NAK-KANAK: Journal of Child Research
E-ISSN: 3047-1168 P-ISSN: 3047-504X
JCR, Vol. 2 (4), November 2025 (199-210)
DOI: https://doi.org/10.21107/njcr.v2i4.203

The Free Nutritious Meal Program and Early Childhood Learning Readiness: A Case Study from Indonesia

Ferlinda Eka Agholin Rahayu[1], Vinandiya Muhtarisul Lisaniyah[2]✉, Syifa Almuk Minun[3], Khaled Ahmed Aqeel Alzoubi[4], Konstantinos T. Kotsis[5], Fani Endang Setia Ningsih[6]

[1236]Universitas Trunojoyo Madura, Indonesia; [4]Hashemite University, Zarqa, Jordan; [5]University of Ioannina, Greece

ARTICLE INFO

Article History:
Received: October 25, 2025
Revised: November 27, 2025
Accepted: November 29, 2025

Keywords:
Early Childhood Education;
Free Nutritious Meal Program;
Child Nutrition;
Learning Motivation;
Stunting Prevention.

This is an open-access article under the CC BY-NC license.

Copyright © 2025 by Author, Published Universitas Trunojoyo Madura

ABSTRACT

Background of the study: Nutritional problems in early childhood remain a major challenge in Indonesia, particularly among low-income families who struggle to meet children's nutritional needs. According to the 2023 Indonesian Health Survey, the national stunting prevalence reached 21.5%, indicating that one in five children experiences growth impairment due to chronic malnutrition. In response to this issue, the Indonesian government launched the Free Nutritious Meal (FNM) Program in January 2025 as a strategic initiative to reduce stunting and improve human resource quality from an early age.
Aims and scope of paper: This study aims to analyze the implementation of the FNM program at RA Muta'alimin Labang, focusing on the types of services provided, the implementation process, challenges encountered, and the program's initial benefits for children's nutritional status and learning motivation.
Methods: The study employed a qualitative approach using a case study design. Research participants included the school principal, classroom teachers, and parents, selected through purposive sampling. Data were collected over four months through participatory observation, in-depth interviews, and document analysis. Data analysis followed the Miles and Huberman interactive model, consisting of data reduction, data display, and conclusion drawing. Data validity was ensured through source, technique, and time triangulation.
Results: The findings indicate that the FNM program was implemented consistently from Monday to Friday at 09:00 a.m. and had a positive impact on children's attendance and learning enthusiasm. Children who received adequate nutritional intake demonstrated improved concentration, higher levels of classroom participation, and increased learning engagement.
Contribution: This study provides empirical evidence that the FNM program enhances children's physical health and cognitive readiness for learning. Beyond its empirical findings, the study makes a conceptual contribution to the international early childhood education literature by reframing nutrition-based interventions as a foundational component of the learning readiness framework. It demonstrates how nutritional status operates as a mediating mechanism linking physical health, cognitive preparedness, and early learning outcomes, offering a theoretically transferable model that is applicable across diverse early childhood education contexts, particularly in settings where nutritional vulnerability shapes educational trajectories.

✉ **Corresponding Author**
Address : Bangkalan, Indonesia
Email : finandiaf@gmail.com

INTRODUCTION

Poverty remains a critical social issue with far-reaching implications for children's health and development, particularly during early childhood (Chowdhury & Naz, 2023; Gross et al., 2021; Wu & Zhang, 2025). Children raised in economically disadvantaged households often face limited access to nutritious food, adequate healthcare services, and healthy living environments. These constraints significantly increase the risk of malnutrition-related conditions such as stunting (chronic growth failure), wasting (low weight-for-height), and micronutrient deficiencies, all of which negatively affect children's physical and cognitive development (Arqam et al., 2026; Debebe et al., 2026; Garina et al., 2024; McCarrison et al., 2024; Supranoto et al., 2025). Global health evidence consistently indicates that children from low-income families are substantially more vulnerable to malnutrition than their peers from more affluent backgrounds, with long-term consequences for learning capacity, future productivity, and susceptibility to chronic diseases (Bosqui et al., 2024; Choi et al., 2026; Fujii et al., 2025; Kizito et al., 2025; Lu et al., 2024; Ordway et al., 2023; Testa et al., 2025; Wei et al., 2024).

Scientific findings from psychology, physiology, and nutrition research demonstrate that approximately half of cognitive development occurs from conception to the age of four, with an additional 30% developing between the ages of four and eight (Cerovac & Keane, 2025; Tosolini et al., 2025). This period represents a critical window during which adequate nutritional intake is essential to support optimal brain development and cognitive functioning. Nutrition, therefore, is not merely a biological necessity to alleviate hunger, but a fundamental determinant of children's developmental potential, learning readiness, and overall well-being throughout the life course.

Despite national progress in improving nutritional indicators, malnutrition remains a major public health concern in Indonesia, particularly in eastern regions such as East Nusa Tenggara and West Papua. While some provinces have shown notable reductions in stunting prevalence through multisectoral interventions, national data from the 2023 Indonesian Health Survey reveal that stunting still affects 21.5% of Indonesian children, meaning that one in five children experiences chronic growth impairment. This condition not only compromises physical growth but also undermines cognitive development, concentration, immune function, and academic performance. Children affected by malnutrition are more likely to struggle with attention, learning engagement, and school achievement, perpetuating cycles of poverty and inequality (https://kemkes.go.id/).

Internationally, various countries have implemented school-based nutrition programs to address similar challenges. In the United States, the National School Lunch Program provides federally regulated nutritious meals to children, aiming to meet up to half of their daily nutritional requirements (Gundersen et al., 2012). Japan's *Shokuiku* initiative promotes healthy eating habits from an early age while preserving food culture (Iwano et al., 2025), whereas Brazil's *Programa Nacional de Alimentação Escolar* integrates nutrition education with local agricultural support to ensure food security and community economic development (Sidaner et al., 2013). These programs demonstrate that nutrition-based interventions in educational settings can play a crucial role in improving children's health, learning outcomes, and long-term human capital development.

In Indonesia, the government launched the Free Nutritious Meal (FNM) Program in January 2025 as part of a national strategy to reduce stunting and enhance human resource quality. Enacted through Presidential Regulation No. 83 of 2024 and Presidential Instruction No. 1 of 2025, the program represents a major policy commitment, supported by substantial budget allocation, to provide equitable access to nutritious food for school-aged children and vulnerable groups, including preschoolers, pregnant women, and breastfeeding mothers. The FNM program reflects growing recognition that early nutritional investment is foundational to achieving Indonesia's long-term development vision toward Indonesia Emas 2045.

Preliminary observations at RA Muta'alimin Labang indicate that the implementation of the FNM program—from Monday to Friday at 9:00 a.m.—has generated positive outcomes for children's school attendance, enthusiasm, and engagement in learning activities. Participatory

observations suggest that children demonstrate higher levels of concentration, activeness, and readiness to participate in classroom activities after receiving nutritious meals. These findings are consistent with previous studies indicating that adequate nutrition is closely linked to improved cognitive performance and learning motivation in early childhood.

However, despite the strategic importance of the FNM program, empirical studies examining its implementation and early impacts in early childhood education settings remain limited, particularly at the institutional level. Most existing research focuses on school-age populations or macro-level policy analysis, leaving a gap in understanding how such programs operate in early childhood institutions and how they influence children's learning readiness and well-being in practice.

Therefore, this study aims to analyze the implementation of the Free Nutritious Meal Program at RA Muta'alimin Labang. Specifically, the study seeks to (1) describe the forms of FNM services and types of nutritious meals provided, (2) examine the implementation process from preparation to distribution and monitoring, (3) identify challenges encountered by schools and program implementers, and (4) explore the program's initial benefits for children's nutritional status and learning motivation. By addressing these objectives, this study contributes to the growing body of evidence on nutrition-based interventions in early childhood education and provides practical insights for policymakers and educators seeking to strengthen holistic child development through integrated nutrition and education programs.

METHOD

Research Design

This study employed a qualitative research approach with a case study design to explore in depth the implementation of the Free Nutritious Meal (FNM) Program at RA Muta'alimin Labang. A qualitative approach was selected to capture participants' perspectives and lived experiences regarding the program in its natural educational setting (Creswell & Creswell, 2018). The case study design enabled an in-depth investigation of the FNM program as a contemporary phenomenon embedded within a real-life early childhood education context, allowing for a comprehensive understanding of planning, implementation, and perceived outcomes from multiple stakeholder viewpoints.

Research Participants

The research participants consisted of the school principal, classroom teachers, and parents of enrolled children. These participants were selected because of their direct involvement in the daily implementation of the FNM program and their continuous observation of children's responses to the provision of nutritious meals. Parents were included to provide complementary perspectives on changes in children's health conditions and eating behaviors at home. Participant selection followed a purposive sampling technique, based on criteria of direct engagement with the program and in-depth knowledge of its implementation.

Data Collection

Data were collected over a four-month period using three primary techniques (Miles et al., 2020): participatory observation, in-depth interviews, and document analysis. Participatory observation was conducted to directly examine meal preparation processes, food distribution, shared mealtime situations, and teacher–child interactions during meal consumption. The researcher documented children's eating behaviors, responses to different food types, and teachers' strategies in encouraging children to consume nutritious meals. Observations were carried out during two field visits, each lasting approximately two to three hours, to obtain a comprehensive portrayal of program implementation.

In-depth interviews were conducted using a semi-structured format with open-ended guiding questions developed in line with the study objectives. Each interview session lasted between 15 and 25 minutes and was audio-recorded with participants' informed consent.

Document analysis involved the collection of secondary data, including the institution's profile, program organizational structure, weekly meal menus, budget documents, and photographic records of FNM activities. These documents served to contextualize and corroborate findings from observations and interviews.

Data Analysis

Data analysis followed the interactive thematic analysis model proposed by Miles and Huberman (Miles et al., 2014), consisting of data reduction, data display, and conclusion drawing and verification. Data reduction involved selecting, focusing, simplifying, and transforming raw data derived from field notes and interview transcripts. The researcher conducted repeated readings to identify relevant information aligned with the study focus. Open coding was applied to meaningful data segments to generate initial codes and emerging themes.

Data display was performed by organizing information into descriptive narratives and matrices to facilitate pattern recognition and interpretation. Codes were subsequently grouped into broader categories, from which core themes related to FNM program implementation were developed.

Trustworthiness of the Study

To ensure the credibility and trustworthiness of the findings, multiple validation strategies were employed. Triangulation of sources was conducted by comparing data obtained from the principal, teachers, and parents to identify convergent and divergent perspectives. Method triangulation involved cross-checking findings derived from observations, interviews, and documentation to enhance data consistency. Time triangulation was applied by collecting data at different points throughout the research period to examine the stability of observed phenomena.

Additionally, member checking was carried out by inviting participants to review interview transcripts and preliminary findings to confirm the accuracy of interpretations. Regular discussions with academic supervisors and qualitative research experts were conducted to obtain critical feedback and strengthen analytical rigor.

RESULTS

Implementation of the Free Nutritious Meal Program

The Free Nutritious Meal Program (FNM) was implemented consistently at RA Muta'alimin Labang from Monday to Friday at 09:00 a.m. The implementation followed technical guidelines issued by the Ministry of Education and national balanced nutrition standards for early childhood. The school principal coordinated all stages of the program, including menu planning, food procurement, daily supervision, and periodic evaluation. Classroom teachers were responsible for accompanying children during mealtime and documenting children's responses to the provided meals. To ensure transparency and parental involvement, weekly menus were shared with parents through school communication channels. The program was implemented through collaborative coordination among school management, teachers, catering staff, and parents to maintain food quality and program sustainability.

Nutritional Composition and Menu Variation

The findings indicate that the FNM menu was designed with daily variation to prevent monotony and to meet children's nutritional requirements. Each meal portion included a carbohydrate source (primarily rice or noodles), animal-based protein (such as chicken or fish), plant-based protein (tofu or tempeh), vegetables, and fresh fruit. School administrators reported that menu planning considered children's food preferences, local food availability, and portion adequacy for children aged four to six years. Consultation with a nutritionist ensured that calorie intake and nutrient balance were aligned with early childhood dietary recommendations. Menu variation also served an educational function by introducing children to diverse healthy foods and fostering positive

eating habits from an early age. Catering personnel prepared meals following strict hygiene and food safety standards.

Food Preparation and Distribution Process

Meal preparation began in the early morning using fresh ingredients sourced from local markets. Food was prepared in a designated school kitchen that met hygiene and sanitation requirements. Prior to meal distribution, teachers arranged eating areas and ensured cleanliness. The principal conducted a visual inspection to verify food quality and portion consistency. Meal distribution was organized sequentially by class level to avoid overcrowding and facilitate supervision. Children were guided to collect their meals independently under teacher supervision, promoting autonomy and responsibility. During mealtime, teachers encouraged children to consume their meals in a supportive and non-coercive manner.

Monitoring of Nutritional and Health Status

Children's nutritional status was monitored through monthly measurements of body weight and height, recorded in individual health monitoring cards. In addition, the school collaborated with the local primary health center to conduct comprehensive health assessments every three months. Parents received regular reports on their children's growth indicators through school communication books. The monitoring results indicated that most children experienced gradual weight gain after approximately two months of program participation. Teachers observed improved physical vitality, particularly among children who had previously exhibited signs of undernutrition. Continuous monitoring enabled early identification of children requiring additional nutritional or health-related attention.

Challenges in Program Implementation

Despite its overall effectiveness, several challenges were identified. Limited dining space required classrooms to be temporarily converted into eating areas, necessitating additional cleaning before instructional activities resumed. Some children showed reluctance to consume certain vegetables, requiring teachers to employ adaptive strategies such as role modeling by eating together with children. Occasional delays in food ingredient delivery disrupted meal schedules. Additionally, budget constraints limited menu diversification and the use of higher-cost food items. These challenges highlight the need for improved logistical coordination and infrastructure support to optimize program implementation.

Children's Responses and Engagement

Observational data revealed high levels of enthusiasm among children during mealtime, reflected in orderly behavior and positive emotional expressions. Teachers reported increased school attendance following program implementation, particularly among children who had previously demonstrated irregular attendance patterns. Parents also reported that children frequently discussed school meals at home, indicating positive program reception. Mealtime interactions fostered social skills, including sharing, cooperation, and peer support, contributing to a positive social learning environment.

Effects on Learning Concentration and Classroom Participation

Teachers consistently observed improvements in children's concentration and classroom engagement following morning meal consumption. Children appeared more energetic, attentive, and actively involved in learning activities. Enhanced performance was noted in fine motor tasks such as coloring and cutting. Increased participation in group activities and classroom discussions was also reported. Parents corroborated these findings, noting improved morning routines and heightened motivation to attend school. These results suggest a strong association between adequate nutritional intake and children's cognitive readiness for learning.

Parental Perspectives on the Program

Parents expressed strong appreciation for the FNM program, particularly for its role in reducing household financial burdens related to providing nutritious meals. Parents from low-income households emphasized the difficulty of consistently offering varied, balanced meals at home. The program ensured that children received at least one nutritious meal per day. Parents also valued the school's transparency in menu planning and its inclusive approach to program evaluation. Suggestions from parents included increasing fruit portions and adding milk to further support calcium intake. Parental support and engagement were high, contributing positively to program continuity.

DISCUSSION

Effectiveness of the Free Nutritious Meal Program Implementation

The implementation of the Free Nutritious Meal Program (FNM) at RA Muta'alimin Labang demonstrates a well-structured, multi-stakeholder approach that aligns with best practices in school-based nutrition interventions. The coordinated involvement of school leadership, classroom teachers, catering staff, and parents reflects an integrated governance model that has been widely recognized as a critical determinant of program effectiveness. This finding is consistent with previous studies indicating that school meal programs yield optimal outcomes when supported by strong institutional coordination and family engagement. Collaborative management enhances accountability, ensures consistent food quality, and facilitates timely problem-solving during implementation (Abderbwih et al., 2022; Cohen et al., 2021).

The transparent communication of weekly menus to parents strengthened parental trust and reinforced shared responsibility for children's nutrition. Prior research suggests that parental involvement not only improves compliance but also increases the sustainability of nutrition programs by fostering collective ownership (Abadi et al., 2025; Ickes et al., 2016). The implementation model observed at RA Muta'alimin Labang may serve as a transferable framework for other early childhood education institutions seeking to adopt similar nutrition-based interventions.

Menu Quality, Variety, and Children's Food Acceptance

Menu diversity emerged as a key factor influencing children's acceptance and enthusiasm toward the program. The provision of varied meals incorporating locally available food sources reflects principles of cultural relevance and sustainability emphasized in global school feeding guidelines. Exposure to diverse food types at an early age has been shown to reduce food neophobia and promote healthier dietary patterns over the life course. The involvement of nutrition experts in menu planning further ensured that caloric adequacy and nutrient balance were appropriate for children aged four to six years (Labyak et al., 2021).

Children's reluctance to consume certain vegetables, while expected within early developmental stages, underscores the importance of pedagogical strategies in nutrition programs. Teachers' use of role modeling aligns with evidence suggesting that children are more likely to accept unfamiliar foods when adults demonstrate positive eating behaviors (Quigley et al., 2025). Thus, the success of the FNM program was not solely dependent on food provision but also on the educational practices embedded within daily mealtime routines.

Impacts on Physical Growth and Cognitive Development

Observed improvements in children's weight status following sustained program participation indicate positive effects on physical growth, particularly among children from nutritionally vulnerable backgrounds. These findings corroborate earlier research demonstrating that school meal programs can accelerate nutritional recovery and mitigate growth faltering in early childhood. Adequate intake of energy and protein supports physiological restoration processes that are critical during periods of rapid growth (Brown & Farquhar, 2014).

Beyond physical outcomes, enhanced concentration, classroom participation, and learning readiness were consistently reported. These findings support neurodevelopmental theories linking

nutrition to cognitive function, which posit that stable glucose availability and sufficient micronutrient intake are essential for attention regulation and memory processes (Benton, 2010). The increased enthusiasm for school attendance further suggests that the program contributed to positive emotional associations with learning environments, reinforcing intrinsic motivation among young learners (Grantham-McGregor et al., 2007; Taras, 2005).

Addressing Socioeconomic Inequalities Through School Nutrition

The universal provision of nutritious meals played a significant role in reducing disparities in access to healthy food among children from diverse socioeconomic backgrounds. By ensuring equal portions for all students, the program minimized stigma and promoted social inclusion within the school setting. This aligns with global evidence indicating that universal school feeding programs are more effective than targeted approaches in fostering equity and participation (Abderbwih et al., 2022).

Parents' testimonies regarding reduced household food expenditure highlight the broader socioeconomic benefits of the program (Larcom et al., 2016). Increased school attendance among children from low-income families further underscores the role of school meal programs as social safety nets that simultaneously address nutrition, education, and poverty-related barriers.

Social Interaction and the Development of Healthy Eating Habits

Shared mealtime experiences functioned as important socialization contexts where children developed prosocial behaviors such as sharing, cooperation, and empathy. These interactions support developmental theories emphasizing the role of communal activities in social and emotional learning. A positive, pressure-free dining environment facilitated children's willingness to consume nutritious foods and reinforced healthy eating norms (Gupta et al., 2018; Hanbazaza et al., 2015a).

The application of responsive feeding practices—encouraging but not forcing food consumption—aligns with recommendations to prevent maladaptive eating behaviors. Early establishment of healthy eating habits within supportive social contexts may have long-term implications for dietary behavior and chronic disease prevention (Hanbazaza et al., 2015b; Rayhani et al., 2024).

Infrastructure and Resource Constraints

Despite its overall effectiveness, the program faced infrastructural and logistical challenges, particularly related to limited dining space and supply chain reliability. The use of classrooms as temporary dining areas required additional time and labor, potentially affecting instructional schedules. Similar constraints have been reported in early childhood institutions in resource-limited settings, highlighting the need for adaptive solutions such as staggered meal times or utilization of outdoor spaces. Budgetary limitations also constrained menu diversification and ingredient quality, underscoring the importance of sustainable financing mechanisms. Strengthening coordination with suppliers and improving procurement systems are essential steps toward enhancing program efficiency and resilience (Asada et al., 2017; El Bilali et al., 2021).

The Role of Nutritional Monitoring in Program Evaluation

Regular anthropometric monitoring provided objective evidence of program outcomes and enabled early identification of children at nutritional risk (Deconinck, 2019). Collaboration with local health services strengthened the school's capacity to conduct comprehensive health assessments and respond promptly to emerging concerns. The use of child health records facilitated continuous communication between schools and families, reinforcing accountability and shared awareness (Chowdhury & Naz, 2023).

Consistent with international recommendations, school-based nutrition monitoring serves as a critical feedback mechanism for program refinement. Data generated through routine assessments can inform menu adjustments and targeted interventions, ensuring that the program remains responsive to children's evolving nutritional needs.

Implications

The findings of this study highlight the importance of school-based nutrition programs as a core component of early childhood education practice, policy, and cross-sectoral collaboration. At the practice level, integrating nutritious meal provision into daily learning routines can support children's physical well-being, learning readiness, and classroom engagement, reinforcing nutrition as a foundational element of holistic early development. From a policy perspective, the results support the inclusion of nutrition-based interventions within early childhood education standards and curricula to promote equitable learning opportunities, particularly for children from socioeconomically disadvantaged backgrounds. Additionally, the study underscores the need for coordinated collaboration among education, health, and social sectors to ensure the sustainability, nutritional adequacy, and broader developmental impact of school-based nutrition programs across diverse early childhood education contexts.

Research Contribution

This study makes both theoretical and empirical contributions to the international literature on school-based nutrition programs in early childhood education. It extends existing global research by conceptualizing nutrition not merely as a health-related input, but as a foundational component of early learning readiness that shapes the interrelated domains of physical growth, cognitive preparedness, learning motivation, classroom engagement, and psychosocial development. By situating the findings within a broader early childhood education framework, this study offers transferable insights that are relevant across diverse educational and socio-cultural contexts, particularly for low- and middle-income settings where nutrition remains a critical determinant of early learning outcomes.

Limitations

Several limitations should be considered when interpreting the findings of this study. *First*, the relatively short observation period limits the ability to assess long-term impacts of the program on children's physical growth, cognitive development, and academic trajectories. *Second*, the study was conducted in a single institution, which constrains the generalizability of the findings to other early childhood education contexts with differing socioeconomic and institutional characteristics.

Third, the limited number of participants may not fully capture the diversity of perspectives among all stakeholders involved in program implementation. The absence of a control group also restricts the ability to attribute observed outcomes exclusively to the FNM program, as external factors may have influenced children's development. Additionally, nutritional status assessment relied primarily on anthropometric measures without laboratory-based indicators such as hemoglobin levels or micronutrient profiles. Finally, children's dietary intake outside of school was not systematically documented, making it difficult to estimate the program's contribution to total daily nutrient intake.

Suggestions

Future studies are encouraged to adopt longitudinal and mixed-methods research designs to examine the sustained effects of school-based nutrition programs on children's physical growth, cognitive development, and learning readiness over time. Integrating qualitative insights with quantitative nutritional data—such as dietary intake, anthropometric measurements, and micronutrient indicators—would strengthen the robustness and generalizability of findings. Comparative studies involving early childhood education institutions with and without nutrition programs are also recommended to enhance causal inference regarding program effectiveness. In addition, large-scale quantitative analyses across diverse socio-cultural contexts would enable statistical testing of the relationships between nutrition-based interventions and educational outcomes, thereby contributing more generalizable evidence to the international literature on early childhood nutrition and learning.

CONCLUSION

The findings demonstrate that the Free Nutritious Meal (FNM) program made a meaningful contribution to enhancing early childhood learning readiness by improving school attendance, learning motivation, and overall classroom engagement. Adequate nutritional intake was associated with improved concentration, increased physical stamina, and more active participation in learning activities, indicating strengthened cognitive readiness for formal learning processes. From a physical health perspective, regular nutritional monitoring revealed positive trends in weight gain and general health conditions among most children after approximately two months of program participation.

Beyond cognitive and physical domains, the program also supported children's social and behavioral readiness for learning. Shared mealtime routines fostered independence, social interaction, and prosocial behaviors, such as cooperation and peer support, which are essential components of early learning readiness. For families—particularly those from low-income backgrounds—the FNM program functioned as a social protection mechanism by alleviating the economic burden of providing nutritious meals, thereby indirectly supporting consistent school participation.

Despite these positive outcomes, several operational challenges were identified, including limited dining infrastructure, selective eating behaviors among children—particularly toward vegetables—and logistical constraints related to food supply and delivery. These challenges underscore the need for continued improvements in infrastructure, menu adaptation, and coordination mechanisms to ensure the sustainability and effectiveness of school-based nutrition programs. The findings suggest that the FNM program plays a critical role in strengthening multidimensional learning readiness in early childhood, reinforcing the importance of integrating nutrition-based interventions into early childhood education policies and practices.

AUTHOR CONTRIBUTION STATEMENT

Ferlinda Eka Agholin Rahayu: Conceptualization, and Writing—original draft. **Vinandiya Muhtarisul Lisaniyah:** Methodology and Data curation. **Syifa Almuk Minun:** Formal Analysis and Supervision. **Fani Endang Setia Ningsih:** Validation and Investigation. **Khaled Ahmed Aqeel Alzoubi:** Resources and Writing - Review & Editing. **Konstantinos T. Kotsis:** Software and Writing - Review & Editing

REFERENCES

Abadi, M. N. P., Basrowi, R. W., Gunawan, W. B., Arasy, M. P., Nurjihan, F., Sundjaya, T., Pratiwi, D., Hardinsyah, H., Astuti Taslim, N., & Nurkolis, F. (2025). Unraveling Future Trends in Free School Lunch and Nutrition: Global Insights for Indonesia from Bibliometric Approach and Critical Review. *Nutrients*, *17*(17), 2777. https://doi.org/10.3390/nu17172777

Abderbwih, E., Mahanani, M. R., Deckert, A., Antia, K., Agbaria, N., Dambach, P., Kohler, S., Horstick, O., Winkler, V., & Wendt, A. S. (2022). The Impact of School-Based Nutrition Interventions on Parents and Other Family Members: A Systematic Literature Review. *Nutrients*, *14*(12), 2399. https://doi.org/10.3390/nu14122399

Arqam, Mhd. L., Firdaus, A. A., Atmojo, A. M., Saputri, G. Z., Furizal, Palahuddin, & Sirnopati, R. (2026). Integrating education-based interventions and machine learning for stunting prevention: A case study in East Lombok, Indonesia. *Dialogues in Health*, *8*, 100264. https://doi.org/10.1016/j.dialog.2025.100264

Asada, Y., Hughes, A. G., Read, M., Schwartz, M. B., & Chriqui, J. F. (2017). High School Students' Recommendations to Improve School Food Environments: Insights Froma Critical Stakeholder Group. *Journal of School Health*, *87*(11), 842–849. https://doi.org/10.1111/josh.12562

Benton, D. (2010). The influence of dietary status on the cognitive performance of children. *Molecular Nutrition & Food Research*, *54*(4), 457–470. https://doi.org/10.1002/mnfr.200900158

Bosqui, T., Mayya, A., Farah, S., Shaito, Z., Jordans, M. J. D., Pedersen, G., Betancourt, T. S., Carr, A., Donnelly, M., & Brown, F. L. (2024). Parenting and family interventions in lower and middle-income countries for child and adolescent mental health: A systematic review. *Comprehensive Psychiatry*, *132*, 152483. https://doi.org/10.1016/j.comppsych.2024.152483

Brown, J., & Farquhar, C. (2014). Endometriosis: An overview of Cochrane Reviews. *Cochrane Database of Systematic Reviews*, *2014*(8). https://doi.org/10.1002/14651858.CD009590.pub2

Cerovac, M., & Keane, T. (2025). Early insights into Piaget's cognitive development model through the lens of the Technologies curriculum. *International Journal of Technology and Design Education*, *35*(1), 61–81. https://doi.org/10.1007/s10798-024-09906-5

Choi, K., Yama, C., Leon, Y., & Kersey, L. (2026). Pilot of Health Care Workers Promoting Tax Filing and Receipt of Tax Credits for Low Income Families. *The Journal for Nurse Practitioners*, *22*(1), 105603. https://doi.org/10.1016/j.nurpra.2025.105603

Chowdhury, A., & Naz, A. (2023). Reducing energy poverty, carbon footprint, human health risk and achieving the sustainable development goals, by use of solar lamps at Indian Sundarbans. *Materials Today: Proceedings*, S2214785323034119. https://doi.org/10.1016/j.matpr.2023.06.032

Cohen, J. F. W., Hecht, A. A., McLoughlin, G. M., Turner, L., & Schwartz, M. B. (2021). Universal School Meals and Associations with Student Participation, Attendance, Academic Performance, Diet Quality, Food Security, and Body Mass Index: A Systematic Review. *Nutrients*, *13*(3), 911. https://doi.org/10.3390/nu13030911

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (Fifth edition). SAGE.

Debebe, W., Alem, A., Abebe, M. S., Bihonegn, M. D., Abdu, H., Bayileyegn, N. S., Beyene, A., Zerfu, T. A., Girma, B., & Tareke, A. A. (2026). Higher altitude stunts children's physical growth: A systematic review and meta-analysis. *Next Research*, *3*, 101059. https://doi.org/10.1016/j.nexres.2025.101059

Deconinck, K. (2019). New evidence on concentration in seed markets. *Global Food Security*, *23*, 135–138. https://doi.org/10.1016/j.gfs.2019.05.001

El Bilali, H., Strassner, C., & Ben Hassen, T. (2021). Sustainable Agri-Food Systems: Environment, Economy, Society, and Policy. *Sustainability*, *13*(11), 6260. https://doi.org/10.3390/su13116260

Fujii, Y., Harada, K. H., Miyakawa, D., Nagahama, Y., Weber, R., & Kajiwara, N. (2025). Levels of perfluoroalkyl carboxylic acids in recycled plastic pellets: A small input into the plastics cycle. *Chemosphere*, *383*, 144467. https://doi.org/10.1016/j.chemosphere.2025.144467

Garina, L. A., Dewi, M. K., Trusda, S. A. D., Purbaningsih, W., Muflihah, H., Tursina, A., Respati, T., & Rahimah, S. B. (2024). Maternal, Child, and Household Risk Factors for Children with Stunting. *The Open Public Health Journal*, *17*(1), e18749445321448. https://doi.org/10.2174/0118749445321448240823112908

Grantham-McGregor, S., Cheung, Y. B., Cueto, S., Glewwe, P., Richter, L., & Strupp, B. (2007). Developmental potential in the first 5 years for children in developing countries. *The Lancet*, *369*(9555), 60–70. https://doi.org/10.1016/S0140-6736(07)60032-4

Gross, R. S., Messito, M. J., Klass, P., Canfield, C. F., Yin, H. S., Morris, P. A., Shaw, D. S., Dreyer, B. P., & Mendelsohn, A. L. (2021). Integrating Health Care Strategies to Prevent Poverty-Related Disparities in Development and Growth: Addressing Core Outcomes of Early Childhood. *Academic Pediatrics*, *21*(8), S161–S168. https://doi.org/10.1016/j.acap.2021.04.005

Gundersen, C., Kreider, B., & Pepper, J. (2012). The impact of the National School Lunch Program on child health: A nonparametric bounds analysis. *Journal of Econometrics*, *166*(1), 79–91. https://doi.org/10.1016/j.jeconom.2011.06.007

Gupta, S. S., Teede, H., & Aroni, R. (2018). Spicing up your advice for South Asian and Anglo-Australians with type 2 diabetes and CVD: Do cultural constructions of diet matter? *Appetite*, *120*, 679–697. https://doi.org/10.1016/j.appet.2017.10.007

Hanbazaza, M. A., Triador, L., Ball, G. D. C., Farmer, A., Maximova, K., Alexander First Nation, & Willows, N. D. (2015a). The Impact of School Gardening on Cree Children's Knowledge and Attitudes toward Vegetables and Fruit. *Canadian Journal of Dietetic Practice and Research*, *76*(3), 133–139. https://doi.org/10.3148/cjdpr-2015-007

Hanbazaza, M. A., Triador, L., Ball, G. D. C., Farmer, A., Maximova, K., Alexander First Nation, & Willows, N. D. (2015b). The Impact of School Gardening on Cree Children's Knowledge and Attitudes toward Vegetables and Fruit. *Canadian Journal of Dietetic Practice and Research*, *76*(3), 133–139. https://doi.org/10.3148/cjdpr-2015-007

Ickes, S., Mahoney, E., Roberts, A., & Dolan, C. (2016). Parental Involvement in a School-Based Child Physical Activity and Nutrition Program in Southeastern United States: A Qualitative Analysis of Parenting Capacities. *Health Promotion Practice*, *17*(2), 285–296. https://doi.org/10.1177/1524839915616363

Iwano, S., Tanaka, K., Takaoka, A., Machida, D., & Tomata, Y. (2025). School Lunch and Body Size in Japanese Junior High School Students: The Japanese National Health and Nutrition Survey. *Nutrients*, *17*(5), 895. https://doi.org/10.3390/nu17050895

Kizito, S., Ssewamala, F. M., Nabayinda, J., Namuwonge, F., Neilands, T. B., Nabunya, P., Bahar, O. S., Ssentumbwe, V., & Nattabi, J. (2025). The long-term impact of family economic empowerment on viral suppression and mental health outcomes among adolescents living with HIV in low-income settings: A cluster-randomized controlled trial in Southern Uganda. *Social Science & Medicine*, *364*, 117546. https://doi.org/10.1016/j.socscimed.2024.117546

Labyak, C. A., Kaplan, L. G., Johnson, T. M., & Moholland, M. (2021). Practical School Nutrition Program May Reduce Food Neophobia. *Nutrients*, *13*(10), 3541. https://doi.org/10.3390/nu13103541

Larcom, S., Sarr, M., & Willems, T. (2016). Dictators Walking the Mogadishu Line: How Men Become Monsters and Monsters Become Men. *The World Bank Economic Review*, lhw039. https://doi.org/10.1093/wber/lhw039

Lu, F., Wong, C. K. H., Ng, A. P. P., Li, L., Fong, D. Y. T., Ip, P., Tse, E. T. Y., & Lam, C. L. K. (2024). Effectiveness of a 5-year health empowerment programme on promoting cardiovascular health for adults from low-income families in Hong Kong. *Patient Education and Counseling*, *124*, 108240. https://doi.org/10.1016/j.pec.2024.108240

McCarrison, S., Kao, K.-T., & Wong, S. C. (2024). Growth in childhood chronic conditions. In *Reference Module in Biomedical Sciences* (p. B9780443138256000686). Elsevier. https://doi.org/10.1016/B978-0-443-13825-6.00068-6

Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). *Qualitative data analysis: A methods sourcebook* (Third edition). SAGE Publications, Inc.

Miles, M. B., Huberman, A. M., & Saldaña, J. (2020). *Qualitative data analysis: A methods sourcebook* (Fourth edition). SAGE.

Ordway, M. R., Sadler, L. S., Jeon, S., Pierre, J. C., Canapari, C., & Redeker, N. S. (2023). Early emergence of racial and ethnic differences in sleep health among toddlers living in low-income families. *Sleep Health*, *9*(4), 389–397. https://doi.org/10.1016/j.sleh.2023.02.006

Quigley, F., Lynch, L., Price, R., Hollywood, L., Gallagher, A. M., Mooney, E., McCloat, A., & Moorhead, S. A. (2025). 'I want food to be tasty and healthy': School-children's experiences with nutrition education and messaging. *Health Promotion International*, *40*(5), daaf151. https://doi.org/10.1093/heapro/daaf151

Rayhani, S., Mochtar, N. M., Djalilah, G. N., & Asmarani, R. I. (2024). Well-Being of Infants Through Touch: The Effects of Massage on Sleep Quality and Weight Gain in the First 0-12 Months. *Golden Age: Jurnal Ilmiah Tumbuh Kembang Anak Usia Dini*, *9*(2), 357–374. https://doi.org/10.14421/jga.2024.92-15

Sidaner, E., Balaban, D., & Burlandy, L. (2013). The Brazilian school feeding programme: An example of an integrated programme in support of food and nutrition security. *Public Health Nutrition*, *16*(6), 989–994. https://doi.org/10.1017/S1368980012005101

Supranoto, Sasmito, L., Indriastuti, S., Prayitno, H., & Sawir, M. (2025). From parallel to partnership governance: Strengthening institutional synergy for stunting reduction in decentralized Indonesia. *Social Sciences & Humanities Open*, *12*, 102051. https://doi.org/10.1016/j.ssaho.2025.102051

Taras, H. (2005). Nutrition and Student Performance at School. *Journal of School Health*, *75*(6), 199–213. https://doi.org/10.1111/j.1746-1561.2005.00025.x

Testa, A., Mijares, L., & Tsai, J. (2025). Family incarceration and barriers to mental health care among low-income US veterans. *Annals of Epidemiology*, *110*, 89–94. https://doi.org/10.1016/j.annepidem.2025.08.006

Tosolini, K. E., Damen, S., Janssen, M. J., & Minnaert, A. E. M. G. (2025). A Piagetian lens on cognitive development of children and youths with congenital deafblindness: A scoping review. *Frontiers in Education*, *10*, 1479668. https://doi.org/10.3389/feduc.2025.1479668

Wei, J., Zhang, Y., Lohman, M. C., & Merchant, A. T. (2024). Supplemental Nutrition Assistance Program and depressive symptoms among adults with low family income in the U.S.: The National Health and Nutrition Examination Survey 2011–2018. *Journal of Affective Disorders*, *362*, 828–834. https://doi.org/10.1016/j.jad.2024.07.093

Wu, Y., & Zhang, X. (2025). State-led regional development strategy and multidimensional health poverty of the residents: Evidence from the China's great western development program. *Economics & Human Biology*, *57*, 101494. https://doi.org/10.1016/j.ehb.2025.101494