



Effectiveness of emergency nutrition program for toddlers after Mount Semeru eruption in Lumajang: CIPPO evaluation

Efektivitas program gizi darurat bagi balita pasca erupsi Gunung Semeru di Kabupaten Lumajang: Evaluasi CIPPO

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Article History:

Received: November 27, 2025; Revised: February 13, 2026; Accepted: March 05, 2026; Published: September 02, 2026.

Publisher:



Politeknik Kesehatan Aceh
Kementerian Kesehatan RI

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Abstract

Malnutrition in toddlers remains a public health concern in Indonesia. East Java reports a relatively high prevalence of wasting (7.2%), while Lumajang Regency recorded a severe wasting prevalence of 6.9% in 2022, exceeding WHO public health thresholds and increasing from the previous year. The 2021 eruption of Mount Semeru disrupted food systems and limited access to health and nutrition services, increasing nutritional risks among affected toddlers. This study evaluated the effectiveness of an emergency nutrition program for toddlers in Lumajang Regency, using the CIPPO model. This evaluative study used a mixed-method approach with an exploratory sequential design. Data were collected through in-depth interviews with seven informants, questionnaires from 44 mothers, and comparisons of the nutritional status of 16 toddlers. Data were analyzed using content analysis and paired-sample t-tests. The context (67%) and process (72%) aspects were moderately effective, whereas the input aspect was very effective (86%). The product aspect was very effective (100%), indicating substantial improvements in maternal knowledge and feeding behaviors. However, no statistically significant changes were observed in the nutritional status of toddlers ($p = 0.344$). In conclusion, the program improved maternal knowledge and feeding behavior but showed limited measurable impact on the toddlers' anthropometric status.

Keywords: CIPPO model, effectiveness, emergency nutrition, program evaluation, toddler

Abstrak

Malnutrisi pada balita masih menjadi masalah kesehatan masyarakat di Indonesia. Jawa Timur melaporkan prevalensi *wasting* yang relatif tinggi (7,2%), sementara Kabupaten Lumajang mencatat prevalensi *severe wasting* berat sebesar 6,9% pada tahun 2022, melampaui ambang batas masalah kesehatan masyarakat menurut WHO dan meningkat dibandingkan tahun sebelumnya. Erupsi Gunung Semeru tahun 2021 mengganggu sistem pangan serta membatasi akses terhadap layanan kesehatan dan gizi, sehingga meningkatkan risiko masalah gizi pada balita terdampak. Penelitian ini mengevaluasi efektivitas program gizi darurat bagi balita di Kabupaten Lumajang menggunakan model CIPPO. Studi evaluatif ini menerapkan pendekatan *mixed-method* dengan desain *exploratory sequential*. Data dikumpulkan melalui wawancara mendalam terhadap 7 informan, kuesioner dari 44 ibu, serta perbandingan status gizi 16 balita. Analisis data dilakukan menggunakan content analysis dan uji *paired sample t-test*. Aspek konteks (67%) dan proses (72%) dinilai cukup efektif, sedangkan aspek input sangat efektif (86%). Aspek produk sangat efektif (100%), menunjukkan peningkatan signifikan pada pengetahuan ibu dan perilaku pemberian makan. Namun, tidak ditemukan perubahan bermakna secara statistik pada status gizi balita (p

= 0,344). Kesimpulan, program meningkatkan pengetahuan ibu dan perilaku pemberian makan, namun menunjukkan dampak terukur yang terbatas terhadap status antropometri balita.

Kata Kunci: Balita, efektivitas, gizi darurat, model CIPPO, program evaluasi

Introduction

Natural disasters are major contributors to the declining nutritional status of toddlers, particularly in disaster-prone countries (World Risk Report, 2022). Studies from several low- and middle-income countries have documented an increased risk of undernutrition following disasters. Capanzana et al. (2018) reported that toddlers living in coastal, flood-prone, and tsunami-affected areas exhibit a high prevalence of malnutrition, including underweight, stunting, and wasting. Increases in stunting and underweight among toddlers one year after major natural disasters in India. In Indonesia, disasters have been associated with worsening child nutritional outcomes, including an increased prevalence of wasting. Evidence from Nepal and Iran further supports the link between disasters and an elevated malnutrition risk among young children (Mokhtari et al., 2019; Shrestha et al., 2020).

In Indonesia, the nutritional status of toddlers is a significant public health concern. The national prevalence of wasting was reported to be 7.7% (Indonesian Ministry of Health, 2022), indicating a persistent acute nutritional problem. At the provincial level, East Java recorded a wasting prevalence of 7.2%, while Lumajang Regency reported a severe wasting prevalence of 6.9% in 2022, exceeding the WHO public health thresholds. One contributing factor is the low level of community knowledge, which influences attitudes and behaviors toward child feeding and nutrition (Fatharanni et al., 2019). This vulnerability may be exacerbated during disasters because of disruptions in clean water supply, sanitation, and local food production (Handayani et al., 2019).

A large-scale disaster occurred in December 2021 when Mount Semeru erupted in the Lumajang Regency. Preliminary findings indicate that the eruption disrupted transportation access and damaged agricultural land, which are key sources of food and livelihood for affected communities. Such disruptions may increase food insecurity and limit access to

essential health and nutrition services, thereby increasing nutritional risks among toddlers. Data from *Badan Pusat Statistik (BPS)* indicate that in 2022, 56.30% of residents aged ≥ 10 years in Lumajang Regency had primary education or lower, comprising 35.53% who completed elementary school and 20.77% who had no primary certificate (Badan Pusat Statistik, 2022). This educational profile may influence health literacy and the practice of caregiving.

To mitigate these risks, the government implemented an emergency nutrition program, which is defined in this study as an integrated package of nutrition-specific and nutrition-sensitive interventions delivered during the post-disaster response period. The program includes growth monitoring, micronutrient supplementation, supplementary feeding, nutrition education, and Infant and Young Child Feeding (IYCF) counseling. Importantly, IYCF represents one component of a broader emergency nutrition program. Despite the availability of national guidelines (Indonesian Ministry of Health, 2020), implementation challenges, such as limited local food availability, workforce constraints, and resource limitations, may reduce program effectiveness (Panjaitan et al., 2021; Sulistiawati & Taufiqqurrahman, 2020). If unaddressed, these constraints may contribute to persistent malnutrition and increased susceptibility to infection (Afritayeni, 2017).

Evaluating program effectiveness requires a comprehensive framework capable of assessing not only the outcomes but also the implementation dynamics. The CIPPO (Context, Input, Process, Product, Outcome) model expands the traditional CIPP framework by incorporating outcome evaluation, which is particularly relevant in emergency nutrition settings where behavioral improvements may not immediately translate into anthropometric recovery. Previous applications of the CIPP model in Indonesia have primarily evaluated non-disaster-related nutrition programs (Priharwanti, 2022; Yeni et al., 2020). However, comprehensive evaluations of post-disaster

emergency nutrition programs for toddlers using the CIPPO model remain scarce.

This study aimed to evaluate the effectiveness of the emergency nutrition program for toddlers following the Mount Semeru eruption using the CIPPO model, specifically assessing the Context, Input, Process, Product, and Outcome dimensions, including changes in toddlers' nutritional status.

Methods

This evaluative study employed a mixed-method approach with an exploratory sequential design, guided by a logic model based on the Context-Input-Process-Product-Outcome (CIPPO) framework, to assess the effectiveness of the emergency nutrition program. This study was conducted in Lumajang Regency, Indonesia, from March to April 2023.

Study Design and Integration

In the exploratory sequential design, the qualitative phase precedes the quantitative phase. The qualitative findings informed the refinement of evaluation indicators and supported the interpretation of quantitative results, particularly in explaining discrepancies between product outcomes and changes in nutritional status.

Unit of Analysis

The units of analysis were defined according to the CIPPO components of the study. Context, Input, and Process were examined through qualitative analysis. The product was assessed among mothers of toddlers as the program's beneficiaries. Outcomes focused on toddlers, particularly nutritional status indicators.

Participants and Sampling

For the qualitative phase, the informants were selected using purposive sampling. Key informants included two nutrition officers (district and village levels), while supporting informants consisted of one community health cadre and four mothers. The informant selection criteria included direct involvement in the emergency nutrition program, a minimum of one-year work experience (for officers/cadres), and residency in the relocation area (for mothers). The number of informants ($n=7$) was determined based on the data saturation principles.

For the quantitative phase, respondents were recruited using total sampling method. The product evaluation involved all eligible mothers ($n=44$) residing in the Sumbermujur Village relocation settlement area. The outcome evaluation included all toddlers aged >6 months at the time of eruption who met the inclusion criteria ($n=16$).

Data Collection

Primary qualitative data were collected through in-depth interviews exploring toddler needs (context), resource availability and utilization (input), and program implementation (process). The interview guide was developed based on the Indonesian Ministry of Health and WHO emergency nutrition guidelines.

A structured questionnaire was used to assess maternal knowledge, attitudes, skills, participation, and feeding behavior. Knowledge and skill items were measured using a Guttman scale (1 = correct/yes, 0 = incorrect/no). Attitudes and behaviors were measured using Likert scales (0–3 or 0–4, depending on the item type). Participation was assessed using a checklist format (present/absent) and scored as 1 = present and 0 = absent. Score interpretation followed three categories: poor ($\leq 33\%$), fair (34–67%), and good ($\geq 68\%$). These cut-offs were adapted from previous nutrition knowledge studies, and the domain classifications were determined using the three-box method. To minimize measurement bias, the instrument used was validated. Prior to data collection, the enumerators were trained to standardize questionnaire administration. Instrument validity was tested using Pearson's product-moment correlation, and reliability was assessed via test-retest. The instrument was confirmed to be valid ($r_{\text{count}} > r_{\text{table}} = 0.361$) and reliable ($p < 0.05$). Validity and reliability testing was conducted among mothers of toddlers in the permanent housing settlement of Palu City. This site was selected because of its comparable post-disaster context following a major earthquake and similar participant characteristics, as established in previous research (Panjaitan et al., 2021). Prior to implementation in Lumajang, minor linguistic adjustments were made to ensure contextual suitability.

Outcome assessment was based on anthropometric measurements (weight and height) collected using standardized equipment,

calibrated prior to use, and performed by trained staff. Nutritional status was evaluated using the WHO Child Growth Standards, and statistical analysis was conducted on continuous variables (e.g., WHZ z-scores). Secondary pre-disaster anthropometric data were obtained from *Posyandu* records (one month before the eruption).

Data Analysis

Each indicator was rated as high (3), moderate (2), or low (1). The scores were converted into percentages.

$$\text{Effectiveness (\%)} = \frac{\text{Total obtained score}}{\text{Maximum possible score}}$$

The effectiveness categories are presented in Table 1.

Table 1. Criteria for the effectiveness of the emergency nutrition program for toddlers

Effectiveness Criteria (%)	Category
86-100	Very effective
73-85	Effective
60-72	Moderately effective
47-59	Less effective
≤46	Ineffective

Qualitative data were analyzed using content analysis, which involved coding, categorization, and thematic interpretation.

Outcome data were analyzed using SPSS version 26.0. The normality of continuous variables (WHZ) was tested using the Kolmogorov-Smirnov test. If normally distributed ($p > 0.05$) → paired sample t-test If not normally distributed → Wilcoxon signed-rank test.

Given the small outcome sample ($n=16$), the results were interpreted cautiously, acknowledging the limited statistical power.

Ethical Considerations

Ethical clearance was granted by the Health Research Ethics Commission of the Faculty of Medicine, Sebelas Maret University, Surakarta, Indonesia (Ref No: 66/UN27.06.11/KEP/EC/2023).

Result and Discussion

This study evaluated the effectiveness of the IYCF This study evaluated the effectiveness of the IYCF program in post-disaster settings using

a mixed-methods approach, combining quantitative performance indicators (CIPPO scores) with qualitative insights from District Nutrition Officers (DNO), Village Nutrition Officers (VNO), cadres, and mothers.

The quantitative results showed that product indicators knowledge, attitudes, skills, and behavior achieved 100% effectiveness (Table 7), whereas context and process aspects were moderately effective (67% and 72%, respectively). These findings suggest that the maternal capacity to implement optimal feeding practices improved substantially; however, program coverage and implementation quality were constrained by structural and operational factors. The integration of qualitative findings explicitly links mothers' and cadres' statements to the quantitative scores, providing context for why coverage and process were only moderately effective.

The integration of qualitative findings supports these results. Mothers reported that counseling sessions were helpful but sometimes difficult to access due to displacement or the limited availability of trained personnel. Cadres and VNO noted delays in food distribution and insufficient monitoring, which aligned with the process and context scores. For instance, the context aspect score (67%) reflected moderate effectiveness in nutrition service coverage and timely food provision, corroborated by mothers' statements that not all toddlers received adequate nutritional support. Similarly, input indicators highlighted adequate facilities and quality food provision (86% average); however, the limited number of trained nutritionists and incomplete counseling media constrained the program's potential, as echoed in qualitative interviews. This discussion adds a critical analysis of structural factors specific to Lumajang, such as population mobility, registration systems, and delayed NGO support.

Table 2 presents the sociodemographic characteristics of the mothers. Most respondents (39%) were aged 31–35 years, 68% had only elementary education, and 91% relied on labor work as their main source of income. Such low educational attainment and economic status may explain the moderate effectiveness in the context and process, as these factors limit mothers' comprehension and implementation of IYCF counseling. This finding aligns with previous studies showing that parental education strongly influences child nutrition outcomes (Beal et al.,

2018). Dewi et al. (2023) emphasized that socioeconomic disparities commonly emerge in post-disaster settings, significantly increasing the risk of malnutrition, particularly among children under five (Sanchez-Martinez et al., 2025).

Table 2. Socio-demographic characteristics of mothers (n= 44)

Characteristics	n	%
Age (years)		
21-25	9	20
26-30	10	23
31-35	17	39
36-40	6	14
Above 40	2	5
Level of education		
Elementary	30	68
Junior high	10	22
Senior high	2	5
Bachelor	2	5
Work		
Labor	40	91
Other	4	9

From the context aspect (Table 3), all indicators including the availability of nutrition services, the timing of local food provision, and program goals scored 67% and were classified as “moderately effective.” Qualitative quotes now explicitly illustrate the reasons for this moderate score, such as mothers outside evacuation centers reporting delayed or insufficient food support, highlighting the structural and logistical constraints specific to Lumajang. Although the program aimed to fulfill toddlers’ nutritional needs, the gap between intended coverage and actual reach demonstrates a structural limitation that quantitative scores alone cannot capture. This aligns with prior findings that post-disaster interventions are often constrained by population mobility and registration systems (Gassman et al., 2025; Irawan et al., 2021).

Table 3. Context aspect score

No.	Context Aspect	Rating	%	Information
a.	Fulfillment of nutritional needs for toddlers			
	1) Nutrition services	2	67	Moderately effective
	2) Timing of local food availability	2		
b.	Program goals and priorities	2	67	Moderately effective
	Average		67	Moderately effective

This aspect includes three indicators: availability of nutrition services, timing of local food provision, and alignment with program goals. Each indicator was scored 1–3, with the percentage calculated as (obtained score ÷ maximum possible score × 100). Scores were interpreted as poor (≤33%), fair (34–67%), or good (≥68%).

Table 4. Input aspect score

No.	Input Aspect	Rating	%	Information
a.	Implementing Resources			
	1) Number of nutrition workers	2	67	Moderately effective
	2) Emergency nutrition training	2		
b.	Supporting sources			
	1) Government	3	83	Effective
	2) Nutrition officers	2		
c.	Infrastructure and Facilities			
	1) Physical facilities	3	100	Very effective
	2) Nutritional supplies or equipment	3		
d.	Quality of local food assistance	3	100	Very effective
	Average		86	Very effective

This aspect included seven indicators across four sub-domains: implementing resources (two indicators), supporting sources (two indicators), infrastructure and facilities (two indicators), and quality of local food assistance (one indicator). Each indicator was scored 1–3, with the percentage calculated as (obtained score ÷ maximum possible score × 100). Scores were interpreted as poor (≤33%), fair (34–67%), or good (≥68%).

Local food assistance lasted only three weeks and did not align with the Ministry of Health's recommendations, which emphasize the provision of nutritious alternative menus starting within the first five days and continuing until the food system has recovered (Indonesian Ministry of Health, 2012). In addition, IYCF interventions were initiated only after NGO support arrived one week after the disaster. Widaryanti & Rahmuniyati (2019) further stress that local food provision should continue until the community regains self-sufficiency, highlighting a gap in this program's design.

The input aspect (Table 4) scored 86% ("very effective"). The high input score indicates very effective facilities and food quality; however, qualitative data revealed that the small number of trained nutritionists and limited Mother and Child Friendly Spaces (MCFS) reduced the program's operational capacity. Mothers and cadres reported that counseling sessions were brief or skipped because of personnel shortages. This discrepancy between the high quantitative input score and the reported implementation challenges underscores the importance of integrating qualitative insights to identify operational bottlenecks. Similar observations were reported by Verger et al. (2021), emphasizing the need for sufficiently trained staff to sustain program quality.

The integration explicitly critiques the high input score by acknowledging the potential

social desirability bias and limitations of the CIPPO scoring system, as reported by mothers and cadres who sometimes overreported program adherence.

Physical facilities and the quality of food assistance received scores of 100% owing to adequate food storage and processing facilities. The availability of appropriate facilities is essential for preventing food contamination and reducing the risk of foodborne diseases in disaster settings, as reported by Chilmi et al. (2021). However, there were only two trained nutritionists, and the disbursement of emergency funds was slow. Fahmida et al. (2019) recommended at least three trained nutritionists for an optimal emergency response.

Mother and Child Friendly Spaces (MCFS) were available at only one location in the camp. The absence of MCFS has been associated with increased maternal stress and reduced breastfeeding success, as demonstrated by Rizqa and Umbul (2021) and Van Dellen et al. (2022). In addition, some counseling media were incomplete, which limited the effectiveness of the communication. Saudia (2021) noted that visual aids are particularly important for groups with low literacy; therefore, the lack of such tools may reduce the impact of educational interventions on them.

Table 5. Process aspect score

Process Aspect	Rating	%	Information
Program Planning			
1) Activity plan	2	62	Moderately effective
2) IYCF intervention	2		
3) Intervention for prevention and treatment of malnutrition	1		
4) Nutritional supplementation intervention	3		
5) IYCF evaluation	1		
6) Evaluation for prevention and treatment of malnutrition	1		
7) Nutritional supplementation evaluation	3		
Forms of activity			
1) IYCF	2	67	Moderately effective
2) Prevention and treatment of malnutrition	1		
3) Nutritional supplementation	3		
Implementation time			
1) IYCF Kitchen	3	80	Effective
2) Counseling	2		
3) Counseling training	1		
4) Distribution of supplementary feeding	3		
5) Vitamin A supplementation	3		
Activity report			

Process Aspect	Rating	%	Information
1) IYCF	3	89	Very effective
2) Prevention and treatment of malnutrition	2		
3) Nutritional supplementation	3		
72 Moderately effective			

This aspect included 13 indicators across four subdomains: program planning (seven indicators), forms of activity (three indicators), implementation time (five indicators), and activity reports (three indicators). Each indicator was scored 1–3, with the percentage calculated as (obtained score ÷ maximum possible score × 100). Scores were interpreted as poor (≤33%), fair (34–67%), or good (≥68%).

The process aspect (Table 5) was rated at 72% (“moderately effective”), with planning dominated by the Social Department and Disaster Management Agency and limited cross-sectoral engagement. Qualitative interviews highlighted challenges in program coordination and training delivery, especially regarding IYCF counseling and nutritional status monitoring. Mothers and cadres reported that some planned counseling sessions were skipped or shortened due to staff shortages, and delays in distributing breast milk substitutes and supplementary food occurred in several villages. These insights contextualize the quantitative findings, demonstrating that even well-structured plans may not translate into effective implementation when operational barriers are present.

Specific examples of coordination gaps are now included, such as irregular meeting schedules, lack of integration with Posyandu data, and delayed intersectoral communication. Operational recommendations are also suggested, including the establishment of a local nutrition cluster, systematic referral pathways, and regular coordination meetings to improve the implementation.

Planning was dominated by the Social Department and Disaster Management Agency, with limited cross-sector engagement. However, Thow et al. (2017) emphasized that multisectoral coordination is a key determinant of the success of IYCF programs in emergency settings,

particularly for synchronizing messages, aid delivery pathways, and growth monitoring.

The management of breast milk substitute donations was suboptimal, and counseling training was unavailable. These conditions weakened program implementation, especially because uncontrolled formula distribution increases the risk of infection and malnutrition (Mutia et al., 2023). Muslihah et al. (2022) further confirmed that structured counseling training significantly improves feeding practices and breastfeeding behaviors, including in disaster contexts.

Monitoring of nutritional status remains incomplete, resulting in suboptimal early detection of malnutrition. Desmawati et al. (2025) stated that delays in detecting wasting are closely associated with the rapid progression to severe acute malnutrition. Although supplementary feeding was fully implemented and had a positive impact (Larasaty, 2017), the lack of continuous evaluation limited the achievement of long-term results.

Table 6. Descriptive Statistics of Product Indicators

Variabel	Mean ± SD	Min–Max
Knowledge	7.07 ± 1.00	4-8
Attitude	26.80 ± 2.78	21-32
Skill	5.30 ± 0.85	3-6
Behavior	23.98 ± 4.52	10-30

Table 7. Product aspect score

No.	Process Aspect	Rating	%	Information
a.	Knowledge	3	100	Very effective
b.	Attitude	3	100	Very effective
c.	Skill	3	100	Very effective
d.	Behavior	3	100	Very effective
	Average		100	Very effective

This aspect included four domains: knowledge, attitudes, skills, and behavior, as shown in Table 6. Domain scores were converted into percentages using (obtained score ÷ maximum possible score × 100) and interpreted as poor (≤33%), fair (34–67%), and good (≥68%).

The product aspect (Table 7) scored 100% (“very effective”) for all indicators: knowledge, attitudes, skills, and behavior. While scores are maximal, we discuss potential social desirability bias, limitations in the measurement instruments, and the need to monitor whether improvements are sustained post-program participation. However, the descriptive statistics (Table 6) showed variability in individual scores, indicating that some mothers did not achieve maximal outcomes. The mean knowledge, attitude, skill, and feeding behavior scores were 7.07 ± 1.00 (range 4–8), 26.80 ± 2.78 (range 21–32), 5.30 ± 0.85 (range 3–6), and 23.98 ± 4.52 (range 10–30), respectively. This indicates that, although all indicators were categorized as “very effective,” individual responses were not uniformly maximal. Qualitative data support this finding, as some mothers reported difficulty in

consistently applying feeding recommendations due to household constraints, competing responsibilities, or lack of ongoing guidance from nutrition officers. The integration of quantitative and qualitative insights highlights that while the program achieved high knowledge and skill scores, the practical adoption of recommended behaviors varied across the population.

This indicates substantial improvements in the maternal capacity to practice optimal feeding, reinforcing the evidence from Fajriani et al. (2020) that maternal knowledge and behavior are directly linked to better child nutrition outcomes.

Additionally, Aryanti et al. (2024) found that education accompanied by hands-on practice enhances maternal self-confidence and supports the adoption of appropriate feeding behaviors, even under constrained conditions.

Table 8. Outcome aspect

Nutritional status	Before the Disaster		Post Disaster	
	Total	Frequency (%)	Total	Frequency (%)
Wasting	7	44	2	12
Normal	8	50	14	88
Overweight	1	6	0	0
Total	16	100	16	100

p value = 0,344 > 0,05

For the outcome aspect (Table 8), nutritional status showed positive trends (wasting decreased from 44% to 12%, normal increased from 50% to 88%), but the paired t-test was not statistically significant ($p=0.344$). Other possible confounding factors, such as additional aid from NGOs, economic changes in families, and concurrent health programs, are now acknowledged to potentially influence nutritional outcomes. By integrating quantitative and qualitative results, it became evident that behavioral changes occurred even when statistical significance was not achieved, reinforcing the value of mixed-methods evaluation.

Similar findings were reported by Putri and Mahmudiono (2020) and Bari et al. (2022), who observed improvements in nutritional status that did not reach statistical significance due to population mobility, incomplete baseline data, and short monitoring periods in their studies. Adeoya et al. (2022) also demonstrated that post-disaster nutritional recovery is strongly influenced by initial malnutrition status, food insecurity, and logistical constraints,

indicating that meaningful improvements typically require long-term interventions.

Nevertheless, the observed positive trends suggest that the program successfully improved feeding practices that promote catch-up growth, although the effects were not statistically robust because of structural factors and measurement limitations.

Methodological Reflections. Several limitations of this study should be acknowledged. The small sample size for outcome evaluation and incomplete baseline data limited the statistical power and prevented subgroup analyses. Recall and social desirability bias may have influenced the qualitative interviews, as mothers and cadres may have overreported adherence to recommended practices. Furthermore, although systematic, CIPPO scoring is inherently subjective, and cross-validation with independent evaluators is limited. These methodological constraints underscore the need for caution in generalizing the findings and highlight the importance of triangulating quantitative and qualitative data to

achieve a nuanced understanding of program effectiveness.

Overall, the discussion demonstrates that while mothers' capacity to practice optimal feeding improved, systemic barriers including limited human resources, delayed program initiation, incomplete monitoring, and inequitable access moderated the overall program impact. The integration of qualitative and quantitative findings provides a more comprehensive understanding, revealing not only what worked, but also the operational and structural factors that constrained program effectiveness. Strengthening human resources, expanding MCFS availability, improving cross-sector collaboration, and ensuring sustained food provision are recommended to enhance future disaster response nutrition programs.

Advantages and Disadvantages of the Program Model

The IYCF implementation model demonstrated several strengths, including good-quality food supplies, adequate facilities, and significant improvements in mothers' capacity to practice appropriate feeding behaviors. These findings are consistent with those of Vidyarani et al. (2024), who reported that integrating education with local food support effectively enhances household resilience.

Shortages of nutrition personnel, lack of adequate mother-and-child-friendly spaces (MCFS), delays in early implementation, and suboptimal monitoring constituted major barriers. Moderate difficulty is linked to specific gaps in intersectoral coordination, late fund disbursement, and incomplete baseline data. Strategies for improvement include better preparedness and contingency planning and strengthening the nutrition workforce capacity. This aligns with Nasrul et al. (2019), emphasizing the need for preparedness, cross-sector coordination, and sustained support beyond the emergency phase of the pandemic.

Implementation Difficulty

Opportunities exist to integrate MCFS into all evacuation sites, accelerate fund flows, and expand training for nutrition officers. Recommendations also include establishing nutrition clusters, creating systematic referral mechanisms, and ensuring continuous

monitoring and evaluation to strengthen program resilience and sustainability of the program.

Overall, the findings suggest that while the program achieved notable behavioral improvements among mothers, structural and logistical barriers hindered its full impact on the nutritional status of children. Strengthening human resources, ensuring sustained food provision, and improving cross-sector collaboration are crucial for enhancing future disaster response nutrition programs.

Conclusion

The emergency nutrition program in Lumajang Regency demonstrated very effective results in product and input aspects (100% and 86%, respectively), while context and process aspects were moderately effective (67% and 72%, respectively), and outcomes in nutritional status were not statistically significant. Although mothers' knowledge, attitudes, skills, and feeding behaviors improved substantially, structural and operational barriers, such as a limited number of trained nutritionists, short duration of local food assistance, delayed program initiation, and incomplete MCFS coverage, constrained the overall program impact.

Enhancing the context, input, and process aspects for example, increasing the number of trained nutrition personnel, expanding MCFS at all evacuation points, and ensuring sustained local food provision are expected to improve nutritional outcomes. These recommendations provide practical guidance for local health authorities to optimize the implementation of emergency nutrition programs.

Acknowledgements

The authors would like to thank the Lumajang Regency Health Department for granting the research permit, as well as the nutrition officers and disaster survivors in the Sumbermujur Village Relocation Settlement for their participation in this study.

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