge scores compared with those who received leaflet-based education. A similar pattern was observed for maternal attitudes, with significantly higher scores in the intervention group. These findings indicate that interactive visual education formats are more effective than text-based materials in improving maternal outcomes related to complementary feeding.

The superior performance of flipchart-based education aligns with previous evidence suggesting that interactive and participatory nutrition education approaches enhance maternal understanding and engagement more effectively than passive information delivery (12–14).

Visual media facilitate learning by translating abstract nutrition concepts into concrete, context-specific messages that are easier for mothers to comprehend and apply in daily feeding practices (9,11).

In contrast, leaflet-based education produced limited effects, particularly with respect to maternal knowledge. Although a modest improvement in attitudes was observed in the control group, the absence of meaningful knowledge gains suggests that one-way, text-heavy educational materials may be insufficient to support sustained learning. This finding is consistent with earlier studies reporting that non-interactive educational strategies are less effective in promoting long-term behavioral change in complementary feeding practices (15,16).

The between-group differences further underscore the importance of delivery modality in nutrition education. Educational effectiveness is influenced not only by content, but also by how information is communicated and the extent to which participants are actively involved in the learning process (10,17).

Flipchart-based sessions allow for dialogue, clarification, and adaptation to participants' needs, thereby strengthening self-efficacy and readiness to adopt recommended complementary feeding behaviors (9,18).

Overall, these findings support the growing body of evidence that community-based, interactive nutrition education interventions contribute meaningfully to improving maternal knowledge and attitudes toward complementary feeding, which are critical determinants of child growth and stunting prevention in low- and middle-income settings (2,19,20).

4 Conclusion and Recommendations

This study concludes that nutrition education delivered using flipchart media produces greater improvements in maternal knowledge and attitudes toward complementary feeding than leaflet-based education. The use of interactive visual materials supports clearer comprehension and active participation among mothers, particularly in community-based health service settings.

The findings highlight the value of incorporating interactive educational media into routine maternal nutrition programs to strengthen mothers' capacity to implement appropriate complementary feeding practices during the first 1,000 days of life. Flipchart-based education offers practical benefits by allowing flexible, two-way communication and context-specific explanations that can be adapted to participants' needs.

Based on these findings, the application of flipchart-based nutrition education is recommended for community-level stunting prevention initiatives, including Posyandu activities, the Family Assistance Team (TPK), and First 1,000 Days of Life programs. Future studies should further assess the sustainability of behavior change associated with this educational approach and evaluate its effects on actual feeding practices and child nutritional outcomes, as well as explore digital or hybrid formats to expand program reach.

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