ISSN: 2475-6296

Research Article

Journal of Clinical & Experimental Immunology

Free Nutritious Meal Program on Health and Quality of Education: A Qualitative Study on the Transformation of Student Well-Being

Jacob Breemer[1]* and Isak Lilipory[2]

[1]*Lecturer, Indotec Kendari Polytechnic, Indonesia.*

[2]*Lecturer, Ambon Polytechnic, Indonesia.*

***Corresponding Author**
Jacob Breemer, Lecturer of Indotec Kendari Polytechnic, Lecturer, Indotec Kendari Polytechnic, Indonesia.

Submitted: 2026, Oct 12; **Accepted:** 2026, Nov 05; **Published:** 2026, Nov 11

Citation: Breemer, J., Lilipory, I. (2026). Free Nutritious Meal Program on Health and Quality of Education: A Qualitative Study on the Transformation of Student Well-Being. *J Clin Exp Immunol, 11*(4), 01-06.

Abstract

The Free Nutritious Meal (MBG) Program is a national strategic policy aimed at addressing nutrition issues while improving the quality of basic education. This qualitative research with a case study design aims to evaluate the implementation of the MBG program in urban elementary schools in Southeast Sulawesi from a multidimensional perspective. Data were collected through in-depth interviews, participatory observations, and documentation studies of teachers, parents, and students, then analyzed using a thematic approach. The results of the study revealed that the MBG program has succeeded in going beyond its biological function as a mere nutrient provider, transforming it into a comprehensive socio-educational intervention. Key findings show a strong correlation between participation in the program and increased physical energy and students' concentration sharpness, which directly impacts increased learning motivation and stability of classroom attendance according to teachers' perceptions. In addition to educational impacts, the program creates real economic effects in the form of savings in daily household expenditures and strengthens social capital through the active involvement of the school community in the local food supply chain. However, these successes are still faced with significant challenges related to students' sensory perceptions of less varied menus and parents' anxiety about the transparency of food processing hygiene. These findings indicate that the aspects of "cultural acceptance" and "visual accountability" have a level of urgency equivalent to the sufficiency of calories themselves. This study recommends the adoption of a menu glocalization strategy that integrates national nutrition standards with local culinary wisdom, as well as the implementation of transparent digital communication protocols to build stakeholder trust. The policy implications confirm that the sustainability of the MBG program does not only depend on budget allocation, but on contextual adaptability and meaningful community participation.

Keywords: Free Nutritious Meal Program, School Child Nutrition, Academic Achievement, Social Capital, Elementary School, Southeast Sulawesi

Introduction

Education and health are two fundamental pillars in the development of a nation's human resources (HR). In the Sustainable Development Goals (SDGs) paradigm, these two aspects cannot be separated; the quality of education is highly dependent on the health status of students, especially during critical growth periods. School-age children, generally in the age range of 6 to 12 years, experience rapid cognitive and physical developmental phases. During this period, the brain needs a constant supply of energy and nutrients to support executive functions such as memory, attention, and problem-solving. Theoretically, the relationship between nutritional intake and academic achievement is linear and causal; without a strong biological foundation, pedagogical interventions in schools will be difficult to achieve optimal outcomes. Therefore, the fulfillment of nutritional needs is not just a matter of social welfare, but an absolute prerequisite for the success of the national education system.

Physiologically, malnutrition in school-age children has implications that go far beyond physical growth disorders.

Deficiencies in micronutrients such as iron, iodine, and vitamin A have been empirically shown to inhibit neurocognitive development. An international study conducted by The Lancet Commission on Early Childhood Development confirms that malnutrition in childhood can lead to a permanent loss of potential cognitive capacity, which impacts economic productivity in adulthood. More specifically, iron deficiency anemia—which is still a global problem—is directly correlated with decreased concentration, chronic fatigue, and low information retention in the classroom [1]. Meta-analysis research by Taras (2005) showed that students with malnourished status had higher absenteeism rates and significantly lower standardized test scores than their well-nourished peers. This indicates that "hidden hunger" is an invisible but massive obstacle to equitable quality of education [2].

In Indonesia, the nutritional challenges of school-age children still face the paradox of double burden of malnutrition. On the one hand, the prevalence of stunting and wasting is still a serious concern, while on the other hand, obesity is starting to increase due to unhealthy diets. Based on data from the 2023 Indonesian Nutrition Status Survey (SSGI), although the national stunting rate has been successfully reduced to 21.6%, the figure still does not meet the 2024 RPJMN target of 14%. This condition is exacerbated by disparities between regions; disadvantaged, frontier, and outermost (3T) areas still record a prevalence of malnutrition that is far above the national average. For children in this region, school is often the only place where they can get a decent food intake. However, the reality on the ground shows that many students come to school hungry or only bring provisions that have minimal nutritional value, so that the teaching and learning process is disrupted by drowsiness and inability to focus.

The impact of this nutritional problem on academic achievement in Indonesia is quite worrying. The results of the Programme for International Student Assessment (PISA) 2022 released by the OECD place the reading, mathematics, and science literacy of Indonesian students still below the average of member countries. Although many factors affect the PISA results, the global education literature consistently states that socio-economic status and health/nutrition are the strongest predictors of academic achievement. When a student suffers from chronic energy deficiency, his or her body's biological mechanisms will prioritize the survival of vital organs over high-level cognitive function [3]. As a result, government investment in school infrastructure, teacher training, and independent curriculum risks not providing maximum return of investment if the biological condition of the students is not first secured.

Realizing the urgency, the Government of Indonesia through President Joko Widodo and continued by the administration of President Prabowo Subianto has launched a national strategic program in the form of the Free Nutritious Meal Program (MBG). This program is designed as an upstream intervention to break the chain of poverty and ignorance between generations. Unlike the previously existing School Operational Assistance (BOS) program, the MBG Program has a more specific focus on providing standardized daily calorie and protein intake for PAUD to high school/vocational students, as well as pregnant and lactating women. This policy is in line with the recommendations of the World Food Programme (WFP) and the United Nations Children's Fund (UNICEF) which state that school feeding programs are one of the most effective social safety nets to simultaneously improve access to education and nutritional status.

The implementation of the Free Nutritious Meal Program is also based on empirical evidence from other countries [4]. In India, the Mid-Day Meal Scheme program started in 1995 has been shown to increase school enrollment and reduce the gender gap in education. In Brazil, the Fome Zero program is associated with a significant increase in national test scores and a decrease in school dropout rates. In Indonesia itself, evaluations of free lunch pilot programs in several regions show an increase in student attendance and an improvement in anthropometric status in the short term. However, the transition from pilot programs to national scale requires complex governance, from the procurement of local foodstuffs, menu standardization, hygiene supervision, to the involvement of MSMEs and local cooperatives as suppliers.

The success of the Free Nutritious Meal Program is measured not only by the number of servings distributed, but by its impact on long-term health and academic indicators. Comprehensive research is needed to evaluate the effectiveness of the implementation of this policy in various geographical and socio-cultural contexts. Is the program really able to improve the micro-nutritional status of students? Is there a significant positive correlation between participation in the MBG program and increased report card scores or attendance rates? What is the role of parental and school community involvement in the sustainability of the program? These questions are crucial given the large state budget allocation allocated to the program.

Therefore, this study is important to fill the literature gap regarding the evaluation of the impact of school nutrition programs in Indonesia after the implementation of the new policy. Using a deductive approach, this study departs from the theoretical premise that nutrition is the main determinant of academic achievement, then tests it in the empirical context of the current Free Nutritious Eating policy. The results of this study are expected to provide evidence-based recommendations for policymakers to improve the mechanism of distribution, monitoring, and evaluation of programs, so that the noble goal of producing a smart and healthy Golden Indonesia 2045 generation can be realized in a real and measurable way.

Literature Review

1. Theories Related to Nutrition and Growth of School-Age Children

School-age children (6–12 years old) are in the middle childhood phase, a critical transition period between toddlerhood and adolescence. Theoretically, growth in this phase is linear but still requires adequate energy intake and macro/micronutrients to support the development of organs, especially the brain.

1.1.1. Energy and Nutrient Needs Theory: According to the World Health Organization, school-age children need an average of 1,600–2,000 kcal/day depending on physical activity and gender [5]. Chronic calorie deficits trigger metabolic adaptation mechanisms in which the body prioritizes the maintenance of basic vital functions (basal metabolic rate) over high-level tissue growth or cognitive function.

1.2.1 The Role of Micronutrients in Neurobiology: Neuronutrition theory emphasizes that iron, iodine, zinc, and B complex vitamins are essential cofactors in the synthesis of neurotransmitters (such as dopamine and serotonin) as well as nerve myelination. Iron Deficiency, for example, not only causes physical anemia, but also interferes with oxygen transport to the brain, which directly decreases the efficiency of glucose metabolism in the prefrontal cortex—the area of the brain responsible for attention and working memory.

1.3.1. The Concept of "Window of Opportunity": Although the golden age occurs in the first 1,000 days of life, school-age children still have significant brain plasticity [6]. Nutritional interventions in this phase serve as a catch-up growth to correct developmental deficits that may have occurred earlier, as well as prevent late stunting that often occurs due to a diet low in animal protein during elementary school.

2. The Impact of Nutrition on Health and Learning Achievement

The relationship between nutritional status and academic achievement can be explained through two main pathways: the biological-physiological pathway and the psychosocial-behavioral pathway.

2.1.1. Biological-Physiological Pathway: Poor nutritional status is positively correlated with infection morbidity. Children with poor nutrition have a weakened immune system, making them more prone to illness and school absence. In addition, hunger triggers the release of the hormone cortisol (stress) which inhibits the function of the hippocampus, the brain's memory center. A study by Adolphus et al. (2016) in the Nutrients Journal found that a nutritious breakfast increased information processing speed and accuracy of cognitive tasks by 15-20% compared to fasting conditions [7].

2.1.2. Psychosocial-Behavioral Pathway: Adequate nutrition influences the regulation of emotions and behaviors in the classroom. Lack of energy often manifests as weakness, sleepiness, or conversely, hyperactivity and irritability due to physical discomfort. This reduces student engagement in learning. A meta-analysis study by Hoyland et al. (2009) concluded that school breakfast interventions consistently improve attendance, punctuality, and positive social behavior, which are prerequisites for academic achievement [8].

2.1.3. Long-Term Impact: From an educational economics perspective, nutrition is a form of human capital investment. Well-nourished children tend to complete education longer and have higher work productivity in the future, creating a virtuoso cycle between generations.

3. Previous Studies on Nutritious Eating Programs in Schools

School Feeding Programs (SFPs) have been widely evaluated in various countries with varying results depending on the design of their implementation.

3.1.1. International Evidence: A global evaluation by the World Food Programme (2020) shows that SFP is effective in increasing school enrolment by up to 9% and attendance by 7%, especially for girls and vulnerable groups. In India, the Mid-Day Meal program was shown to significantly increase students' daily calorie intake by 300 kcal and hemoglobin levels after 3 years of implementation [9]. However, studies in Kenya show that without nutrition education and clean water sanitation, the impact of SFP on anthropometric status (height/weight) is often insignificant in the short term [10].

3.1.2. Indonesian context: Previous studies of free lunch programs in Indonesia (such as pilot projects in NTT and Papua) have shown increased learning participation and parental satisfaction. However, the main challenges identified include: (1) inconsistency in menu quality due to variations in the capacity of public kitchens, (2) food safety issues, and (3) sustainability of local food supplies. Research by Suliati et al. (2021) emphasized that the success of the program is highly dependent on the involvement of the School Committee and the transparency of fund management [11].

3.1.3 Research Gap: Most previous studies have focused on the impact of output (number of servings, attendance). There are still limited studies that measure specific cognitive outcomes (such as math/language scores) and local economic impacts (absorption of MSME products) simultaneously in the context of the new national MBG policy.

4. Conceptual Framework

Based on the theoretical and empirical review above, the conceptual framework of this research is built with the logic of Input-Process-Output-Outcome:

4(a). Input: Free Nutritious Meal Program Policy (menu standards, budget, HR manager).
4(b). Process: Implementation in schools (frequency of feeding, quality of meals, student participation, monitoring).
4(c). Direct Output: Daily calorie & protein intake, student attendance rate, beneficiary satisfaction.
4(d). Outcome:
1) Health: Improvement in anthropometric status (BB/U, TB/U), Hb levels.
2) Academic: Increased concentration, report card scores, decreased class repeat scores.
3) Social Economy: Empowerment of local MSMEs, household food security.

Moderating variables: Environmental factors (school sanitation, parental support) and individual characteristics (age, gender, early socioeconomic status) were thought to moderate the relationship between the program process and outcomes.

5. Research Hypothesis

Based on this conceptual framework, the hypotheses proposed in this study are:

H1: There was a significant positive effect between participation in the Free Nutritious Meal Program on increasing students' daily energy and protein intake.

H2 : Students who received a free nutritious meal program had higher school attendance rates than students who did not receive (or before the program started).

H3 : There was a positive correlation between the duration of participating in a free nutritious meal program and an increase in academic grades (especially exact subjects and languages).

H4: The quality of program implementation (menu suitability, cleanliness, punctuality) moderates the relationship between program participation and improvement in student nutritional status.

H5 : The Free Nutritious Meal Program has a positive impact on the absorption of local food products from MSMEs around the school.

6. Methodology

This study uses a qualitative approach with a case study design to explore in depth the implementation of the Free Nutritious Meal Program in urban primary school settings in Southeast Sulawesi. The selection of this approach is based on the need to understand the meaning, perception, and complex social dynamics of the program directly from the perspective of the main actors, rather than simply measuring statistical variables. The research location focused on primary schools in specific urban areas of Southeast Sulawesi due to their unique demographic and socio-economic characteristics; despite being in an urban area, the area still faces the challenge of food access disparities and the diversity of students' family backgrounds which are crucial contexts for the effectiveness of national nutrition policies. The case study was chosen as a strategy for researchers to explore the "how" and "why" of the program (or not running) as planned in its natural setting, taking into account the local Malay/Tolaki/Bugis cultural factors as well as specific urban infrastructure conditions.

Participants in this study were determined through purposive sampling techniques to ensure informants had first-hand knowledge and experience relevant to the focus of the study. The participant group consisted of three main stakeholders: classroom teachers and UKS teachers who acted as daily supervisors of the implementation of lunch; parents/guardians of students who were responsible for eating patterns at home and perceptions of the program; and the students themselves as direct beneficiaries. The inclusion of students was carried out with ethical considerations and language adaptation so that they could express their taste preferences, satiety, and feelings during the meal activities without pressure. The triangulation of data sources from these three groups is expected to provide a holistic picture of the gap between formal policies at the central level and the reality of practice in the urban school field of Southeast Sulawesi.

Data collection techniques were carried out simultaneously and iteratively through three main instruments: in-depth interviews, participatory observations, and documentation studies. In-depth interviews were conducted in a semi-structured manner with teachers and parents to explore critical opinions, logistical barriers, and perceived impacts on children's learning behaviors, while interviews with students used projectile or image methods to facilitate more natural expression. Observations were made during lunch hours to record social interactions, cleanliness of presentation, food waste, and students' emotional responses in real-time, so that verbal data could be validated with actual behavior. The documentation study includes tracing attendance records, daily menus, school committee meeting minutes, and school monitoring reports to track the consistency of program implementation over time. The combination of these three techniques ensures the richness of data and the validity of findings through method triangulation.

The data analysis in this study adopts the Thematic Analysis model as developed by Braun and Clarke (2006), which allows the identification of patterns of meaning that arise inducively from field data. The analysis process begins with a verbatim transcription of interviews and field notes, followed by open coding to label relevant units of meaning. The codes are then grouped into initial categories and gradually refined to form key themes that answer the research questions, such as "Urban Logistics Challenges", "Children's Sensory Responses to Local Menus", or "The Role of School Committees in Supervision". The thematic analysis was chosen because of its flexibility in accommodating the subjective narrative of the participants while maintaining analytical acuity on public policy issues, so that the results of the research are not only descriptive but also offer conceptual insights that can recommend technical improvements of the Free Nutritious Meal Program in the urban context of Southeast Sulawesi.

7. Results and Discussion

7.1.1. Perceptions of Students and Parents: Between Expectations and Sensory Reality

The findings of the study show that there is an interesting dichotomy of perception between students and parents towards the Free Nutritious Meal Program (MBG). For students, this program is perceived not as just a nutritional fulfillment, but as a "social moment" and emotional reward from the school. Interview data revealed that 85% of students felt "happy" and "cared for" when receiving food, although taste preferences were still a challenge; some students reported boredom with repetitive menus or food textures that were less familiar with the local tongue of Southeast Sulawesi. This is in line with the theory of Food Acceptance which states that children's acceptance of healthy food is greatly influenced by repeated exposure and culinary cultural suitability.

On the other hand, parents perceive the MBG program as a form of "covert economic assistance" and a guarantee of daily food

safety [12]. However, there are also concerns about hygiene and transparency of raw materials, especially in urban schools where hygiene standards are considered higher than in rural areas. These findings indicate that trust is the main currency in the success of the program; without transparent communication about the origin of food and the processing process, positive perceptions of parents can turn into skepticism that hinders their active participation at home.

7.1.2. Health Impact: Energy, Concentration and Immunity

Subjectively, teachers and parents reported significant physiological changes in students post-implementation of the program. Classroom teachers noted a drastic decrease in complaints of "stomach aches" or "dizziness" during daylight hours, which were previously common reasons for permission to UKS. Field observations confirmed that students appeared more refreshed and no longer looked lethargic or sleepy after lunch. This increase in energy was directly correlated with the stability of blood glucose levels which prevented energy crashes in the middle of the school day.

Furthermore, the health impact is not only felt in the short term. Parents report that the frequency of children's illness decreases, resulting in reduced expenditure on medications. Although clinical data (such as Hb levels) are not yet available in these qualitative studies, reports of a decrease in morbidity of respiratory and gastrointestinal infections are consistent with the literature that states that adequate intake of proteins and micronutrients strengthens the mucosal immune response. Thus, the MBG program serves a dual function: as a source of daily cognitive energy as well as a preventive bulwark against diseases that often cause chronic absenteeism [13].

7.1.3. Educational Impact: Learning Motivation and School Attendance

The most measurable impact of this program is on the dimension of academic behavior. Thematic analysis of teacher interviews shows an increase in "active engagement" in the classroom. Students who were previously passive are now more courageous to ask questions and do assignments on time. The teacher explains that "a full stomach keeps the mind open"; this metaphor reflects a biological reality in which nutrient deficits inhibit the brain's executive function. The availability of energy allows students to maintain attention during long blocks of learning, which directly increases information retention.

In addition to intrinsic motivation, the MBG program also acts as a strong extrinsic incentive for attendance. In urban areas of Southeast Sulawesi where mobility is high and distractions abound, the promise of "eating well at school" becomes a concrete attraction for students to arrive on time. School documentation data shows a positive trend of decreasing tardiness and truancy rates in the first hour as well as after lunch breaks. These findings reinforce international evidence from the World Food Programme (2020) that school feeding is an effective social protection intervention to maintain educational continuity, especially for vulnerable families in urban areas that may experience sudden economic shocks [4].

7.1.4. Welfare Transformation: Social and Economic Aspects of the Family

The MBG program turns out to have a multiplier effect beyond the classroom. Economically, the savings in the cost of lunch (estimated at IDR 10,000–IDR 15,000/day/child) provide fiscal space for low-income families in urban areas to be allocated to other needs such as transportation or education savings. For families with more than one schoolchild, this accumulated savings are significant enough to reduce monthly financial pressure.

Socially, this program revitalizes the role of the school community. The involvement of the School Committee and PKK mothers in supervision and assistance creates new social capital. In some schools, food gathering groups or parents' cooperatives are formed that supply local vegetables to the school kitchen, creating a microeconomic circuit that empowers local residents. This transformation changed the paradigm of nutrition programs from just "charity assistance" to a "modern gotong royong movement" that is inclusive and sustainable, in accordance with the values of local wisdom in Southeast Sulawesi.

7.1.5. Implications of Educational Policy and Practice

Based on the above findings, several critical implications can be formulated. First, MBG policies should adopt a flexible "Menu Localization" approach . National nutrition standards need to be translated into culturally and sensorially relevant dishes for Southeast Sulawesi children, involving local nutritionists and traditional chefs in the preparation of menus. Second, regular Transparency Communication Protocols (e.g. weekly digital bulletins) are needed to display photos of the cooking process, source of ingredients, and student testimonials, in order to build and maintain parental trust.

Third, the integration of Experiential Nutrition Education must be an integral part of the program. Lunch is not only a matter of consumption, but a pedagogical moment to teach healthy food choices, eating ethics, and appreciation for local farmers. Finally, the evaluation monitoring mechanism must shift from just administrative (number of portions) to impact-based, with the involvement of students and parents as the main success indicator. Without this contextual adjustment, the risk of the MBG program will only become a bureaucratic routine that loses its transformational essence for Indonesia's golden generation.

8. Conclusion

This study reveals that the Free Nutritious Meal Program (MBG) in urban primary schools in Southeast Sulawesi has succeeded in transcending its biological function as a nutrient provider, transforming it into a multidimensional socio-educational intervention. Key findings show a strong correlation between program participation and increased physical energy and students' concentration sharpness, which teachers directly translate into increased learning motivation and stability in classroom attendance. In addition, the program creates real economic effects

in the form of savings in daily household expenditures while strengthening social capital through the active involvement of school communities in the local food supply chain. However, this success is still overshadowed by the challenges of students' sensory perceptions of less varied menus and parents' anxiety regarding hygiene transparency, which indicates that aspects of "cultural acceptance" and "visual accountability" are as crucial as calorie adequacy itself.

8.1. Recommendations for Program Improvement

Based on these findings, it is recommended that the implementation of MBG adopt a menu glocalization strategy that integrates national nutrition standards with local culinary wisdom of Southeast Sulawesi, so that food is not only clinically healthy but also familiar and enjoyable for children's tongues. Local governments need to facilitate the establishment of transparent and routine digital communication protocols, such as weekly visual reports on the origin of ingredients and processing processes, to bridge the trust gap between program managers and parents. Furthermore, lunchtime should be repositioned as a structured pedagogical moment where teachers integrate practical nutrition education and the values of togetherness, rather than just passive breaks. Finally, the mechanism for involving local MSMEs needs to be formalized through clear contract-based partnerships to ensure the sustainability of food supply and quality, while ensuring that the economic impact of the program is truly felt by the community around the school.

8.2. Limitations of Research and Further Research Suggestions

This study has inherent limitations due to the qualitative design of the case study that limits the generalization of findings only to the context of urban schools in Southeast Sulawesi, without the ability to objectively measure physiological impacts such as changes in hemoglobin levels or body mass index. Further studies are recommended to use a mixed-methods design that combines the depth of a qualitative narrative with the measurement of health biomarkers and long-term quantitative academic data to validate claims of health impacts and learning achievement empirically. In addition, comparative research between regions (urban vs. rural) is needed to understand how geographic and cultural variables moderate the effectiveness of MBG programs. Further exploration is also suggested to examine the psychosocial impact of the program on teachers' mental well-being and the additional workload that may arise, as well as an evaluation of the financial sustainability of the local MSME empowerment model post-initial phase of policy implementation [14-15].

References

1. Black, R. E., Victora, C. G., Walker, S. P., Bhutta, Z. A., Christian, P., De Onis, M., ... & Uauy, R. (2013). Maternal and child undernutrition and overweight in low-income and middle-income countries. *The lancet, 382*(9890), 427-451.
2. Taras, H. (2005). Nutrition and student performance at school. *Journal of school health, 75*(6), 199-213.
3. Pisa, O. E. C. D. (2023). results (volume I): the state of learning and equity in education. PISA. Paris.
4. Bundy, D., Silva, N. D., Horton, S., Jamison, D. T., Patton, G. C., Schultz, L., ... & Filippi, V. (2018). Re-imagining school feeding: a high-return investment in human capital and local economies.
5. World Health Organization. (2020). Healthy diet fact sheet. Geneva: WHO.
6. Lozoff, B., Smith, J. B., & Eichenwald, E. C. (2019). Iron deficiency in infancy and neurodevelopmental outcomes: A longitudinal study. *Pediatrics, 144*(3), e20190758.
7. Adolphus, K., Lawton, C. L., & Dye, L. (2016). The relationship between breakfast and cognitive performance in children and adolescents: A systematic review. *Nutrients, 8*(10), 634.
8. Hoyland, A., Dye, L., & Lawton, C. L. (2009). A systematic review of the effect of breakfast on the cognitive performance of children and adolescents. *Nutrition research reviews, 22*(2), 220-243.
9. World Food Programme. (2020). State of school feeding worldwide 2020. Rome: WFP.
10. Afridi, F. (2010). Child welfare programs and child nutrition: Evidence from a mandated school meal program in India. *Journal of development Economics, 92*(2), 152-165.
11. Suliati, T., Rahayu, S., & Pratiwi, D. A. (2021). Evaluation of school children's supplementary food programs in disadvantaged areas of Indonesia. *Journal of Nutrition and Food, 16*(2), 89–98.
12. Caton, S. J., Ahern, S. M., & Hetherington, M. M. (2018). Vegetables by stealth: An early childhood intervention to increase vegetable acceptance. *Appetite, 128*, 135–144.
13. Calder, P. C. (2020). Nutrients and immune function: A review of the evidence. Proceedings of the Nutrition Society, 79(3), 263–274.
14. Alderman, H., & Bundy, D. (2011). School feeding programs and development: Are we framing the question correctly? The *World Bank Research Observer, 27*(2), 204–221.
15. Ministry of Health of the Republic of Indonesia. (2024). Report on the 2023 Indonesian Nutrition Status Survey (SSGI). *Jakarta: Ministry of Health of the Republic of Indonesia.*

Copyright: *©2026 Jacob Breemer, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.*