e-ISSN : 2597-6052

MPPKI MEDIA PUBLIKASI PROMOSI KESEHATAN INDONESIA

Research Articles Open Access

Cadre Disposition as a Key Determinant of Local-Food Supplementary Feeding: A Mixed-Methods Study

Sudirman Sudirman[1]*, Budiman Budiman[2], Sriyani Oktavia[3]
[1]Faculty of Public Health, Universitas Muhammadiyah Palu, Indonesia
[2]Faculty of Public Health, Universitas Muhammadiyah Palu, Indonesia
[3]Faculty of Public Health, Universitas Muhammadiyah Palu, Indonesia

***Corresponding Author: Email:** sudirman@unismuhpalu.ac.id

ARTICLE INFO

Manuscript Received: 25 Sep, 2025
Revised: 29 Dec, 2025
Accepted: 08 Jan, 2026
Date of Publication: 27 Jan, 2026
Volume: 9
Issue: 1
DOI: 10.56338/mppki.v9i2.8658

KEYWORDS

Stunting;
Supplementary Feeding;
Edwards III Framework;
Cadre Motivation;
Implementation Determinants

ABSTRACT

Introduction: Stunting remains a major public health concern in Indonesia. Local-food supplementary feeding (PMT berbasis pangan lokal) is prioritized in national strategies, yet implementation fidelity varies. This study aimed to assess determinants of PMT implementation in Donggala, Indonesia, a sequential explanatory mixed-methods approach among community health cadres and health workers, guided by Edwards III's policy implementation framework.

Methodology: A sequential explanatory mixed-methods design was employedmixed-methods sequential explanatory design was applied. Quantitative data were collected via structured questionnaires from 54 cadres and health workers, while qualitative insights were derived from focus group discussions (FGDs). . Binary logistic regression examined the associations between communication, resources, disposition, and bureaucratic structure with PMT implementation, adjusting for education, occupation, and years of service. Results are presented as odds ratios (ORs), 95% confidence intervals (CIs), pseudo-R^2, and exact p-values. Qualitative data were derived from focus group discussions and analyzed thematically to contextualize quantitative findings.

Results: Disposition emerged as the only statistically significant determinant in the adjusted model (OR = 21.01; 95% CI: 3.02–146.18; p = 0.002), whereas communication, resources, and bureaucratic structure lost significance after adjustment. Qualitative findings reinforced these results, highlighting intrinsic motivation, peer solidarity, and willingness to serve as key drivers of implementation. Participants also identified systemic barriers, including unclear SOP dissemination, limited resources, and administrative burdens, which affected program continuity and cadre performance.

Conclusion: Cadre disposition plays a pivotal role in PMT implementation; however, its effectiveness depends on supportive structural and resource conditions. Motivation alone cannot compensate for weak communication systems, limited budgets, or burdensome administrative procedures. Strengthening supervision, improving communication channels, and ensuring adequate resource allocation are essential. Findings should be interpreted cautiously given the modest sample size and non-validated measurement instruments. Further research using larger samples and validated tools is recommended.

Publisher: Fakultas Kesehatan Masyarakat Universitas Muhammadiyah Palu

INTRODUCTION

Stunting persists as a deeply entrenched nutritional challenge in Indonesia, with implications that extend beyond individual growth trajectories to encompass cognitive development, educational attainment, and long-term human capital formation. Global analyses similarly demonstrate that chronic undernutrition remains a leading cause of preventable developmental loss in low- and middle-income countries (LMICs). Despite successive national and provincial interventions, prevalence levels remain well above the internationally agreed targets. The 2018 Basic Health Research (Riskesdas) documented a prevalence of approximately 30%, a reduction from 37.2% in 2017, yet still reflecting a considerable public health burden (1). Central Sulawesi has long been identified as one of the provinces with the highest stunting rates; the 2015 survey reported 35.3% of children affected (11.4% very short and 23.9% short) (2). At the district level, Donggala has exhibited worrying trends, with prevalence increasing from 29.5% in 2021 to 32.4% in 2022, a figure that persisted through 2023 (3,4). These statistics illustrate persistent regional disparities in stunting reduction and underscore the need for rigorous implementation research to assess the fidelity and equity of ongoing interventions.Within the Indonesian health policy architecture, supplementary feeding using locally sourced foods, known as Program Makanan Tambahan (PMT berbasis pangan lokal), has been designated as a central component of national stunting-reduction strategies. Anchored in Presidential Regulation No. 72/2021 on the Acceleration of Stunting Reduction, and operationalized through the National Strategy, PMT berbasis pangan lokal is designed not only to improve dietary adequacy but also to strengthen local economies and cultural appropriateness. Its implementation relies on cross-sectoral collaboration facilitated through the Tim Percepatan Penurunan Stunting (TPPS), thereby situating nutrition-specific interventions within broader governance reforms(5,6). International evidence similarly emphasizes the effectiveness of culturally adapted, community-delivered nutrition programs when supported by strong intersectoral coordination

However, numerous barriers continue to impede implementation. Empirical studies from Indonesia and comparable LMICs repeatedly document fragmented governance, weak accountability structures, and limited coordination across sectors, all of which constrain program coherence (7–9). Monitoring and evaluation deficits further undermine adaptive learning and course correction (10,11). Chronic budgetary constraints limit scalability, while weaknesses in data quality and hotspot identification complicate targeted prioritization (12–14). Geographic isolation, conflict, and recurrent disasters exacerbate implementation challenges (15). Issues of sustainability and local ownership remain salient, as weak community empowerment continues to restrict long-term impact (16). These implementation failures parallel global findings that system-level constraints regularly attenuate the effectiveness of nutrition interventions in decentralized settings.

To interrogate these challenges, Edwards III's policy implementation framework offers a rigorous analytic structure. It posits that implementation effectiveness hinges upon four interrelated determinants: communication, resources, disposition, and bureaucratic structure. Effective translation of policy into practice requires clarity of directives, adequacy of resources, favorable implementer disposition, and institutional arrangements that sustain monitoring and accountability. In the field of stunting reduction, the framework illustrates how frontline discretion and motivational climates shape program fidelity. Although widely used, Edwards III has rarely been empirically tested through quantitative weighting in community nutrition programs. Furthermore, comparative frameworks such as the Consolidated Framework for Implementation Research (CFIR) and RE-AIM highlight additional determinants, including outer setting influences, leadership engagement, and implementation climate, that remain insufficiently explored within the Indonesian context.

The role of frontline worker motivation has attracted increasing scholarly attention as a determinant of implementation fidelity. Motivation influences adherence to protocols, quality of data collection, and responsiveness to supervisory feedback. Evidence from Indonesia and global studies indicates that continuous capacity-building and supportive supervision improve community health worker performance (17). Leadership commitment and inter-sectoral collaboration are also central to creating enabling environments (3,18). At the same time, heavy workloads associated with multi-competency expectations can undermine motivation and service quality (19). Enhanced monitoring and supportive supervision have been shown to mitigate such challenges and sustain engagement (20).

Despite extensive mapping of determinants, methodological gaps persist. Current scholarship tends to identify priority areas such as income, nutrition, WASH, and maternal care, but it rarely develops context-sensitive weighting schemes that could more effectively guide resource allocation (12,21,22). This reliance on generalized

rather than evidence-weighted approaches constrains decision-making and adaptive governance (13,23). International implementation science literature similarly highlights the need for quantitative weighting and interaction analysis to understand multi-level implementation barriers. There is therefore an urgent need for analytic approaches capable of deriving relative weights and elucidating interactions among determinants within complex, multi-actor implementation systems (24,25).

This study responds to these gaps through a mixed-methods design applied to the case of Donggala Regency. By integrating quantitative regression analysis with qualitative insights from focus group discussions, the study interrogates which determinants most decisively shape PMT implementation. The working hypothesis posits that disposition, which reflects the motivation and commitment of cadres and health personnel, constitutes the primary determinant and exerts a stronger influence than communication, resources, and bureaucratic structure. The contribution of this research is twofold: theoretically, it advances implementation scholarship by quantifying determinant weights within Edwards III's framework; empirically, it contextualizes these dynamics within the lived realities of frontline implementers in a decentralized LMIC setting.

METHODOLOGY

Study Design

This study adopted a mixed-methods sequential explanatory design, combining quantitative and qualitative approaches to provide both breadth and depth of analysis. The quantitative phase involved a structured survey administered to cadres and health workers to identify statistical associations between Edwards III determinants and PMT implementation outcomes. A sequential explanatory design was chosen because it allows quantitative patterns to be further unpacked through qualitative inquiry, consistent with established mixed-methods practice. The subsequent qualitative phase was used to interpret these statistical results, contextualize them within field realities, and explore underlying mechanisms shaping program implementation.

Quantitative Component

Population and Sample

The study population comprised cadres and health workers directly involved in PMT berbasis pangan lokal implementation in Donggala Regency. A total sampling technique was applied, yielding 54 respondents. This approach was chosen to capture the perspectives of all available implementers at the primary health care level. Although the sample size is modest, it meets minimum adequacy criteria for logistic regression in small populations, following the "events-per-variable" guideline and methodological precedents in community-based implementation studies.

Instrument Development

A structured questionnaire consisting of 25 Likert-scale items was developed to assess the four determinants from Edwards III's framework: communication, resources, disposition, and bureaucratic structure. Each determinant was operationalized through multiple items reflecting perceptions of policy clarity, adequacy of resources, motivation, and structural supports. Item development followed a multi-step process: 1) Extraction of construct domains from Edwards III theory; 2) Expert review by three public-health and health-policy specialists for content validity; 3) Pilot testing with eight cadres to assess clarity and item comprehension. Internal reliability was evaluated using Cronbach's alpha for each subscale, all of which demonstrated acceptable internal consistency (>0.70).

Although validated scales specific to Edwards III's determinants are lacking in Indonesian health-policy literature, this study followed precedents from similar research that developed bespoke instruments tailored to local contexts. For example, Ningsi et al. (2024) used a questionnaire capturing household and sanitation characteristics without published validation (26), while Syukur (2025) assessed stunting knowledge through a knowledge-assessment tool that was not validated externally (27). Suminar et al. (2023) and Marhaeni et al. (2024) relied primarily on qualitative approaches without structured scales (20,25). In line with these practices, the instrument in this study was developed with expert input and piloted for clarity, though no standardized validation tool was available. Nevertheless, the absence of standardized measures presents a potential source of measurement bias, which is acknowledged as a study limitation.

Data Collection

The questionnaire was distributed via Google Form and self-administered by respondents. Data were collected on socio-demographic characteristics and perceptions of the four Edwards III determinants. Automated form settings prevented duplicate submissions and required completion of all items. Responses were anonymized to reduce reporting bias.

Data Analysis

Data were analyzed using SPSS software. Bivariate associations between determinants and PMT implementation status were examined using chi-square tests. Binary logistic regression was then performed, adjusting for all theoretical predictors (communication, resources, disposition, bureaucratic structure) and relevant sociodemographic covariates. Model fit was assessed using the Hosmer–Lemeshow test and pseudo-R^2 statistics. Odds ratios, 95% confidence intervals, and exact p-values were reported, with $p<0.001$ replacing SPSS's 0.000 output.

Qualitative Component

Data Collection

Focus group discussions (FGDs) were conducted with cadres, health workers, and program managers. Participants were purposively selected to capture variation in experience, geographic context (urban–rural), and implementation roles. Three FGDs were conducted, each lasting 60–90 minutes, using a semi-structured guide aligned with Edwards III domains. All FGDs were audio-recorded and transcribed verbatim.

Data Analysis

Thematic analysis was conducted to extract and categorize emergent themes. Coding was conducted through an inductive–deductive approach whereby new codes were allowed to emerge while guided by Edwards III domains. Two independent coders analyzed all transcripts; intercoder reliability was assessed through percentage agreement and consensus meetings. Theme development followed Braun and Clarke's six-phase procedure. This phase enabled triangulation with quantitative findings and provided explanatory depth for statistical associations.

Mixed-Methods Integration

Consistent with best practices in sequential explanatory designs, qualitative findings were explicitly used to interpret and elaborate upon quantitative results. For example, when regression analysis showed disposition as the sole significant determinant, FGD themes regarding cadre motivation, workload, and recognition were analyzed to provide context. This integration followed principles observed in comparable Indonesian studies, such as those by Suminar et al. (2023), Marhaeni et al. (2024), and Kolomboy et al. (2025), which emphasize triangulation, stakeholder engagement, and multi-actor perspectives (3,20,25). Integration occurred at three points: 1) During development of qualitative prompts based on quantitative trends; 2) In the merging of datasets during interpretation; 3) In constructing joint displays linking statistical results with thematic evidence.

Ethical Considerations

Ethical clearance was sought from relevant institutional review boards, and written informed consent was obtained from all participants. Confidentiality was assured by anonymizing responses and restricting access to data. Participants were informed of their right to withdraw without penalty, and all digital data were stored on encrypted, password-protected servers. This step addresses a notable gap in Indonesian implementation research, where studies such as those by Suminar et al. (2023), Ningsi et al. (2024), and Marhaeni et al. (2024) employed questionnaires and interviews without consistently reporting ethical protocols (20,25,26). This study, therefore, contributes to strengthening ethical transparency in community-based nutrition research.

RESULTS

Quantitative Findings

Respondent Characteristics

A total of 54 respondents participated in the survey, representing cadres and health workers involved in PMT berbasis pangan lokal implementation. Respondents were predominantly female (98.1%), reflecting the gendered nature of community health volunteerism in Indonesia, which aligns with national findings that frontline public health roles are largely performed by women (11,17). Respondents were predominantly female (98.1%), reflecting the gendered nature of community health volunteerism in Indonesia, where womenespecially housewivesconstitute the backbone of frontline service delivery. This demographic trend is consistent with national patterns in posyandu-based programming and illustrates the reliance of public health systems on voluntary female labor. The occupational distribution further reinforces this observation: a large majority (72.2%) identified as URT (housewives), while smaller proportions were civil servants, contract staff, or kader with specialized functions. Educational attainment varied substantially across respondents, a pattern also noted in prior studies of cadre readiness and health-system capacity in Indonesia (20,26). While 27.8% had completed only primary school, others held diplomas (5.6%) or bachelor's degrees (20.4%). across respondents. While 27.8% had completed only primary school, others held diplomas (5.6%) or bachelor's degrees (20.4%). This variability has direct implications for implementation capacity, particularly in relation to comprehension of technical guidelines, adherence to SOPs, and execution of administrative tasks such as reporting and documentation. The presence of cadres with higher levels of formal education suggests potential for peer mentoring and leadership development within the cadre network, while lower-educated cadres may require more intensive guidance and training.

Table 1. Characteristics of Respondents

Variable	Category	n	%
Sex	Male	1	1.9
	Female	53	98.1
Occupation	URT	39	72.2
	PNS	4	7.4
	Honorer	6	11.1
	Cadre KPM	2	3.7
	Unemployed	3	5.6
Education	Primary school (SD)	15	27.8
	Diploma	3	5.6
	Bachelor (S1)	11	20.4

As shown in Table 1, the respondents were predominantly female (98.1%), indicating the central role of women in the implementation of the supplementary feeding program. Most respondents were housewives (72.2%), followed by honorary workers (11.1%) and civil servants (7.4%). In terms of educational attainment, respondents were mainly educated at the primary school level (27.8%) and the bachelor's level (20.4%), reflecting heterogeneity in educational backgrounds among program implementers.

Communication

Clear and consistent communication emerged as a key factor influencing PMT implementation, consistent with previous findings showing that communication quality is central to coordination and clarity in stunting-prevention programs (20,25). Respondents who perceived communication as good as a key factor influencing PMT implementation. Respondents who perceived communication as good reported markedly higher rates of successful implementation (71.4%) compared with those perceiving communication as poor (26.9%). This large gap underscores the importance of communication pathways between health centers, village governments, and cadre networks.

Table 2. Communication and PMT Implementation

Communication	PMT Not Good n (%)	PMT Good n (%)	Total	p-value
Not Good	14 (73.1)	5 (26.9)	19	0.002
Good	13 (28.6)	22 (71.4)	35	
Total	27 (50.0)	27 (50.0)	54	

Field notes and qualitative narratives revealed that communication challenges commonly stemmed from inconsistent messaging, unclear SOP dissemination, and limited feedback loops. Ineffective communication not only impedes implementation but also diminishes cadre confidence. Conversely, strong communication systems help synchronize roles, ensure accurate data flow, and reinforce cadre engagement.

Resources

Resource availability was strongly associated with implementation quality, echoing evidence that limited budgets, logistical gaps, and infrastructure weaknesses impede stunting-reduction programs at community level (28)(7,12,14). Respondents who rated resources as adequate with implementation quality. Respondents who rated resources as adequate achieved far higher levels of implementation success (68.4%) compared with those reporting inadequate resources (6.3%).

Table 3. Resources and PMT Implementation

Resources	PMT Not Good n (%)	PMT Good n (%)	Total	p-value
Not Good	15 (93.8)	1 (6.3)	16	0.000
Good	12 (31.6)	26 (68.4)	38	
Total	27 (50.0)	27 (50.0)	54	

Resource constraints included insufficient funding, lack of ingredients for PMT preparation, and limited logistical support. Several cadres reported needing to purchase materials using personal funds, an unsustainable practice that risks demoralization. At the same time, respondents who had access to adequate resources described greater ease in preparing meals, organizing distribution, and meeting reporting expectations. These findings emphasize the fundamental role of resources in enabling frontline program delivery, consistent with broader evidence that material support is a prerequisite for effective community-level nutrition programs in Indonesia.

Disposition

The disposition of cadres reflecting motivation, willingness to serve, and sense of responsibility displayed the strongest bivariate association with implementation outcomes. This pattern is consistent with literature emphasizing the role of motivation in sustaining community-based health interventions (17,20). The disposition of cadres reflecting motivation, willingness to serve, and sense of responsibility displayed the strongest bivariate association with implementation outcomes. Respondents with positive disposition reported an 85.7% implementation success rate, compared to only 11.5% among those with weak disposition.

Table 4. Disposition and PMT Implementation

Disposition	PMT Not Good n (%)	PMT Good n (%)	Total	p-value
Not Good	23 (88.5)	3 (11.5)	26	0.000
Good	4 (14.3)	24 (85.7)	28	
Total	27 (50.0)	27 (50.0)	54	

Cadres frequently described their work as a moral obligation to their communities. The sense of social duty that many expressed enabled them to continue implementing PMT activities even when faced with inadequate resources and heavy workloads. Such motivation is a critical, though fragile, asset within community-based public

health systems, a phenomenon similarly described in studies highlighting the reliance on intrinsic motivation among CHWs in resource-limited settings.

Bureaucratic Structure

Supportive bureaucratic structures facilitated higher implementation performance, consistent with studies showing that strong governance, clear SOPs, and functional monitoring systems improve program fidelity in decentralized contexts (3,18,24). Supportive bureaucratic structures facilitated higher implementation performance (71.0%) compared with unsupportive structures (21.7%).

Table 5. Bureaucratic Structure and PMT Implementation

Structure	PMT Not Good n (%)	PMT Good n (%)	Total	p-value
Not Good	18 (78.3)	5 (21.7)	23	0.004
Good	9 (29.0)	22 (71.0)	31	
Total	27 (50.0)	27 (50.0)	54	

This determinant encompassed monitoring systems, reporting procedures, distribution of responsibilities, and managerial support. Respondents described certain bureaucratic processes as excessively burdensome, particularly reporting requirements that consumed substantial time. Where supervision was supportive and guidance clear, cadres reported greater ease in completing tasks, aligning with findings that structured oversight and clear governance frameworks improve implementation fidelity.

Regression Analysis

The multivariable logistic regression model examined the simultaneous effects of Edwards III determinants. Similar to evidence reported in earlier implementation studies using this framework, only disposition remained statistically significant, reinforcing its centrality in frontline decision-making (5,6). The multivariable logistic regression model examined the simultaneous effects of Edwards III determinants. Disposition remained the only statistically significant predictor in the adjusted analysis.

Table 6. Regression Results for Edwards III Determinants

Variable	B	S.E.	Wald	Sig.	Exp(B)
Communication	-0.130	1.046	0.016	0.901	0.878
Resources	1.813	1.389	1.705	0.192	6.130
Disposition	3.045	0.990	9.466	0.002	21.012
Bureaucratic Structure	0.675	0.940	0.515	0.473	1.964

Disposition's strong adjusted effect (OR = 21.01) indicates that cadres with high motivation were dramatically more likely to achieve good implementation outcomes than those with low motivation, even after controlling for communication, resources, and bureaucratic structure. This pattern suggests that disposition may mediate or amplify the effects of other determinants, a dynamic noted in earlier examinations of Edwards III's framework and mixed-methods implementation studies.

Qualitative Findings

Participants described persistent communication gaps, a challenge widely documented in implementation studies where fragmented information flow undermines program coherence (20,25). Participants described persistent communication gaps. Examples include: "*Information often does not reach the cadres, so we are confused about who should do what.*" "*Messages from the health center and the village sometimes differ, so the community becomes confused.*"

These narratives highlight fragmentation and inconsistent messaging, which create uncertainty and hinder coordination, echoing similar observations in communication-centered analyses of stunting prevention and local governance systems (20,25).

Resource Constraints

Cadres frequently invoked resource shortages that shaped the pace, continuity, and fidelity of PMT implementation. Their testimonies illustrate not only the scarcity of materials and funding but also the emotional and physical burdens associated with these limitations. As one cadre explained, *"Sometimes we have to use our own tools to prepare supplementary food because there is no support from the health center."* This statement highlights the extent to which personal resources were substituted for institutional gaps. Another participant added, *"The incentives are very small, so motivation decreases when the workload is too heavy."* These accounts reaffirm broader findings that insufficient logistical and financial support erodes frontline motivation and can compromise program sustainability.

Beyond tangible shortages, participants also described the psychological strain associated with constantly improvising solutions to resource deficits. Several cadres emphasized that the lack of consistent financial support forced them to scale down activities, postpone planned sessions, or reduce the variety and quality of distributed local-food meals. This situation created tension between their desire to meet community expectations and their limited operational capacity. Such experiences reflect a pattern reported in studies of community-based nutrition interventions, where resource scarcity not only limits service delivery but also generates feelings of inadequacy and burnout among frontline workers.

Motivation and Peer Support

Motivation emerged as one of the most salient themes across FGDs. Cadres consistently described strong intrinsic motivation derived from a sense of social responsibility and emotional attachment to the community. One cadre expressed, *"Even though funds are limited, if we are motivated the program can still continue."* Their commitment was frequently strengthened by peer networks. As another cadre noted, *"When fellow cadres support each other, the work feels much lighter."* These sentiments underscore the relational and collective nature of cadre motivation, where encouragement and solidarity act as protective factors against the pressures of inadequate resources and administrative burden.

Several cadres described how mutual support compensated for gaps in supervisory support, creating informal systems of shared problem-solving. This peer-driven dynamic reflects findings in community health literature showing that horizontal support networks can enhance resilience and task persistence in settings with limited formal resources. In some cases, cadres reported that they divided tasks among themselves based on individual strengths, allowing the group to collectively overcome challenges related to time constraints, literacy skills, or physical demands.

Administrative Burdens and Bureaucratic Barriers

Participants described administrative and bureaucratic requirements as among the most demanding components of their work. Multiple cadres expressed concern that reporting obligations were excessively time-consuming, reducing the time they could dedicate to direct community service. One cadre explained, *"There are too many reports, which becomes a burden and reduces the time available to serve the community."* Another noted the potential for digital tools to ease this burden: *"If the reports could be digital, the work would be faster and not waste so much time."*

These reflections highlight tensions between accountability mechanisms and practical workload management. While cadres recognized the importance of reporting for program monitoring, they also felt that the volume and repetitive nature of the tasks created inefficiencies. Some participants also noted inconsistencies in reporting expectations across agencies, which further complicated their responsibilities. This aligns with evidence from governance studies showing that excessive bureaucratic layers can impede service delivery and contribute to frontline fatigue.

Variability Across Contexts and Actor Experiences

Participants described notable differences between urban and rural implementation environments. Cadres in rural areas reported greater challenges accessing timely information, fewer training opportunities, and more significant shortages of materials. By contrast, cadres in urban areas described stronger coordination networks but heavier administrative demands due to higher caseloads. These contextual variations demonstrate that PMT implementation is not uniform across settings and that determinants interact differently depending on local capacity, geography, and governance structures.

Participants also noted variations in the quality of support received from supervisors and village governments. Some cadres described highly supportive environments with regular feedback and clear instructions, while others felt overlooked or inadequately guided. These disparities highlight the importance of leadership and cross-sectoral collaboration in shaping cadre performance and program fidelity.

Synthesis of Themes

Taken together, the qualitative findings reveal a complex ecosystem shaping PMT implementation. Communication gaps, resource shortages, motivational dynamics, and bureaucratic pressures intersect to influence how cadres carry out their responsibilities. Their narratives emphasize that successful implementation depends not only on structural determinants but also on interpersonal relationships, emotional resilience, and locally driven problem-solving. This depth of insight complements and contextualizes the quantitative results, revealing mechanisms that statistical analyses alone cannot capture.

DISCUSSION

This mixed-methods study provides an integrated analysis of the determinants influencing the implementation of local-food supplementary feeding (PMT berbasis pangan lokal) in Donggala Regency. The findings demonstrate that among the four determinants in Edwards III's policy implementation framework-communication, resources, disposition, and bureaucratic structure-disposition emerged as the only statistically significant predictor in the adjusted regression model, a pattern consistent with earlier discussions of policy implementation complexity in decentralized health systems (5,6). The qualitative findings further contextualize these results, offering insight into how motivational and structural factors interact within frontline implementation environments, echoing perspectives documented in prior studies on cross-sectoral stunting prevention efforts in Donggala and similar regions (3,18).

Disposition as the Dominant Determinant

Disposition showed the strongest association with PMT implementation in both quantitative and qualitative phases. Respondents with high motivation, commitment, and willingness to serve were substantially more likely to implement PMT effectively, a finding consistent with literature indicating that motivation among community health workers strongly influences service delivery, adherence to protocols, and community engagement (17,20). Participants frequently emphasized intrinsic commitment, as reflected in a cadre's statement: *"Even though the funds are limited, if we are motivated, the program can still continue."* This illustrates that in low-resource settings, individual-level motivation can compensate for structural weaknesses. The prominence of disposition aligns with Lipsky's Street-Level Bureaucracy theory and mirrors observations in studies exploring cadre roles in community-driven programs (11). In this study, cadre motivation appears to buffer the negative effects of resource constraints, unclear communication, and administrative burdens, though overreliance on this intrinsic motivation risks normalizing systemic inadequacies and placing disproportionate responsibility on volunteers, as noted in analyses of cadre workload and community health-system burden in stunting programs (17)s.

The Role of Communication, Resources, and Bureaucratic Structure

Although these determinants exhibited significant associations with implementation in the bivariate analysis, their influence diminished in the multivariable model. This attenuation may be due to mediation by disposition or the limitations imposed by sample size. Nevertheless, qualitative findings underscore their continued relevance. Participants frequently described unclear or inconsistent information flows, a challenge consistent with findings from

health communication research in stunting-reduction initiatives (20,25). One cadre noted: *"Information often does not reach us, so we are confused about who should do what"* Such gaps in communication and SOP dissemination hinder coordination and clarity. Respondents also highlighted insufficient materials, funding, and tools required to conduct PMT, reflecting systemic resource limitations widely documented in Indonesian stunting prevention efforts (7,12–14). Excessive reporting requirements and limited supervisory support further complicated their work. As expressed by a cadre: *"There are too many reports, and it reduces our time to serve the community."* Similar critiques of bureaucratic burden have been noted in governance studies examining multi-actor collaboration and administrative overload (24). These qualitative insights demonstrate that structural determinants continue to shape the daily realities of PMT implementation, even when not statistically significant in the adjusted model.

The Role of Communication, Resources, and Bureaucratic Structure

Although these determinants showed significant associations with PMT implementation in the bivariate analysis, their effects did not persist in the multivariable model. This attenuation may indicate a mediating influence of disposition or reflect the limitations imposed by the relatively small sample size. Nevertheless, the qualitative findings clearly demonstrate that these determinants continue to shape implementation processes in meaningful ways.

Communication barriers were consistently reported by participants, particularly regarding unclear and inconsistent information flows. One cadre explained, *"Information often does not reach us, so we are confused about who should do what."* Such experiences point to gaps in the dissemination of standard operating procedures and limited clarity regarding role distribution among implementers. These shortcomings hinder coordination, reduce confidence among cadres, and weaken the overall coherence of PMT implementation.

Resource constraints also emerged as a significant challenge. Respondents described insufficient materials, limited funding, and the lack of essential tools required to conduct PMT activities. As one participant stated, *"Sometimes we have to use our own tools because there is no support from the health center."* These limitations mirror broader evidence from Indonesia that highlights resource scarcity as a persistent structural barrier affecting the performance, continuity, and sustainability of community-based nutrition programs.

In addition, many participants perceived the bureaucratic structure as burdensome. Excessive reporting requirements coupled with limited supervisory support were frequently mentioned as obstacles to efficient service delivery. One cadre noted, *"There are too many reports, and it reduces our time to serve the community."* These administrative demands can divert frontline workers' attention away from direct community engagement, reduce operational efficiency, and potentially erode motivation among implementers over time. Despite their lack of statistical significance after adjustment, these determinants remain important contextual factors shaping program delivery.

Comparison With Existing Literature

Most studies on stunting reduction and nutrition program implementation emphasize communication quality, resource sufficiency, and cross-sectoral coordination as primary predictors of program success (3,7–9,20). In contrast, this study identifies disposition as the central determinant of PMT implementation. This divergence may reflect the unique features of voluntary, community-based health systems where frontline workers operate with limited incentives and high levels of social cohesion, a pattern also noted in analyses of integrated service post cadres and women-centered community health structures (17). International implementation frameworks such as CFIR and RE-AIM highlight the dynamic interplay between individual motivation and system-level supports. The findings of this study reinforce these theoretical perspectives by demonstrating how intrinsic motivation can dominate program outcomes when structural constraints are substantial, a condition also observed in studies of actor collaboration in zero-stunting village initiatives (24).

Theoretical Implications

This study offers several theoretical contributions. First, motivation emerges as a conditional determinant that becomes dominant when structural supports fall below functional thresholds, a pattern consistent with program performance challenges noted in complex multi-level stunting prevention contexts (3). In more resource-sufficient contexts, communication and governance structures may regain prominence. Second, qualitative evidence reveals

that motivation interacts with factors such as communication and supervision quality, influencing how effectively cadres navigate system gaps, an interaction effect echoed in community health communication studies (20,25). Third, this study provides empirical weighting to Edwards III's framework, addressing a gap in implementation science where determinants are frequently discussed qualitatively rather than quantified, aligning with recommendations for stronger implementation-mechanism mapping in policy studies (6).

Implications for Policy and Practice

The findings suggest that strengthening cadre motivation is essential but not sufficient to ensure sustainable and effective PMT implementation. Policy strategies must therefore address both individual and structural components of the implementation environment. Enhancing communication systems, ensuring consistent SOP dissemination, and improving resource provision are central steps, aligning with practical lessons derived from cross-sectoral implementation studies in Donggala and comparable regions (3,18). Streamlining administrative requirements through digital reporting tools may reduce the operational burden on cadres, consistent with broader calls to simplify bureaucratic processes in multi-actor stunting governance (24). Supportive supervision can reinforce motivation and reduce burnout, a finding echoed in studies on cadre capacity strengthening and integrated service post revitalizations (17). As cadres form the operational foundation of stunting reduction initiatives, policies that integrate motivational strengthening with structural reform are likely to yield more durable improvements in PMT program fidelity.

Study Limitations

Several limitations should be considered when interpreting the findings of this study. The modest sample size may have limited statistical power, particularly in detecting the independent effects of structural determinants, a challenge noted in small-sample stunting-prevention studies (26). Although measurement tools were pilot-tested and reviewed by experts, the absence of formal psychometric validation introduces potential measurement bias, as similarly reported in prior research employing non-standardized instruments in nutrition and sanitation studies (26,27). The cross-sectional design restricts causal interpretations, while FGD-based qualitative data may not fully capture minority or divergent perspectives, a limitation previously identified in qualitative stunting research involving community actors (20,25). These limitations suggest the need for cautious interpretation and more rigorous future research designs.

Study Limitations

Several limitations should be considered when interpreting the findings of this study. The modest sample size may have limited statistical power, particularly in detecting the independent effects of structural determinants. Although measurement tools were pilot-tested and reviewed by experts, the absence of formal psychometric validation introduces potential measurement bias. The cross-sectional design restricts causal interpretations, while FGD-based qualitative data may not fully capture minority or divergent perspectives. These limitations suggest the need for cautious interpretation and more rigorous future research designs.

This study has several limitations. The modest sample size limits statistical power and may reduce the ability to detect smaller effects, particularly for structural determinants. The measurement tools, although pilot-tested and expert-reviewed, lack formal psychometric validation, introducing potential measurement bias. The cross-sectional design also limits causal inference, while FGD data may underrepresent minority perspectives.

Future Research Directions

Future studies should employ larger samples and incorporate validated measurement instruments to enhance the robustness and generalizability of findings, following methodological precedents in ecological and spatial analyses of stunting determinants (22). Longitudinal or mixed-methods designs may help uncover temporal dynamics and causal pathways influencing PMT implementation. Comparative studies across different districts or provinces could further clarify contextual variability, as suggested in evaluations of district-level stunting interventions (15,16). Advanced analytical approaches such as structural equation modeling or multilevel modeling may yield deeper

insights into interactions among determinants, particularly in complex multisectoral environments highlighted in recent policy analyses (5,6).

Integration of Quantitative and Qualitative Findings

The integration of quantitative and qualitative findings strengthens the study's conclusions by demonstrating convergence between statistical patterns and lived cadre experiences. Quantitatively, disposition emerged as the only determinant with significant predictive power in the adjusted regression model, a finding that aligns with earlier policy implementation studies showing heightened influence of individual-level factors in resource-limited contexts (5,6). Qualitatively, participants consistently emphasized intrinsic motivation, social obligation, and mutual support as central to sustaining PMT activities despite substantial structural constraints, a sentiment also reflected in community health empowerment studies (17,20). These findings confirm that disposition is a substantive driver of implementation outcomes rather than a statistical anomaly. The qualitative data also reveal how communication gaps, resource shortages, and bureaucratic burdens shape the context in which motivation is expressed, consistent with system-level constraints identified in multi-actor stunting governance research (24). Although these determinants were not statistically significant in the adjusted model, they remain essential for understanding how motivation is enabled or constrained in daily practice.

The mixed-methods integration strengthens the validity of the study's conclusions by demonstrating convergence between statistical patterns and lived experiences of cadres. Quantitatively, disposition emerged as the only determinant with significant predictive power in the adjusted regression model. Qualitatively, participants consistently emphasized intrinsic motivation, social obligation, and mutual support as central to their ability to sustain PMT activities despite structural constraints.

The alignment between quantitative and qualitative insights provides robust confirmation that disposition is not merely a statistical artifact but a substantive driver of real-world implementation outcomes. At the same time, qualitative narratives reveal how communication gaps, resource shortages, and bureaucratic burdens shape the context in which disposition operates. These contextual influences, though not statistically significant after adjustment, remain essential for understanding how motivation is activated-or constrained-in everyday practice.

Practical Implications for Strengthening Implementation Systems

The findings underscore the need for a holistic approach to improving PMT implementation. Structural improvements such as strengthening communication channels, ensuring adequate resource provision, and reducing bureaucratic burdens are necessary complements to efforts aimed at enhancing cadre motivation. A supportive supervision culture can help reinforce motivational factors while mitigating the risk of burnout, consistent with findings from cadre empowerment and supervision studies (17).

CONCLUSION

This study examined determinants of local-food supplementary feeding (PMT berbasis pangan lokal) in Donggala, Indonesia, using Edwards III's policy implementation framework. Quantitative analysis indicated that although communication, resources, and bureaucratic structure were associated with implementation outcomes in bivariate tests, only disposition remained statistically significant in the adjusted regression model. Qualitative evidence reinforced this pattern, emphasizing motivation, willingness to serve, and peer support as central influences operating within a context shaped by communication gaps, limited resources, and administrative workload.The study contributes to implementation science by clarifying how individual and structural determinants interact within community-based nutrition programs. Disposition emerged not only as an independent determinant but also as a potential multiplier of other system components when adequate communication, resources, and governance structures are present. These findings align with broader implementation literature, including CFIR and RE-AIM, which similarly underscore the interplay between inner-setting factors (such as motivation) and outer-setting system supports.

For practice, the findings indicate that cadre motivation is necessary but insufficient to sustain effective PMT implementation. Strengthened communication systems, predictable resource allocation, supportive supervision, and

streamlined administrative processes are essential to translate motivation into consistent program delivery. Without these enabling conditions, frontline commitment risks being undermined.

Future research should employ larger and more diverse samples, incorporate validated or standardized measurement tools, and apply longitudinal or mixed-method designs capable of testing causal mechanisms. Comparative studies across districts, provinces, and countries would further clarify contextual variability and enhance generalizability. In sum, findings from Donggala illustrate that motivation is decisive but only effective when embedded within supportive institutional systems. Aligning individual commitment with structural reform offers a promising pathway for strengthening PMT implementation and, ultimately, contributing to sustained reductions in child stunting. A cautious interpretation is warranted given the study's modest sample size, cross-sectional design, and potential measurement bias arising from non-validated instruments, but the patterns nonetheless provide actionable insight for policymakers and implementers.

AUTHOR'S CONTRIBUTION STATEMENT

Sudirman conceived and designed the study, developed the research instruments, coordinated data collection, and led the quantitative analysis. Budiman contributed to study design refinement, supervised field implementation, and performed statistical data analysis and interpretation. Sriyani Oktavia conducted qualitative data collection, performed thematic analysis, and contributed to the integration of qualitative and quantitative findings. All authors contributed to manuscript drafting, critically revised the intellectual content, approved the final version, and agree to be accountable for all aspects of the work.

CONFLICTS OF INTEREST

The authors declare that they have no competing financial or non-financial interests related to this study.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

The authors used a generative AI tool (OpenAI ChatGPT, accessed Aug–Sep 2025) solely to support language editing and bidirectional translation between English and Indonesian. The tool was not employed to generate original scientific content, analyses, or references. All prompts avoided confidential or identifiable information. AI-assisted outputs were critically reviewed, fact-checked, and edited by the authors, who take full responsibility for the integrity, accuracy, and originality of the manuscript. The underlying methods, results, and conclusions reflect the authors' work; prompts and AI interaction logs can be provided upon reasonable request.

SOURCE OF FUNDING STATEMENTS

This research was funded by the Ministry of Education, Culture, Research, and Technology of the Republic of Indonesia through the Directorate of Higher Education, Science and Technology (Kemdiktisaintek) under the Fundamental Research – Regular Scheme, Contract Number 137/C3/DT.05.00/PL/2025 (Master Contract) and 848/LL16/AL.04/2025 (Derived Contract), dated 28 May 2025 and 4 June 2025, respectively. The research was administered by the Institute for Research and Community Service (LPPM), Universitas Muhammadiyah Palu.

ACKNOWLEDGMENTS

The authors wish to express their sincere gratitude to all cadres and health workers in Donggala Regency who participated in this study and generously shared their time, experiences, and insights. Appreciation is extended to the District Health Office of Donggala for their facilitation and support during data collection. The research team also acknowledges the valuable contributions of Universitas Muhammadiyah Palu colleagues and administrative staff for their assistance in project coordination and reporting.

Special thanks are due to the community leaders and local government stakeholders who provided access, encouragement, and cooperation throughout the implementation of the fieldwork. Their engagement was essential to the success of this research.

BIBLIOGRAPHY

1. Hanifah I, Hidayati T. Implementation of Local Ingredient-Based Supplementary Feeding for Stunting Toddlers with Animation Media on Paiton Village. Int J Nurs MIDWIFERY Sci. 2024;8(2):180–9.
2. Syam DM, Sunuh HS. Hubungan kebiasaan cuci tangan, mengelola air minum dan makanan dengan stunting di sulawesi tengah. Gorontalo J Public Heal. 2020;3(1):15–22.
3. Kolomboy F, Adhyanti A, Arsyad G, Aminuddin A, Faisal TI, Ramadhan K, et al. Cross-Sectoral Collaboration in Stunting Prevention: Implementation in Donggala Regency, Central Sulawesi. J Public Heal Pharm. 2025;5(1):191–9.
4. Tibaka L, Malarangan K. The Rights Of Stunted Children to Health Services In Donggala District. Tadulako Soc Sci Hum J. 2024;4(2):34–40.
5. Masturina ML, Ilham M, Kurniawati L. Policy Implementation Handling Stunting In Bogor District West Java Province. Mutiara Multidiciplinary Sci J. 2025;3(6):601–22.
6. Daswati D, Ahsan SC. Implementasi kebijakan penurunan stunting di kabupaten Donggala. JPPI (Jurnal Penelit Pendidik Indones. 2024;10(4):529–52.
7. Indra J, Khoirunurrofik K. Understanding the role of village fund and administrative capacity in stunting reduction: Empirical evidence from Indonesia. PLoS One. 2022;17(1):e0262743.
8. Wahyudianto H, Prasetyo A. Addressing the Issue of Stunting in Papua Province: A Coordinated Effort for Child Well-being. In: 5th Borobudur International Symposium on Humanities and Social Science 2023. Atlantis Press; 2024. p. 74–82.
9. Suharsih S, Rahayu A. Relationship between budget policy, fiscal capacity and stunting prevalence in indonesia. Int J Adv Econ. 2023;5(7):187–98.
10. Murdhani LA. Empowering Village Communities Through Mutual Cooperation Mobilization Agents in Kalimontang Village in Overcoming Stunting. Int J Sci Res. 2024;1(01):1–6.
11. Alam S, Rusmin M, Aswadi A, Syafri M. the Role of Human Development Cadres in Efforts To Prevent Stunting. Homes J Hosp Manag Stud J. 2024;5(1):52–71.
12. Randani AI, Baliwati YF, Sukandar D, Tanziha I. Economic and consumption variables and their associations with stunting prevalence: A provincial analysis of the Indonesian child nutritional status survey 2019. J Gizi Dan Pangan. 2022;17(1):57–66.
13. Sipahutar T, Eryando T, Paulina Budhiharsana M. Spatial Analysis of Seven Islands in Indonesia to Determine Stunting Hotspots. 2022;
14. Yushananta P, Muslim A, Rusli Y. Specific Determinants of Stunting Toddlers in Lampung Province: Spatial Data Analysis. J Kesehat. 2023;14(3):462–74.
15. Fentiana N, L Achadi E, Besral B, Kamiza A, Sudiarti T. A stunting Prevention Risk factors pathway model for Indonesian Districts/Cities with a stunting prevalence of≥ 30%. 2022;
16. Soffiudin M, Putri W, Amanda R, Pratiwi D, Makrufardi F. Community Based Stunting Prevention: Learning from Blue Collar Workers' Children in Indonesia. Indones J Community Occup Med. 2025;4(3):86–93.
17. Susyani S, Sartono S, Sadiq A, Telisa I, Terati T, Sary DK, et al. REFRESHING INTEGRATED SERVICES POST CADRES IN IMPROVING THE KNOWLEDGE AND SKILLS OF CADRES THROUGH ASSISTANCE METHODS IN PREVENTION AND ACCELERATION OF REDUCING STUNTING IN THE STUNTING LOCUS IN MUARA ENIM REGENCY. Abdi Dosen J Pengabdi Pada Masy. 2023;7(2):514–9.
18. Arief H, Ekoriano M, Rahadian AS, Widodo T. Good practices for reducing stunting in sumedang regency. Sci Environ J Postgrad. 2023;5(2):138–44.
19. Widiyaningrum A, Kholiq A, Pratiwi D. The Influence of Professional Competence, Workload, and Work Commitment on Teacher Performance through Job Satisfaction in Madrasah Tsanawiyah. Abjadia Int J Educ. 2024;9(2):433–48.
20. Suminar JR, Prasanti D, Fuady I, Arifin HS, Aisha S. The health communication for the acceleration of stunting reduction in Garut regency. J Kaji Komun. 2023;11(1):81–95.
21. Siswati T, Muchlasin A, Kristyanto RY, Gunawan DCD. Determinants and model for estimating the prevalence of stunting toddlers in Sleman Regency. Heal Dyn. 2024;1(6):191–8.

22. Ridwanah AA, Megatsari H, Laksono AD, Ibad M. Factors related to stunted in East Java Province in 2019: An ecological analysis. Medico-Legal Updat. 2021;21(2):230–5.
23. Riani EN, Margiana W. Hubungan Pola Asuh dengan Kejadian Stunting pada Balita. J Kebidanan Harapan Ibu Pekalongan. 2022;9(1):48–53.
24. Mahardhani AJ, Darmawan DA, Sunarto S, Mufanti R. Zero Stunting Villages: Analyzing the Challenges and Imperatives of Actor Collaboration. J Public Policy. 2025;11(2):133–40.
25. Marhaeni A, Yuliarmi NN, Primajana DJ, Pradnyadewi D, Yasa IGWM, Jayanthi NKE. The role of communication, information and education in preventing stunting among stakeholders in Abang Village, Karangasem Regency. Cent Community Dev J. 2024;4(1):1–13.
26. Ningsi NW, Mayangsari R, Abdullah AD. Water Sanitation and Stunting Incident in Banggae District, Majene Regency, West Sulawesi. J Ilm Kesehat. 2024;6(1):97–105.
27. Syukur D, Ganing A, Arsyad G, Mustaqim U. Analysis of Sanitation, Internal and External Factors Affecting Stunting Knowledge among At-Risk Communities in Central Sulawesi, Indonesia. J Kesehat Manarang. 2025;11(2):192–200.
28. Afrianto I, Yusuf H. The Relationship of Local Wisdom-Based Character Education on Young Females' Reproductive Health in Parigi Moutong. Media Publ Promosi Kesehat Indones. 2024;7(12):2952–9.