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Implementation of Food Service Management Standards at Orphanages A and B in Palangka Raya, Indonesia

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Abstract

Orphanages are social institutions that play a crucial role in providing protection, care, and education to children who have lost their parents or families. According to the Indonesian government, the number of abandoned children in Indonesia has reached 67,368, although only a portion of them receive care in orphanages. Currently, there are approximately 12,000 orphanages in Indonesia. One of the critical services provided in orphanages is food service management, which aims to meet children's nutritional needs. This study aims to evaluate the implementation of food service management standards at orphanages in Palangka Raya City and to intervene in the food service process to align it with applicable standards. This research used a quasi-experimental method with a non-equivalent control group design in a two-group pre-test-post-test design. The study sample comprised the entire populations of Orphanage A and Orphanage B, selected using purposive sampling. The respondents in Orphanage A were predominantly male (82%) with an average age of 18 years, while in Orphanage B, the majority were also male (63%) with an average age of 13 years. The score for the implementation of management standards increased from 55 to 77 in Orphanage A and from 58 to 85 in Orphanage B after the intervention. There was a significant improvement in the implementation of food-service management standards across both orphanages. These results indicate that proper implementation of standards can enhance the quality of food services, which ultimately fulfill the nutritional needs of orphans.

Keywords: *Abandoned Children, Food Service Standards, Nutrition, Orphanage.*

Introduction

Orphanages are one of the social institutions that aim to provide protection, care, and education for children who have lost their parents or families. According to Law Number 35 of 2014 concerning Child Protection, every child has the right to life, to grow and develop properly, and the right to be protected from all forms of violence and discrimination [1]. In addition, Article 34, Paragraph 1 of the 1945 Constitution of the Republic of Indonesia states that the poor and abandoned children are the responsibility of the state [2].

The number of abandoned children in Indonesia is quite significant. According to data from the Ministry of Social Affairs as of 2020, there were approximately 67,368 abandoned children in Indonesia. However, not all of these children have access to orphanages or appropriate protection services. Currently, the number of orphanages in Indonesia has increased significantly, from around 5,000–8,000 orphanages in 2010 to about 12,000 orphanages in 2020. This reflects the growth of social service facilities, but there remains a gap in meeting the needs of abandoned children [3, 4].

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The Ministry of Social Affairs states that one of the main functions of orphanages is to provide physical services, including food service. Food service is a crucial element in meeting children's basic needs, particularly in ensuring adequate nutrition. The food service system involves six main components:

1. Input, which includes manpower, costs, food ingredients, equipment, and institutional policies
2. Process, which covers menu planning, procurement of food ingredients, storage, food production, distribution, as well as the application of hygiene, sanitation, and occupational safety
3. Output, which refers to quality food that meets the needs of consumers
4. Outcome, in the form of assessing the nutritional status of consumers
5. Control, which involves supervision of work procedures and programs being implemented
6. Environment, which includes the cleanliness of the kitchen and its surroundings [5].

Ensuring proper nutrition in early life is especially important, as inadequate intake during this critical period may increase the risk of chronic illnesses in adulthood [6].

Previous studies have shown that the quality of food service in orphanages largely depends on the orphanage management. One way to improve food service quality is to apply food service management standards [7] consistently. This study aims to evaluate the implementation of food service management standards at Orphanage A and Orphanage B in Palangka Raya City. In addition, this research provides an intervention to improve the quality of food service in accordance with applicable standards. The results of this study are expected to contribute to the management of orphanages in Palangka Raya, particularly by optimizing the nutritional needs of abandoned children.

Materials and Methods

Research location

This study was conducted in two orphanages located in Palangka Raya City, Indonesia. The Central Kalimantan Social Services Office manages Orphanage A, while Orphanage B is managed under the auspices of the Evangelical Kalimantan Church (GKE).

Research Design

The research employed a quasi-experimental design with a non-equivalent control group pre-post test and an analytical research type. The research objects covered the aspects of input, process, output, control, environment, and outcome. The research sample included the entire population at Orphanage A (22 individuals) and adolescents at Orphanage B (19 individuals).

Data Collection

Data on food service management were collected through in-depth interviews, focus group discussions (FGD), and direct observation. The assessment of food service standards in Orphanage A and Orphanage B used the following indicators as mentioned in Table 1.

Table 1. Food Service Standard Indicators in Orphanage A and Orphanage B

Element	Activity	Details
Input	Man (Labor)	Calculation of labor includes working time
	Money (Cost)	Food cost per person
	Regulation/Policy	Regulations related to menu cycles and meal service funding

	Facilities & Infrastructure	Receipt, storage of materials, preparation, processing, serving, dishwashing area, and equipment storage
Process	Menu planning	Portion standards, recipe standards, and menu cycles
	Procurement	Standard process
	Receiving	Standard process
	Storage	Standard process
	Processing	Standard process
	Distribution	Standard process
Output	Macronutrient intake	Categories based on the Ministry of Health of the Republic of Indonesia, 1996
	Acceptability	Organoleptic test according to the 2013 guidelines
Control	Supervision of work procedures	Evaluation of food service procedures
Environment	Environmental sanitation	Assessment of food service sanitation according to standards
Outcome	Nutritional status measurement	Categories based on Ministry of Health Regulation No. 2 of 2020
	Hemoglobin (Hb) test	Categories according to the Ministry of Health of the Republic of Indonesia, 2018

Nutritional intake data were obtained using the food weighing and food record methods. Food acceptability was measured using a Hedonic Test form, while hemoglobin (Hb) levels were measured using a Hematology Analyzer (HA).

Data Analysis

Univariate data analysis was conducted using frequency and percentage distributions presented in a single table. For bivariate analysis, a paired t-test was used for normally distributed data. If the data were not normally distributed, the Wilcoxon test was used to assess the differences before and after the intervention.

Ethical Clearance

This study received ethical approval from Komisi Etik Penelitian Kesehatan, Poltekeks Kemeskes Palangka Raya, with approval no. 260/V/KE.PE/2024.

Results and Discussion

Respondent Characteristics

The characteristics of respondents at Orphanage A and Orphanage B based on gender and age are presented in Table 2 below.

Table 2. Respondent Characteristics at Orphanage A and Orphanage B by Gender and Age

Characteristics		**Orphanage A**		**Orphanage B**	
		N	**%**	**N**	**%**
Gender	Male	18	82	12	63
	Female	4	18	7	37
Age	10-11 years	-	-	3	16
	12-13 years	-	-	6	31
	14-15 years	2	10	5	26
	16-17 years	8	37	4	21

	18-19 years	8	37	1	5
	20-21 years	4	16	-	-
	Total	22	100	19	100

Source: Primary data, 2024

Based on Table 2, the majority of respondents at Orphanage A were male (82%), and most were 18 years old (23%). This indicates that Orphanage A tends to accommodate male adolescents, which is likely related to admission policies focused on the adolescent age group. According to Table 2, most respondents at Orphanage B were male (63%), with the dominant age being 13 years (26%). This distribution shows that Orphanage B has a more diverse age distribution than Orphanage A, reflecting an institutional policy that may be more inclusive of both young children and adolescents.

The differing distributions of gender and age across the two orphanages indicate variations in caregiving approaches and specific needs that must be addressed. Orphanage A, which is predominantly male, requires a caregiving approach focused on character development, vocational education, and preparation for independence. Meanwhile, Orphanage B requires a more diverse approach to accommodate the needs of both younger children and adolescents, including caregiving programs tailored to developmental stages. A study by Wrottesley et al. showed that children's nutritional needs and caregiving patterns are greatly influenced by age and gender [8]. Younger children need more attention to cognitive and emotional development, whereas adolescents require support in identity development and independence [4, 9].

Input of Respondents at Orphanage A and Orphanage B

Table 3 illustrates the input elements at Orphanage A and Orphanage B before and after the intervention, including aspects of manpower (man), cost (money), facilities/infrastructure, and regulations/policies.

Table 3. Input Elements at Orphanage A and Orphanage B

Element	**Indicator**	**Orphanage A**		**Orphanage B**	
		Before	**After**	**Before**	**After**
Man (Labor)	Number of Food Handlers	2 persons	3 persons	1 person	2 persons
	Working Hours	8 hrs x 7 days	5 hrs x 7 days	10 hrs x 7 days	6 hrs x 7 days
	Use of PPE	No	Yes	No	Yes
Money (Cost)	Meal Cost per Person	< Rp 30,000	Rp 30,000	< Rp 30,000	Rp 30,000
Facilities / Infrastructure	Receiving Area	No dedicated room	No dedicated room	No dedicated room	No dedicated room
	Storage Area	Dedicated room (FIFO & FEFO)	Dedicated room (FIFO & FEFO)	Dedicated room (FIFO & FEFO)	Dedicated room (FIFO & FEFO)
	Preparation Area	No dedicated room	No dedicated room	No dedicated room	No dedicated room

	Cooking Area	No kitchen room	No kitchen room	Kitchen room	Kitchen room
	Serving Area	Dedicated room	Dedicated room	Dedicated room	Dedicated room
	Sink	None	Available	None	Available
Policy / Regulation	Menu Cycle	Available	Available	Available	Available
	Portion Standard	None	Available	None	Available
	Recipe Standard	None	Available	None	Available

FIFO: First in first out; FEFO: First expired first out

Based on Table 3, there was a significant improvement in the input elements in both orphanages after the intervention. In the labor aspect, the number of food handlers at Orphanage A increased from 2 to 3, and at Orphanage B from 1 to 2. This increase was accompanied by a reduction in working hours, which contributed to improved work efficiency and reduced fatigue risk [10]. The use of Personal Protective Equipment (PPE), which was previously absent, is now implemented in both orphanages after the intervention. This is essential to enhance food hygiene and safety standards, in accordance with WHO recommendations [11].

In terms of cost, the per-person allocation of meal funds increased to Rp 30,000 at both orphanages. This increase allows for the provision of more nutritious and varied food, supporting the nutritional needs of orphanage residents [12]. Regarding facilities and infrastructure, a significant change occurred with the provision of sinks, which were previously unavailable. The presence of sinks supports better hygiene practices [13]. Moreover, the use of FIFO (First In First Out) and FEFO (First Expired First Out) systems in food storage reflects improved food logistics management.

In terms of regulations/policies, portions, and recipe standards that were previously absent, are now implemented in both orphanages. This implementation aims to ensure consistency in food service and fulfillment of the nutritional needs of the orphanage residents [14]. The interventions included training for food handlers and the provision of supporting equipment, such as PPE, blenders, dispensers, cabinets, racks, trash bins, and cleaning tools. Additionally, the increase in the number of food handlers, along with improvements in food quality and variety, supported enhancements in the food service system.

Food service process at Orphanage A and Orphanage B

1. Menu Patterns and Plate Waste Percentage at Orphanage A and Orphanage B

The intervention in the food service process at Orphanage A and Orphanage B aimed to complete the menu to meet the daily per-person meal budget allocation, in accordance with government regulations, set at IDR 30,000. The provided food ingredients were used to prepare daily menus tailored to the nutritional needs of the children in both orphanages. At Orphanage A, the intervention included one portion of animal-based dishes, 2 portions of plant-based dishes, fruit, and 1 snack per day. Meanwhile, at Orphanage B, the intervention consisted of 2 portions of animal-based dishes, two portions of plant-based dishes, fruit, and one snack per day. Table 4 shows the menu pattern and food service frequency before and after the intervention. The intervention increased the frequency of plant-based dishes, fruit, and snacks in both orphanages. The dietary pattern became more varied, contributing to improved nutrient intake among the children.

Table 4. Daily Menu Pattern and Plate Waste Percentage at Orphanage A and Orphanage B before and after the Intervention

Menu	Daily menu pattern				Plate waste percentage			
	Orphanage A		Orphanage B		Orphanage A		Orphanage B	
	Before	After	Before	After	Before	After	Before	After
Staple food	3x	3x	3x	3x	1%	6%	1%	0%
Animal-based dish	3x	3x	3x	3x	6%	6%	2%	0%
Plant-based dish	1x	2x	1x	2x	0%	11%	1%	0%
Vegetables	3x	3x	2x	3x	15%	11%	1%	0%
Fruit	1x	2x	1x	2x	0%	0%	0%	0%
Snacks	1x	2x	1x	2x	0%	0%	0%	0%

Source: Primary data, 2024

The increase in plate waste at Orphanage A, especially for staple food and plant-based dishes, was due to changes in food types that respondents less favored, such as switching from rice to noodles, yellow rice, and rice cakes. This aligns with the study of Appleton et al., which shows that taste, texture, and serving method affect food acceptability [15]. At Orphanage B, plate waste drastically dropped to zero after the intervention. The self-service method allowed children to take food in the desired portion, supporting other study findings that self-service can reduce food waste [16,17].

2. Macronutrient Intake

The macronutrient intake at Orphanage A and Orphanage B before and after the intervention is represented in Table 5. The intervention increased energy, protein, fat, and carbohydrate intake in both orphanages. These findings are in line with the study by Struszczak et al., which showed that high-energy and high-protein diet interventions significantly improved nutrient intake [18].

Table 5. Macronutrient Intake at Orphanage A and Orphanage B before and after the Intervention

Nutrient	Orphanage A		Orphanage B	
	Before	After	Before	After
Energy	84.5%	91.5%	69%	99%
Protein	98.0%	106.4%	76%	105%
Fat	90.8%	100.4%	66%	102%
Carbohydrates	67.4%	90.2%	65%	93%

3. Menu preference level

Menu preference increased after the intervention, especially for plant-based dishes (Table 6). This was due to more attractive menu variations, consistent with the study of Crixell et al., which showed that menu variety improves children's food preferences in orphanages [19].

Table 6. Percentage of Menu Preference at Orphanage A and Orphanage B before and after the Intervention

Menu	Appearance				Taste			
	Orphanage A		Orphanage B		Orphanage A		Orphanage B	
	Before	After	Before	After	Before	After	Before	After
Staple food	99%	99%	95%	94%	100%	100%	91%	94%
Animal-based dish	88%	90%	88%	90%	90%	90%	87%	93%
Plant-based dish	12%	57%	31%	81%	10%	60%	41%	84%
Vegetables	77%	78%	60%	74%	73%	75%	61%	79%
Fruit	95%	90%	95%	95%	100%	100%	100%	100%
Average	74%	83%	74%	87%	75%	85%	76%	90%

Control

Based on Table 7, there was a significant change in the implementation of monitoring and evaluation activities as a form of oversight in Orphanages A and B before and after the intervention.

Table 7. Monitoring and Evaluation Activities in Orphanage A and Orphanage B before and after the Intervention

	Before	After
Orphanage A	Not available	Available
Orphanage B	Not available	Available

Source: Primary data, 2024

Before the intervention, neither Orphanage A nor B had structured monitoring and evaluation activities. This indicates that there was previously no organized supervision system in place to control the quality of food service management. After the intervention, both orphanages began implementing regular monitoring and evaluation activities. These included assessing food taste, food quality, and the use of production factors, carried out periodically by orphanage administrators and external personnel.

The implementation of monitoring and evaluation is crucial to ensure the nutritional quality and safety of food are maintained. According to Chen et al., routine supervision in food service management can improve service quality and reduce the risk of foodborne illness from contamination [20]. Furthermore, these activities help identify areas that require improvement to ensure the optimal fulfillment of children's nutritional needs in orphanages.

Monitoring is not only focused on the technical aspects of food service but also includes the evaluation of kitchen work procedures, such as equipment cleanliness, kitchen sanitation, and compliance with standard operating procedures (SOPs) for food preparation. Another study showed that consistent monitoring contributes positively to improved kitchen efficiency and the quality of food produced [21]. Overall, the presence of monitoring and evaluation activities after the intervention in Orphanages A and B signifies a significant improvement in food service management, ultimately contributing to better nutritional and health outcomes for children in the orphanages.

Environment

The environmental conditions of food service operations in Orphanages A and B showed significant differences before and after the intervention. The physical kitchen environment plays a vital role in ensuring food safety and the efficiency of food processing.

Orphanage A

At Orphanage A, food service still used a temporary kitchen, with several issues that could have affected the quality of food provision. The kitchen workflow was not organized in a one-way direction, increasing the risk of cross-contamination between raw and cooked ingredients. Additionally, there was no adequate dish rack for maintaining utensil cleanliness. The existing ventilation was mainly blocked with wire mesh, which, although effective in preventing insect entry, hindered proper air circulation necessary for kitchen hygiene and comfort. This condition aligns with findings from Annashr et al., which reported that kitchens lacking unidirectional workflow and adequate air circulation are at higher risk for food contamination [22]. To uphold the strict hygiene and safety standards required throughout the food supply chain, it is essential to upgrade the kitchen layout and ventilation [23]. Therefore, improvements to the kitchen layout and ventilation systems are needed to enhance food safety at Orphanage A.

Orphanage B

Before the intervention, the kitchen at Orphanage B had several deficiencies, including an uncovered trash bin, no tiled flooring, no handwashing sink, and no cabinet for storing cooked food. These conditions posed hygiene and food safety risks. Following the intervention, significant improvements were made in Orphanage B's kitchen. The kitchen was equipped with tiled flooring for easy cleaning, a dedicated cabinet for storing cooked food, a fire extinguisher (APAR) for safety, a handwashing sink to support hygiene practices, and a covered trash bin to reduce the risk of contamination from exposed waste. These improvements help the study by Bulochova et al., which found that adequate kitchen facilities can enhance food service quality and reduce the risk of contamination [24].

Outcome

Based on Table 8, the nutritional status of respondents in Orphanage A before the intervention was mainly well-nourished (60%) for those under 18, while for those over 18, the majority were mildly overweight (43%). After the intervention, the proportion of adolescents under 18 with good nutritional status increased to 66%. For those over 18, the mildly overweight category decreased from 43% to 14%, while the normal nutritional status increased to 57%. This suggests an improvement in dietary patterns following the intervention. In Orphanage B, the nutritional status across all age groups mainly remained in the well-nourished category (78%) both before and after the intervention, indicating that the intervention helped maintain an already good nutritional status.

Table 8. Nutritional Status of Respondents in Orphanage A and Orphanage B before and after the Intervention

BMI-for-age (<18 years)					**BMI (>18 years)**				
Category	**Orphanage A**		**Orphanage B**		**Category**	**Orphanage A**		**Orphanage A**	
	Before	**After**	**Before**	**After**		**Before**	**After**	**Before**	**After**
Severely malnourished	1 (7%)	1 (7%)	0	0	Severely thin	0	0	0	0
Underweight	2 (13%)	1 (7%)	0	0	Mildly thin	1 (14%)	0	0	0

Well-nourished	9 (60%)	10 (66%)	14 (78%)	14 (78%)	Normal	2 (29%)	4 (57%)	1 (100%)	1 (100%)
Overweight	2 (13%)	2 (13%)	4 (22%)	4 (22%)	Mildly overweight	3 (43%)	1 (14%)	0	0
Obese	1 (7%)	1 (7%)	1 (4%)	1 (4%)	Severely overweight	1 (14%)	2 (29%)	0	0

Source: Primary Data, 2024

Based on Table 9, there was a decrease in the percentage of normal hemoglobin (Hb) levels among adolescent girls in Orphanage A after the intervention, from 75% to 25%. This decline may have been caused by increased physical activity during internships/fieldwork and menstruation at the time of Hb measurement. Arini et al. showed that intense physical activity can lead to decreased Hb levels among adolescent girls [25]. Additionally, Cahyani and Sulastri found that menstruation significantly contributes to Hb reduction, particularly among adolescent girls with inadequate iron intake [26]. In contrast, no change occurred in Orphanage B, where Hb levels remained at 100% normal before and after the intervention. This indicates that risk factors affecting Hb levels in Orphanage A were not present in Orphanage B.

Table 9. Hemoglobin (Hb) Levels of Adolescent Girls in Orphanage A and B before and after the Intervention

Orphanage	Before	After
A	75% (Normal)	25% (Normal)
B	100% (Normal)	100% (Normal)

Implementation of Food Service Management Standards in Orphanage A and B

The application of food service management standard assessments in Orphanage A and Orphanage B before and after the intervention is shown in Table 10.

Table 10. Score of Food Service Management Standard Implementation in Orphanage A and B before and after the Intervention

No.	Description	Max. Score	Orphanage A		Orphanage B	
			Before	After	Before	After
1.	Input (Labor)	6	2	5	2	5
2.	Input (Cost)	3	3	3	2	3
3.	Input (Materials)	9	6	8	6	8
4.	Input (Method)	5	2	4	1	4
5.	Process	15	5	10	3	9
6.	Output	25	20	25	18	25
7.	Control	5	2	2	1	3
8.	Environment	17	8	9	13	13
9.	Outcome	15	7	11	15	13
	Total Score	100	55	77	58	85

Source: Primary data, 2024

Based on the analysis of food service management standards implementation in Orphanages A and B, there was a noticeable increase in scores after the intervention. In Orphanage A, the score improved from 55 to 77, while Orphanage B saw an increase from 58 to 85. These improvements were due to various interventions, including adding food handlers, training food handlers, meeting food material needs (animal-based dishes, plant-based dishes, fruit, and snacks), and providing support infrastructure such as aprons, head coverings, covered trash bins, and cleaning tools. Additionally, efforts by the orphanages to meet sanitation standards, such as installing handwashing sinks, also contributed to this progress.

Analysis of the Effect of Food Service Management Standards Implementation on Output

1. Preference Level

Based on the analysis (Table 11), the implementation of food service management standards had a significant effect on the preference level for plant-based dishes in Orphanage A ($p = 0.004$) and Orphanage B ($p = 0.008$). Before the intervention, plant-based dishes were not routinely served and lacked variety. The intervention involved providing a wider range of plant-based dishes, which increased residents' preference for this food type. Meanwhile, no significant effects were observed for staple foods, animal-based dishes, vegetables, or fruits in either orphanage.

Table 11. Results of Analysis on the Effect of Food Service Management Standards Implementation on Output (Preference Level)

	Orphanage A (*p*-value)	**Orphanage B (*p*-value)**
Staple food	1.000	0.371
Animal protein	1.000	1.000
Plant protein	0.004	0.008
Vegetables	0.317	0.059
Fruits	1.000	0.157

Source: Primary data, 2024

2. Nutrient Intake

The implementation of food service management standards also affected nutrient intake (Table 12). In Orphanage A, there was a significant effect on protein ($p = 0.019$), fat ($p = 0.006$), and carbohydrate ($p = 0.001$) intake, but not on energy intake ($p = 0.108$). In contrast, in Orphanage B, the implementation significantly affected all intake parameters—energy, protein, fat, and carbohydrates ($p = 0.001$). This increase in intake was due to the provision of animal- and plant-based dishes as protein sources, the use of cooking methods such as sautéing and frying, which increased fat intake, and the provision of fruit and snacks, which boosted carbohydrate intake.

Table 12. Results of Analysis on the Effect of Food Service Management Standards Implementation on Output (Nutrient Intake)

	Orphanage A (*p*-value)	**Orphanage B (*p*-value)**
Energy	0.108	0.001
Protein	0.019	0.001
Fat	0.006	0.001
Carbohydrates	0.001	0.001

Source: Primary data, 2024

Analysis of the Effect of Food Service Management Standards Implementation on Outcome

1. Hemoglobin (Hb) Levels

The analysis results (Table 13) show that the implementation of food service management standards did not significantly affect hemoglobin (Hb) levels in Orphanage A (p = 0.715) or Orphanage B (p = 0.231). Several factors influenced this outcome, including the menstrual cycle, fatigue during measurement, and non-compliance with iron tablet (TTD) intake due to reasons such as forgetfulness or nausea. Additionally, the intake of anti-nutritional substances, such as tannins in tea, can inhibit iron absorption, thereby affecting Hb levels.

Table 13. Results of Analysis on the Effect of Food Service Management Standards Implementation on Outcome (Hb levels)

Orphanage	Hb levels (*p*-value)
A	0.715
B	0.231

Source: Primary data, 2024

2. Nutritional Status

According to Table 14, the implementation of food service management standards significantly affected nutritional status in Orphanage A (p = 0.012), but not in Orphanage B (p = 0.198). In Orphanage A, the implementation improved nutritional status, as reflected in weight and height gains, indicating increased adequate intake. Some adolescents who were previously undernourished improved to good nutritional status. In contrast, Orphanage B showed no significant changes in nutritional status, indicating a balance between nutrient intake and energy expenditure from physical activity.

Table 14. Results of Analysis on the Effect of Food Service Management Standards Implementation on Outcome (Nutritional Status)

Orphanage	Hb levels (*p*-value)
A	0.012
B	0.198

Source: Primary data, 2024

In Orphanage A, the intervention led to measurable improvements in weight and height, shifting some participants from undernutrition to normal nutritional status, likely due to enhanced dietary intake from more balanced, varied meals [27]. In contrast, Orphanage B showed no significant change, possibly due to an already stable baseline nutritional status and a younger age group whose growth may not yet reflect in standard indicators [28,29]. Differences in physical activity levels may also have influenced outcomes, as higher energy expenditure could offset nutritional gains [30]. These findings highlight the need for nutrition interventions to be tailored to individual and contextual factors—including age, activity, and baseline health—and supported by multi-sectoral strategies such as education, health integration, and regular monitoring to optimize and sustain nutritional improvements.

Conclusion

This study concludes that the application of standardized food management, encompassing components such as input, process, control,

environment, and outcome, can significantly improve the quality of food service in orphanages. The intervention led to enhanced menu planning, increased macronutrient intake, improved food acceptability, and better adherence to hygiene and safety standards. In Orphanage A, these improvements translated into measurable gains in nutritional status, while Orphanage B maintained its already favorable status. Although changes in hemoglobin levels were not statistically significant, the intervention highlighted the importance of integrating nutrition programs with regular health monitoring and behavior-based strategies. Overall, implementing standardized food management practices is essential to ensuring adequate nutrition, promoting child health, and supporting optimal growth and development in institutional care settings.

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Conflicts of Interest

All the authors declare that there are no conflicts of interest.

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