



Teacher Capacity Management and Family Partnership for Early Childhood Nutrition via Local Fish Utilization

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ABSTRACT

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This study aims to examine how capacity management of Early Childhood Education (PAUD) educators and family partnership management can strengthen early childhood nutrition through the optimal utilization of local fish resources. A qualitative case study employed a Community-Based Participatory Action Research (CBPAR) approach involving 30 purposively selected informants, comprising 10 PAUD educators and 20 parents of children aged 4–6 years. Data were collected through participatory observation, in-depth interviews, and focus group discussions across four stages: needs analysis, nutrition education, tuna croquette-making training, and collaborative evaluation. Data were analyzed thematically and validated through triangulation. The findings indicate improved nutritional literacy, increased participant engagement in practical food processing, strengthened educator capacity as community nutrition change agents, and the development of sustainable family–school partnerships grounded in local wisdom. The tuna croquette product was perceived as nutritious, healthy, and appealing to young children, demonstrating the feasibility of integrating local food resources into child nutrition practices. The study contributes a context-responsive model linking educator capacity management, family partnerships, and local food optimization to early childhood nutrition improvement. Educational and local authorities should institutionalize local-food-based nutrition programs and strengthen multisectoral collaboration to support sustainable implementation and replication.

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INTRODUCTION

Early childhood nutrition is a critical societal concern because adequate nutrition supports physical growth, cognitive development, learning readiness,

and long-term health. The quality of nutrition provided during this period therefore influences not only individual development but also future human resource quality. Evidence indicates that food literacy and early exposure to healthy eating practices can shape children's dietary preferences and sustainable food choices (Ares et al., 2023; Tran et al., 2024). Early childhood education settings consequently represent strategic environments for strengthening healthy eating behaviors because teachers interact with children while also influencing families. Nutrition-related professional development can improve teachers' knowledge and self-efficacy in promoting healthy eating (Bales et al., 2025; Stage et al., 2025). Thus, strengthening nutrition capacity within early childhood education is important for communities because it connects child development, family practices, educational quality, and preventive health.

Despite the strategic role of early childhood education, nutrition problems remain difficult to address because healthy food availability does not necessarily produce healthy dietary practices. Families and educators may experience limited nutritional knowledge, inadequate food-processing skills, resource constraints, and difficulties establishing consistent eating habits. Studies have identified substantial socio-ecological barriers affecting teachers' ability to deliver food and nutrition education, including limited resources, institutional support, and professional preparation (Esdaile et al., 2024; Oskar et al., 2025). Similar concerns have been reported among preschool educators, who require adequate resources and institutional support to conduct food-based learning effectively (Resor et al., 2024; Pardamean et al., 2024). Moreover, nutrition interventions are influenced by contextual factors beyond individual commitment, including organizational conditions and collaboration among educators and food providers (Chan et al., 2025). Therefore, community nutrition improvement requires systematic capacity development rather than information delivery alone.

These challenges are particularly relevant in Tugurejo Village, where local fish resources provide an important opportunity for improving children's dietary quality, yet their nutritional potential may not be fully translated into daily meals. Fishing families may have access to affordable fish while facing constraints related to parents' working time, children's food preferences, preparation skills, and limited nutrition literacy. Such conditions can create a gap between local food availability and actual child consumption. Previous evidence shows that parents and teachers both influence the development of healthy eating habits in preschool settings, but their perspectives and capacities require coordinated strengthening (Niškanović et al., 2023; Hidajat et al., 2026). Local culinary approaches have also been proposed as practical strategies for introducing balanced nutrition to young children (Murnaka & Marini, 2025).

These conditions make Tugurejo a relevant context for examining how educational actors can mobilize local food resources through collaborative capacity development.

Previous research has established the importance of teacher knowledge and professional development in supporting nutrition education. Studies have examined teachers' nutrition knowledge and practices (Habib et al., 2023), professional development for early childhood educators (Lea & Patrick, 2023), and the adoption of nutrition-related best practices across early care settings (Vasicsek et al., 2025; Leztari et al., 2026). Other studies have emphasized the importance of co-designing sustainable and affordable food provision strategies with early childhood stakeholders (Elford et al., 2024). These findings demonstrate that nutrition improvement depends on teacher competence, organizational resources, and stakeholder participation. However, much of the existing literature focuses on individual knowledge, intervention outcomes, or policy implementation rather than the management of teacher capacity within community-based early childhood settings. This limitation leaves insufficient understanding of how local resources, teacher development, and family participation can be integrated into sustainable nutrition programs.

Research has increasingly highlighted collaboration between schools, teachers, parents, and communities as an important mechanism for strengthening children's healthy behaviors. Teacher-parent partnerships have been incorporated into preschool health interventions (Toussaint et al., 2023), while collaborative school-family models have demonstrated potential for improving balanced nutrition and healthy lifestyles (Yafie et al., 2026). Policy-oriented research further indicates that translating nutrition policy into practice requires coordination among multiple stakeholders within early childhood environments (Aristova et al., 2025). Similarly, early childhood educational quality increasingly emphasizes holistic and integrative management rather than isolated educational activities (Anisyah et al., 2025). Nevertheless, existing studies rarely examine how PAUD teachers can be positioned as capacity-building agents who connect local food resources with family practices, particularly in coastal communities. This gap is important because sustainable nutrition improvement requires institutional mechanisms that connect knowledge, skills, partnership, and local resources.

The state of the art of this study lies in integrating educational management, teacher capacity development, family partnership, and local-resource-based nutrition within a single community intervention framework. Rather than treating nutrition education as a standalone health activity, this study conceptualizes it as a managed educational process involving capacity strengthening, skill development, collaborative implementation, and

sustainability. The use of local fish provides a contextually relevant resource for developing nutritious, safe, affordable, and child-appealing meals. The study also positions PAUD teachers as change agents who can translate nutrition knowledge into practical family routines while strengthening communication between educational institutions and households. This perspective offers a managerial contribution by demonstrating how community-based early childhood nutrition initiatives can be organized beyond short-term training. The approach is important because sustainable behavioral change requires institutionalized collaboration, practical competencies, and continuous engagement rather than one-time nutritional awareness activities.

The research problem addressed in this study is how PAUD teacher and parent capacity can be managed to transform locally available fish resources into sustainable nutritional practices for early childhood. The study argues that effective nutrition improvement requires three interconnected processes: strengthening teachers' and parents' understanding of child nutrition, developing practical skills for preparing nutritious and appealing fish-based meals, and managing school-family partnerships to sustain these practices. Accordingly, this qualitative study examines capacity-strengthening management, partner skill development, and partnership sustainability in Tugurejo Village. The study contributes by providing a community-level educational management perspective on early childhood nutrition and by identifying mechanisms through which teachers, parents, and local resources can be coordinated. Its findings are expected to inform the design of sustainable, context-sensitive nutrition programs that can be adapted to other resource-rich but nutritionally vulnerable communities.

RESEARCH METHODS

This study employed a qualitative case study design to examine how PAUD teacher capacity and family partnerships were managed within a community-based early childhood nutrition program. A case study was selected because it enables an in-depth examination of contemporary practices within their natural social context (Defensor et al., 2024). The study adopted a participatory action research orientation, positioning teachers and parents as active participants in identifying needs, implementing activities, and reflecting on program practices. This approach was appropriate because participatory nutrition education can facilitate context-sensitive behavioral change through collaboration between researchers and communities (Upreti et al., 2024). The research was conducted in Tugurejo Village in 2026. The village was purposively selected because fishing is a dominant livelihood and local fish resources are readily available, providing a relevant setting for examining nutrition education, teacher capacity, and family practices.

Data were collected from 30 purposively selected participants: 10 PAUD educators and 20 parents of children aged 4–6 years. Participants were selected because teachers and parents directly influence children's eating experiences and daily nutritional practices. Data collection involved field observations, semi-structured interviews, participatory observations, practical food-processing activities, and focus group discussions (FGDs). Initial observations and interviews explored nutritional knowledge, children's eating patterns, perceptions of fish consumption, local fish availability, and challenges in preparing fish-based meals. Participatory observations were conducted during nutrition education and hands-on tuna-croquette preparation to document engagement, interaction, and skill development. Post-activity interviews and FGDs explored perceived changes, barriers, and strategies for sustaining fish-based nutrition practices at home and in PAUD settings. These complementary methods captured participants' experiences and observable practices, consistent with the importance of identifying contextual barriers and enablers in nutrition education (Esdaile et al., 2024).

Data were analyzed using three interactive stages: data condensation, data display, and verification. First, observation notes, interview transcripts, and FGD records were condensed through coding, categorization, and summarization of information concerning teacher capacity, nutritional understanding, food-processing skills, participation, family partnership, and program sustainability. Second, condensed data were displayed through thematic matrices and organized narrative descriptions to identify recurring patterns, relationships, and differences between participant groups. Third, conclusions were verified by comparing emerging interpretations with the original data and examining consistency across participants and methods. The analytical process followed systematic and iterative qualitative analysis principles (Naeem et al., 2023). Trustworthiness was strengthened through source triangulation between teachers and parents and method triangulation across observations, interviews, and FGDs. Member checking was conducted during the final reflection session to confirm that interpretations accurately represented participants' experiences.

RESULTS AND DISCUSSION

Results

Initial Nutritional Understanding

The initial assessment through field observations and interviews indicated that most PAUD teachers and parents in Tugurejo Village had limited understanding of the nutritional content of local fish and its relationship with children's dietary practices. Several participants tended to view different animal-protein sources as nutritionally equivalent and did not specifically identify fish

as a source of omega-3 fatty acids. Participants also commonly described children's rejection of fish as a matter of taste preference. Limited knowledge was also identified regarding alternative preparation methods that could make fish more acceptable to children. These findings indicated differences in participants' understanding of fish nutrition, children's food preferences, and appropriate strategies for preparing local fish before the intervention.

Changes in Nutritional Understanding

Post-activity interviews and focus group discussions indicated increased understanding among participants regarding fish nutrition and food safety. Participants who had previously generalized animal-protein sources were able to identify fish as an important source of omega-3 fatty acids and explain its relevance to children's growth and development. Participants also demonstrated greater awareness of food-selection criteria and basic food-safety considerations when preparing meals for children. During the reflection sessions, participants were able to describe several ways of modifying fish-based meals to accommodate children's preferences. The responses showed observable changes in the information participants could recall and explain after the education and training activities.

Participant Participation and Engagement

Participants demonstrated active involvement throughout the education and food-processing activities. During the nutrition education sessions, participants asked questions concerning children's rejection of fish, methods for selecting fresh fish, and the affordability and availability of local fish. Participation increased during the practical tuna-croquette processing session. Participants directly performed the preparation, mixing, shaping, and cooking stages under facilitator guidance. Several participants also discussed their intention to practice the preparation method independently at home. Some participants expressed interest in adapting the procedure to other types of fish available in Tugurejo Village. The practical session therefore generated visible participation through direct involvement, questions, discussions, and plans for subsequent household application.



Figure 1. Participants' Active Involvement During the Tuna Croquette Processing Training

Tuna Croquette Product

The training produced tuna croquettes as a fish-based food product designed for children. Fresh tuna was used as the main animal-protein ingredient and was combined with other ingredients and seasonings during preparation. The product was processed into a molded croquette form with a crispy outer texture and softer interior. Participants completed the processing stages through direct practice, including ingredient preparation, mixing, shaping, and cooking. During the activity, participants observed the final product and discussed its suitability as a children's meal. Participants also identified the possibility of applying the same preparation technique to other local fish species. The resulting product provided a concrete output of the practical training and became a reference for participants in preparing alternative fish-based meals at home and within PAUD activities.



Figure 2. Tuna Croquette Product Resulting from the Training

Strengthening the PAUD Teacher Role

Post-activity interviews indicated changes in how PAUD teachers viewed their role in supporting children's nutrition. Teachers reported readiness to introduce information about fish and healthy eating through PAUD learning activities. Proposed activities included introducing different types of local fish, incorporating fish-related themes into classroom activities, conducting cooking-related role play, and organizing shared meals involving fish-based menus. Teachers also expressed willingness to communicate nutrition-related information to parents through their routine interactions. These responses indicated that teachers increasingly identified themselves not only as classroom educators but also as participants in communicating nutrition information to families. The findings further showed that teachers considered their existing interactions with parents an opportunity to support the continuation of fish-based nutritional practices beyond the PAUD setting.

Parent Participation and Local Knowledge

Parents actively contributed information about local fish resources during the intervention. Participants shared knowledge concerning fish varieties commonly available in the surrounding area, seasonal availability, and household preparation practices. Several parents also described traditional fish recipes that had been practiced within their families. These recipes became part

of the discussions during the training, particularly regarding ingredient selection, preparation procedures, and possible adaptations for children. Parents participated in exchanging information with facilitators and other participants throughout the activities. The findings showed that parents contributed not only as recipients of nutrition education but also as sources of information concerning local food resources and household practices. Their participation provided contextual information that supported the adaptation of fish-processing activities to the local conditions of Tugurejo Village.

Program Sustainability

The final reflection sessions identified participants' plans to continue applying fish-based menus after completion of the formal activities. Participants reported intentions to prepare locally sourced fish as children's meals at home and to introduce fish-based menus during activities at the PAUD unit. Participants also discussed the possibility of using different fish species according to local availability rather than relying on tuna alone. To support continued implementation, the research team provided a simple module containing fish-processing recipes and preparation guidance. The module was intended to function as a reference that participants could use independently after the training. The reflection activities also documented participants' proposed strategies for incorporating the newly acquired food-processing practices into their regular household and PAUD routines.



Figure 3. UM Lecturer in Discussion with the Village Head to Ensure Program Sustainability

Summary of Findings

The findings identified several changes across the four stages of the community activity. The initial assessment revealed limited understanding of fish nutrition, food safety, and strategies for making fish more acceptable to children. Following nutrition education, participants demonstrated greater ability to explain fish nutritional content and food-safety principles. Practical training generated active participation and produced tuna croquettes as a tangible fish-based food product. Teachers reported plans to integrate nutrition-related activities into PAUD learning and parent communication, while parents contributed local knowledge concerning fish availability and traditional recipes. Final reflections documented participants' intentions to continue preparing local-fish-based meals and using the provided module as a practical reference. These findings collectively describe changes in knowledge, participation, practical skills, teacher roles, parent involvement, and planned continuation of the program.

Discussion

The findings show that PAUD teachers and parents initially had limited understanding of fish nutrition, food safety, and strategies for increasing children's acceptance of fish-based meals. This finding is consistent with studies showing that teachers' nutrition knowledge and practices can be constrained by limited preparation and contextual resources (Habib et al., 2023; Esdaile et al., 2024). However, the present study extends these findings by demonstrating that the knowledge gap was not addressed through information alone. Nutrition education was connected directly with locally available food resources and practical preparation skills. The subsequent improvement in participants' explanations of fish nutrition and food safety indicates that capacity building can move beyond awareness toward practical nutritional literacy. This supports the view that food literacy develops through meaningful experiences and contextual learning rather than isolated information transfer (Ares et al., 2023).

The increased participation observed during tuna-croquette training compared with education sessions suggests that experiential learning was particularly important in translating nutritional knowledge into practical competence. This finding corresponds with Bales et al. (2025), who reported that early childhood education initiatives can strengthen teachers' knowledge and self-efficacy through structured health-related learning experiences. It also aligns with Resor et al. (2024), who identified resources and opportunities for food-based learning as important factors influencing preschool teachers' practices. The present study adds a contextual dimension by demonstrating how hands-on preparation using a locally available fish can transform nutrition education into

an immediately applicable household skill. Unlike approaches emphasizing general nutrition knowledge, the intervention connected knowledge, practice, and locally appropriate food preparation within one learning process.

The production of tuna croquettes represents another important finding because participants did not merely receive nutritional information but produced a concrete food product that could be replicated. The use of local culinary practices is consistent with Murnaka and Marini (2025), who identified local culinary approaches as a strategy for introducing balanced nutrition in early childhood. The finding also corresponds with Ares et al. (2023), who emphasized practical food literacy as an important component of healthier dietary behavior. However, the present study differs in its emphasis on fish processing as a locally embedded educational resource within a coastal community. The contribution therefore lies in linking food literacy with local-resource utilization. Rather than introducing an externally designed menu, the training demonstrated how an existing community food resource could be modified into a child-oriented meal while simultaneously developing participants' practical skills.

The strengthening of teachers' roles as nutrition change agents also supports previous evidence concerning professional development and teacher capacity. Bales et al. (2025) demonstrated the potential of professional learning to improve teacher knowledge and self-efficacy, while van Vijfeijken et al. (2024) showed that professional development can strengthen teachers' agency to initiate change. Similarly, Lea and Patrick (2023) emphasized the importance of professional development and resources in supporting teachers' work with young children. The present findings extend this literature by positioning PAUD teachers beyond the classroom as intermediaries between educational institutions and families. Teachers' plans to integrate fish-related activities into learning and communicate nutrition information to parents suggest that capacity development can generate a broader community role. This provides an educational-management contribution by connecting teacher development with family-oriented nutrition practices.

Parental participation and the sharing of local fish knowledge further demonstrate the importance of collaborative approaches. The findings are consistent with Niškanović et al. (2023), who emphasized the complementary perspectives of parents and teachers in developing healthy eating habits. They also correspond with Toussaint et al. (2023), whose intervention framework highlights teacher-parent partnership as a relevant mechanism for promoting healthy behaviors. More broadly, Yafie et al. (2026) demonstrated the potential of collaborative school-family wellness models for improving balanced nutrition and healthy lifestyles. The present study contributes a community-based perspective in which parents are not simply intervention recipients but also

contribute knowledge about fish varieties, seasonal availability, and traditional recipes. This reciprocal exchange strengthens the contextual relevance of the intervention and provides a practical basis for developing nutrition strategies that are compatible with local household practices.

The findings concerning program sustainability are also consistent with research emphasizing contextual and organizational conditions in early childhood nutrition interventions. Chan et al. (2025) showed that successful implementation depends on contextual factors beyond the presence of individual “local champions,” while Elford et al. (2024) emphasized co-designed support strategies for sustainable, healthy, and affordable food provision. Similarly, Aristova et al. (2025) highlighted the importance of stakeholder coordination in translating nutrition policy into practice. In the present study, participants’ plans to continue preparing fish-based meals, combined with the provision of a practical recipe module, indicate an attempt to embed the intervention beyond the training period. The novelty lies in connecting sustainability with teacher-parent collaboration and locally available fish resources. Thus, sustainability is framed not only as continued activity but as the development of community capacity to independently maintain the practice.

Overall, this study contributes a locally grounded educational-management model that integrates teacher capacity building, parental participation, experiential food literacy, and sustainable use of local resources. Its findings complement holistic-integrative early childhood education approaches that emphasize coordinated educational, health, and family services (Anisyah et al., 2025). The study also responds to evidence that nutrition practices in early childhood settings vary according to institutional resources, educator capacity, and contextual conditions (Kempler et al., 2024; Vasicsek et al., 2025). Its principal novelty is therefore the integration of these dimensions within a coastal PAUD context, where fish availability can be transformed into an educational and nutritional asset. Rather than treating nutrition as a separate health program, the findings demonstrate the potential of managing teachers and families as interconnected actors in a community learning process. This perspective offers a transferable foundation for context-sensitive early childhood nutrition programs.

CONCLUSION

This study highlights that strengthening PAUD teachers’ capacity and managing family partnerships through the utilization of local fish can transform nutrition education from a conventional knowledge-transfer activity into a participatory, context-responsive process of community change. The most important lesson is that empowering teachers as nutrition change agents, combined with family engagement and the use of locally available food

resources, can foster greater nutritional awareness, participation, and practical capacity to support early childhood nutrition and stunting prevention. Scientifically, the study contributes an integrated educational management perspective by demonstrating how teacher capacity strengthening, family partnership management, and local wisdom can be strategically connected to address nutritional challenges in coastal communities, thereby extending community-based nutrition interventions beyond generic educational approaches. However, the study is limited by its qualitative scope, contextual focus on a single village, and relatively short observation period, which restrict the generalizability and assessment of long-term behavioral sustainability. Future research should therefore employ longitudinal and mixed-method designs, involve broader and more diverse community settings, examine sustained changes in dietary practices and child nutritional outcomes, and investigate stronger cross-sectoral partnerships with health and fisheries institutions to support the institutionalization and scalability of community-based nutrition management.

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