

EMPOWERMENT OF MOTHERS OF CHILDREN UNDER TWO THROUGH EDUCATION AND LOCAL COASTAL FOOD-BASED COMPLEMENTARY FEEDING TRAINING FOR STUNTING PREVENTION

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Received: 17/07/2026

Revised: 04/08/2026

Accepted: 05/08/2026

Abstract. Stunting remains a significant public health challenge in Indonesia. Bagan Serdang Village, a coastal area in Deli Serdang Regency, recorded stunting and underweight rates among children under two of 25.9% and 29.6%, respectively, exceeding national averages. Despite abundant local marine resources, only 25.9% of mothers had good knowledge, and 37% had good skills in processing local food-based complementary feeding. This program aimed to improve mothers' knowledge and skills in preparing local coastal food-based complementary feeding for stunting prevention. A participatory community empowerment approach was applied involving 27 mothers of children under two, 5 posyandu cadres, and 5 PKK members in Bagan Serdang Village from February to May 2026. Activities included nutrition counselling through interactive lectures and booklet-based education, and complementary feeding preparation practice using local coastal food ingredients (lemuru fish, yellow stripe scad, and small shrimp). Knowledge and skills were assessed through pre-test and post-test questionnaires and direct observation checklists, analyzed descriptively. Knowledge in the good category improved significantly from 25.9% to 100%, while skills improved from 37.0% to 100%. The greatest improvement occurred in understanding the nutritional value of local coastal food and hygienic processing techniques. Five local food-based complementary feeding recipes were developed along with a nutrition education booklet and recipe book distributed to all participants. The combination of interactive counselling, cooking demonstrations, and direct practice proved highly effective, consistent with findings from similar studies. The empowerment program significantly improved mothers' knowledge and skills in local coastal food-based complementary feeding for stunting prevention. The participatory approach is replicable in other coastal areas with similar marine resource characteristics.

Keywords: children under two, complementary feeding, local coastal food

Abstrak. Stunting masih menjadi masalah kesehatan masyarakat yang serius di Indonesia. Desa Bagan Serdang, Kabupaten Deli Serdang, mencatat prevalensi stunting dan berat badan kurang pada baduta masing-masing sebesar 25,9% dan 29,6%, melebihi rata-rata nasional. Meski memiliki potensi sumber daya laut yang melimpah, hanya 25,9% ibu berpengetahuan baik dan 37% memiliki keterampilan baik dalam pengolahan MP-ASI berbasis pangan lokal. Program ini bertujuan meningkatkan pengetahuan dan keterampilan ibu baduta dalam menyiapkan MP-ASI berbasis pangan lokal pesisir untuk pencegahan stunting. Pendekatan pemberdayaan masyarakat partisipatif diterapkan dengan melibatkan 27 ibu baduta, 5 kader posyandu, dan 5 anggota PKK di Desa Bagan Serdang pada Februari-Mei 2026. Kegiatan meliputi penyuluhan gizi melalui ceramah interaktif dan media booklet, serta pelatihan praktik pembuatan MP-ASI menggunakan bahan pangan lokal pesisir (ikan lemuru, ikan layang, dan udang kecepe). Pengetahuan dan keterampilan dinilai melalui kuesioner pre-test dan post-test serta lembar observasi langsung, dan dianalisis secara deskriptif. Pengetahuan kategori baik meningkat secara signifikan dari 25,9% menjadi 100%, sementara keterampilan meningkat dari 37,0% menjadi 100%. Peningkatan terbesar terjadi pada pemahaman nilai gizi pangan lokal pesisir serta teknik pengolahan yang higienis. Lima resep MP-ASI berbasis pangan lokal berhasil dikembangkan, beserta booklet edukasi gizi dan buku resep yang didistribusikan kepada seluruh peserta. Kombinasi penyuluhan interaktif, demonstrasi memasak, dan praktik langsung terbukti sangat efektif, sejalan dengan temuan studi serupa di berbagai daerah. Program pemberdayaan berhasil meningkatkan pengetahuan dan keterampilan ibu secara signifikan dalam pembuatan MP-ASI berbasis pangan lokal pesisir untuk pencegahan stunting. Pendekatan partisipatif ini dapat direplikasi di wilayah pesisir lain dengan karakteristik sumber daya laut yang serupa.

Kata Kunci: baduta, MP-ASI, pangan lokal pesisir

How to Cite: Masthalina, H., Saribu, T. H. D. & Manalu, M. (2027). EMPOWERMENT OF MOTHERS OF CHILDREN UNDER TWO THROUGH EDUCATION AND LOCAL COASTAL FOOD-BASED COMPLEMENTARY FEEDING TRAINING FOR STUNTING PREVENTION. *Mitra Mahajana: Jurnal Pengabdian Masyarakat*, 7(2) 402-411. doi: <https://doi.org/10.37478/mahajana.v7i2.8509>

INTRODUCTION

Stunting is one of the chronic nutritional problems that remains a public health challenge in Indonesia. Based on the Indonesian Health Survey (Survei Kesehatan Indonesia/SKI) 2023, the national prevalence of stunting among children under five was 21.5%, while the prevalence of underweight was 13.7% (Kementrian Kesehatan RI, 2023). This condition is of serious concern given the long-term impact of stunting on children's cognitive development, productivity, and quality of life in the future.

Bagan Serdang Village, Pantai Labu District, Deli Serdang Regency, North Sumatra, is one of the coastal villages facing nutritional problems higher than the national average. Initial data collection revealed that 29.6% of children under two years of age (baduta) were underweight (WAZ) and 25.9% experienced stunting (HAZ), figures higher than the national prevalence. This situation is noteworthy because the village is located in a coastal area with abundant marine resources, particularly lemuru fish (*Sardinella lemuru*), yellow stripe scad (*Selaroides leptolepis*), and small shrimp (udang kecepe), yet these animal protein sources have not been optimally utilized as a basis for complementary feeding (MP-ASI).

One of the main factors contributing to the high stunting rate in coastal areas is the low knowledge and skills of mothers of children under two in processing local food into complementary feeding that meets children's nutritional needs. Pre-test results showed that 74.1% of participants had knowledge classified as poor and 63% had poor skills in processing local food-based complementary feeding. This condition reflects a gap between the abundance of local food resources and their level of utilization, as reported by Nirmala and Octavia (2022), coastal areas generally have high potential for marine products as animal protein sources, but their use to meet children's nutritional needs remains suboptimal (Nirmala & Octavia, 2022).

Small marine fish such as lemuru and yellow stripe scad are known to contain high-quality protein (18–22 g/100 g), omega-3 fatty acids, particularly docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA), as well as essential minerals such as iron, zinc, and selenium (Nurapipah et al., 2023). These nutrients are essential for supporting children's growth and development, particularly during the early stages of life when nutritional requirements are relatively high. DHA and EPA play critical roles in the development and function of the central nervous system, brain maturation, and cognitive function during the growth period. In addition, adequate intake of protein and essential micronutrients contributes to tissue formation, immune function, and the prevention of growth faltering in young children. Increasing the consumption of animal-source foods during the first 1,000 days of life (1,000 HPK) has therefore been recommended as one of the main strategies to support optimal growth, improve dietary quality, and reduce the risk of stunting (Yaumil & Thaifur, 2026). The utilization of locally available small marine fish as complementary feeding ingredients can thus provide a practical and nutritious dietary option while simultaneously promoting the use of local coastal food resources.

Based on the above background, a Community Service Program (Pengabdian kepada Masyarakat/PKM) was implemented in the form of Empowerment of Mothers of Children Under Two through Education and Training on Local Coastal Food-Based Complementary Feeding in Bagan Serdang Village. This program aimed to: (1) improve mothers' knowledge about appropriate complementary feeding and the use of local coastal food; (2) improve mothers' skills in processing local food into nutritious complementary feeding; and (3) develop educational media in the form of a booklet and a local food-based complementary feeding recipe book for sustainable use.

METHOD

This community service activity was conducted in Bagan Serdang Village, Pantai Labu District, Deli Serdang Regency, North Sumatra, from February to May 2026. The method used was participatory community empowerment through a series of activity stages, including initial assessment and socialization, baseline data collection, nutrition counseling, and complementary

feeding preparation practice training. The target participants were 27 mothers of children under two (mothers with children aged 0–23 months), 5 posyandu cadres, and 5 PKK (Family Welfare Program) members in Bagan Serdang Village. Activities were held at the Bagan Serdang Village Hall with the support of the village government and posyandu cadres as implementing partners. The implementation team consisted of 3 lecturers and 5 posyandu cadres who formed the field team.

The program implementation consisted of several systematic stages. The initial assessment and coordination stage was conducted in February–March 2026 through site visits to partner locations and coordination meetings with the village government, Posyandu cadres, and PKK members. These activities aimed to identify local food potential and develop an appropriate activity plan based on the needs and conditions of the community. In April 2026, baseline data collection and a pre-test were conducted to assess the nutritional status of children under two years of age using calibrated measuring instruments, including weight-for-age (WAZ) and height-for-age (HAZ) indicators. Participants also completed pre-test questionnaires to assess their initial knowledge and skills related to nutrition and complementary feeding.

The nutrition counseling stage was conducted during April–May 2026 through interactive lectures supported by an LCD projector and educational booklets. The materials covered nutrition and stunting prevention, the first 1,000 days of life, appropriate complementary feeding practices, and the utilization of local coastal food resources as complementary feeding ingredients. The counseling was complemented by question-and-answer sessions and small-group discussions to encourage active participation and facilitate participants' understanding. In May 2026, participants received practical training on complementary feeding preparation. A food technology expert first demonstrated the preparation process, after which participants practiced independently in small groups using locally available food ingredients, including lemuru fish, yellow stripe scad, and small shrimp. The final stage involved a post-test and evaluation using the same questionnaire as the pre-test to measure changes in participants' knowledge. Participants' practical skills were also assessed through direct observation using a structured checklist during the food preparation practice. Overall, these stages were designed to integrate knowledge enhancement with hands-on skill development in utilizing local coastal food resources for appropriate complementary feeding.



Figure 1. Site assessment and coordination with village government and cadres

Skill assessments covered the ability to select fresh raw ingredients, hygienic processing techniques, appropriate use of seasonings according to the child's age, texture consistency with the child's developmental stage, and attractive presentation. Data analysis was conducted descriptively by comparing the frequency distribution of knowledge and skill categories in the pre-test and post-test. Program outputs included the development of five local food-based complementary feeding recipes, a nutrition education booklet, and a recipe book distributed to all participants and posyandu cadres. To support program sustainability, a WhatsApp

discussion group was also established as a channel for ongoing nutrition consultation between the service team and partners.



Figure 2. Pre-Test activities and skills of mothers of children under two and nutrition education sessions

RESULTS AND DISCUSSION

Participant Characteristics

This activity was attended by 27 mothers of children under two from three hamlets (Dusun 1, 2, and 3) in Bagan Serdang Village. Participant characteristics are presented in Table 1.

Table 1. Characteristics of Mothers of Children Under Two Participating in the Activity

Characteristic	n	%
Age		
< 20 years	1	3.7%
20–49 years	26	96.3%
Education		
Primary school (SD)	11	40.8%
Junior high school (SMP)	8	29.6%
Senior high school (SMA)	8	29.6%
Address		
Hamlet 1	12	44.4%
Hamlet 2	7	25.9%
Hamlet 3	8	29.6%

The majority of participants (96.3%) were in the productive age group of 20–49 years, with the highest educational level at primary school (40.8%). This variation in educational background reflects the diversity of target characteristics that needs to be accommodated in selecting appropriate and easily comprehensible educational methods and media.

Nutritional Status of Children Under Two

Initial data collection on the nutritional status of children under two was conducted through anthropometric measurements, including body weight (BW) and body length (BL). Nutritional status assessment results are presented in Table 2.

Table 2. Nutritional status assessment results for children under two in bagan serdang village

Indicator	Nutritional Status	n	%
WAZ (Weight-for-Age)	Normal	19	70.4
	Underweight	8	29.6
HAZ (Height-for-Age)	Normal	20	74.1
	Stunted	7	25.9

Table 2 shows that although the majority of children under two had normal nutritional status, 29.6% of children were still underweight and 25.9% were stunted. These figures are higher than the national SKI 2023 prevalence of underweight (13.7%) and stunting (21.5%) (Kementrian Kesehatan RI, 2023). This condition indicates that nutritional problems in Bagan

Serdang Village require more serious attention and intervention, particularly regarding suboptimal complementary feeding practices.



Figure 3. Measurement of body length and body weight of children under two

Improvement in Participants' Knowledge

Knowledge evaluation was conducted by comparing pre-test results (before the intervention) and post-test results (after counselling) using the same questionnaire. Comparison results are presented in Table 3.

Table 3. Comparison of pre-test and post-test knowledge results of participants

Category	Pre-test n (%)	Post-test n (%)
Good	7 (25.9%)	27 (100%)
Poor	20 (74.1%)	0 (0%)
Total	27 (100%)	27 (100%)

Table 3 shows a highly significant improvement in participants' knowledge. Before the intervention, only 25.9% of participants had knowledge classified as good, while 74.1% were still in the poor category. After attending nutrition counseling, all participants (100%) successfully achieved the good knowledge category. This improvement exceeded the program's target of $\geq 30\%$ increase in score. The most prominent knowledge improvement occurred in understanding coastal local food as a complementary feeding source, indicating that participants had previously been unaware of the potential of food ingredients available in their surroundings. This aligns with the findings of Nirmala & Octavia (2022) that coastal communities generally have not optimized abundant marine protein sources to meet children's nutritional needs (Nirmala & Octavia, 2022).

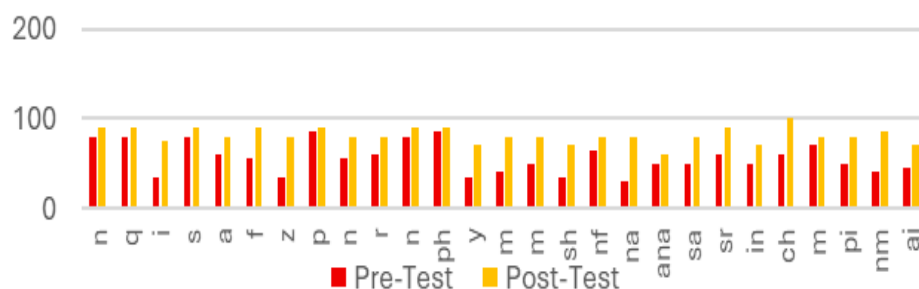


Figure 4. Pre-Test and post-test knowledge chart of mothers of children under two

The 100% achievement in the post-test was supported by appropriate counseling methods a combination of interactive lectures, question-and-answer sessions, and small group discussions that allowed participants to ask questions and receive personalized explanations. The relatively small number of participants (27 people) also played an important role in optimizing the intensity of mentoring. Hikmah et al. (2025) reported a significant difference in mothers' knowledge before and after education on local food-based complementary feeding (Hikmah et al., 2025), while Doloksaribu et al. (2025) found that educational methods with

visual media and interactive question-and-answer sessions improved the knowledge of mothers of children under two evenly, not limited to participants with specific educational backgrounds (Doloksaribu et al., 2025).

The improvement in participants' knowledge was also supported by the use of a nutrition education booklet as supplementary counseling material. Raodah et al. (2023) in a quasi-experimental study in Aceh Province reported that the use of booklet media significantly increased the knowledge and attitudes of mothers of stunted children under five compared to conditions before the intervention ($p < 0.05$) (Raodah et al., 2023). Booklets have the advantage of delivering health messages in a structured and easy-to-understand manner, and can be reused by participants as a reference at home. Aryani et al. (2024) confirmed that health education on nutrition significantly increases mothers' knowledge in preventing stunting in children, especially when information is delivered face-to-face and accompanied by concrete visual media (Aryani et al., 2024).

From an international perspective, structured nutrition education has also been proven effective in improving mothers' knowledge regarding infant and young child feeding. Hien et al. (2023) in a before-and-after study in the peri-urban areas of Bobo-Dioulasso, Burkina Faso, found that a nutrition education intervention significantly improved mothers' knowledge and infant and young child feeding (IYCF) practices, with a significant difference between the intervention and control groups (Hien et al., 2023). Rahmadani et al. (2025) also demonstrated that nutrition education was effective in improving mothers' knowledge and behavior in preventing stunting among children under five, with significant differences before and after the intervention in the group that received education. Globally, low maternal knowledge about nutrition and child-rearing is identified as one of the main risk factors for stunting, making nutrition education for mothers a strategic intervention that must be prioritized (Rahmadani et al., 2023).

Regarding understanding of local food as a source of complementary feeding, Rasima et al. (2026) in a community service activity in Deunong Village, Aceh Besar Regency, reported a significant increase in mothers' knowledge related to local food-based complementary feeding processing, with an average knowledge score increase of 0.4 points (p -value < 0.05) (Rasima et al., 2026). This finding is consistent with results from Bagan Serdang Village, where the most prominent knowledge improvement was in understanding the potential of local coastal food as nutritious complementary feeding ingredients. A local wisdom-based educational approach that directly links educational materials to food resources available in the community has proven more effective in building relevance and learning motivation compared to a generic nutrition education approach (Rahmadani et al., 2023).

Improvement in Participants' Skills

Skills evaluation was conducted through direct observation during practice sessions using a checklist covering aspects of selecting fresh raw ingredients, hygienic processing techniques, use of seasonings appropriate to the child's age, texture consistency, and attractive presentation. Results are presented in Table 4.

Table 4. Comparison of pre-test and post-test skills results of participants

Category	Pre-test n (%)	Post-test n (%)
Good	10 (37.0%)	27 (100%)
Poor	17 (63.0%)	0 (0%)
Total	27 (100%)	27 (100%)

Consistent with the knowledge results, all participants (100%) also successfully achieved the good skills category after attending practice training, a sharp increase from the initial condition where 63% of participants were still in the poor category. The most prominent skills improvement occurred in the hygienic processing of fish/shrimp and adjustment of complementary feeding texture to the child's age.

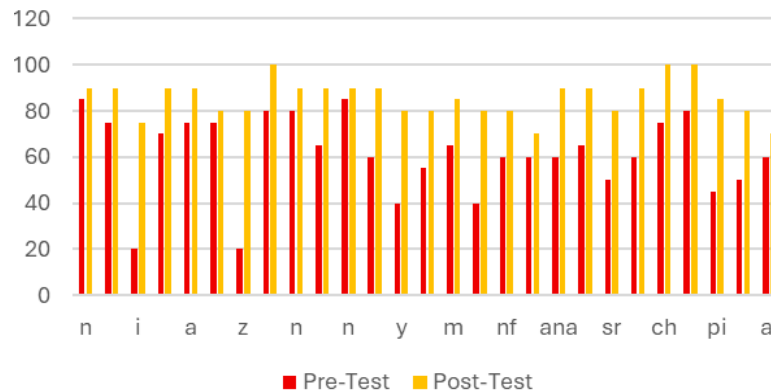


Figure 5. Pre-test and post-test skills chart of mothers of children under two

This improvement in the psychomotor domain affirms that food processing skills cannot be built through information delivery alone, but require direct hands-on experience. This finding supports the results of Faqihatus Has et al. (2022) in a healthy food cooking class activity, which showed that nutrition mentoring combining education with direct cooking practice was more effective in building skills and changing feeding behaviour compared to conventional counselling without practice (Faqihatus Has et al., 2022). Eny Sulistyadewi et al. (2024) in fish processing training for stunting prevention in Jembrana Regency also reported that participants who underwent both demonstrations and independent practice showed a tangible improvement in food processing skills (Eny Sulistyadewi et al., 2024).

From an international perspective, participatory cooking demonstrations have been proven effective in improving child feeding practices in various contexts. Mizéhoun-Adissoda et al. (2023), in a pilot intervention study in southern Benin, showed that participatory cooking demonstrations using local food ingredients from local markets successfully produced food with adequate nutrient density for infants aged 12–23 months, while also improving mothers' understanding of appropriate feeding practices (Mizehoun-Adissoda et al., 2023). This study affirms that local ingredient-based cooking demonstration methods not only transfer technical cooking skills, but also build mothers' capacity to independently assess the nutritional value of food ingredients available in their communities.

Ramadhani et al. (2024) in child nutrition counselling and complementary feeding cooking demonstration activities in Dramaga Village, Bogor, reported that the combination of counselling and cooking demonstrations effectively improved the knowledge and skills of mothers of children under five in preparing complementary feeding that is healthy, nutritious, safe, and appropriate for infants' needs (Ramadhani et al., 2024). These results are consistent with findings in Bagan Serdang Village, where practice training using familiar local food ingredients resulted in evenly distributed skills improvement among all participants regardless of educational background. Participants' familiarity with the ingredients used proved to be a key factor in reducing psychological barriers to trying and adopting new recipes at home.

Widyastuti et al. (2026), in training and mentoring on the use of local food for supplementary feeding (PMT) for stunted children, affirmed that local food processing training is not only effective in improving parental skills, but also promotes sustainable family food independence (Widyastuti et al., 2026). Nyirenda et al. (2025) in their review of culinary nutrition interventions found that approaches integrating nutrition education with locally contextualized cooking skills consistently demonstrated positive impacts on improving child feeding practices and nutritional status in communities (Nyirenda et al., 2025). These findings reinforce that local food-based training programs such as those implemented in Bagan Serdang Village have high replication potential in other coastal areas with similar food resource characteristics.

The success of the training was also supported by the utilization of local food already familiar to the community — lemuru fish, yellow stripe scad, and small shrimp. The use of

familiar ingredients made it easier for participants to follow the practice steps while increasing their confidence in reapplying them at home.

Local Food-Based Complementary Feeding Recipes Developed

During the training activity, five local food-based complementary feeding recipes were successfully developed, tailored to the nutritional needs and developmental stages of children under two, as presented in Table 5.

Table 5. *Local food-based complementary feeding recipes developed*

No	Product Name	Main Ingredients	Target Age	Key Nutritional Content
1	Yellow Stripe Scad Porridge	Yellow stripe scad, rice, carrot	6–8 months	Protein, Omega-3, Vitamin A
2	Lemuru Fish and Vegetable Steam	Lemuru fish, rice, broccoli, tomato	9–11 months	Protein, iron, Vitamin C
3	Small Shrimp Soft Rice Soup	Small shrimp, rice, potato, spinach	12–23 months	Protein, zinc, iron, Vitamin A
4	Yellow Stripe Scad Nuggets	Yellow stripe scad, flour, egg, carrot	12–23 months	High protein, Omega-3, Carbohydrate
5	Nutritious Small Shrimp Pudding	Small shrimp, agar-agar, milk, carrot	12–23 months	Protein, calcium, Vitamin A

All five recipes were designed taking into account nutritional content, texture appropriate to the child's developmental stage, ease of preparation, and local availability of ingredients. All recipes have been documented in a local food-based complementary feeding recipe booklet printed and distributed to all participants, complete with a guide on reading nutrition labels, food storage tips, and a complementary feeding schedule by age.

The selection of lemuru fish, yellow stripe scad, and small shrimp as main ingredients was based not only on local availability but also on their high nutritional value. These small pelagic fish contain high-quality protein (18–22 g/100g), omega-3 fatty acids (DHA and EPA) that play a critical role in central nervous system development, and essential minerals such as iron, zinc, and selenium (Nurapipah et al., 2023). These advantages make local coastal food not only an economically affordable alternative, but also nutritionally superior to commercially available complementary feeding products.

Supporting Factors and Implementation Challenges

The success of this program was supported by several main factors: (1) a participatory approach involving mothers of children under two, posyandu cadres, and PKK members from the planning stage, thereby building a sense of program ownership; (2) appropriate educational methods through a combination of interactive lectures, demonstrations, and direct practice; and (3) the use of locally relevant food ingredients familiar to the target community. Rahman et al. (2023) affirmed that participatory community-based nutrition interventions have a higher success rate because they accelerate behavioural change and build a sense of program ownership at the community level (Rahman et al., 2023).

The main challenge encountered was the presence of young children during the activities, which sometimes caused participants to temporarily pause their participation to calm their children. The service team addressed this by creating a flexible and conducive activity atmosphere, allowing participants to attend to their children before returning to the activity. This flexible approach proved effective as all participants were able to complete the entire series of activities.

CONCLUSION

The empowerment program for mothers of children under two through local coastal food-based complementary feeding education and training in Bagan Serdang Village successfully and significantly improved participants' knowledge and skills. Participants' knowledge in the good category increased from 25.9% (pre-test) to 100% (post-test), and skills improved from 37% to

100%. The program produced five local food-based complementary feeding recipes (lemuru fish, yellow stripe scad, small shrimp), a nutrition education booklet, and a recipe book distributed to all participants.

The participatory empowerment approach combining interactive lectures, cooking demonstrations, and direct practice proved effective and can be adapted in other coastal areas with similar marine resource characteristics. Program sustainability should be maintained through strengthening the capacity of posyandu cadres as field drivers and periodic monitoring through routine posyandu activities. For follow-up, laboratory nutritional content analysis of the developed complementary feeding recipes is needed, as well as publication of activity results to support program replication in other regions.

ACKNOWLEDGMENTS

The service team expresses gratitude to the Polytechnic of Health of the Ministry of Health, Medan, for funding support for this activity. Appreciation is also extended to the Head of Bagan Serdang Village, posyandu cadres, PKK members, and all mothers of children under two who actively participated in the entire series of activities.

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