International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Management of Integrated Nutrition Education and Malnutrition among Children Aged 3–6 Years in Pre-Primary Schools in Sub-Saharan Africa: A Systematic Review and Qualitative Meta-Synthesis

Moses Kyangwa[1], Musa Matovu[2]

[1,2]Islamic University in Uganda, Department of Educational Management and Administration, Faculty of Education

Abstract

Background: Malnutrition among children aged 3–6 years remains a major public health and educational challenge across Sub-Saharan Africa despite numerous nutrition-specific and nutrition-sensitive interventions. During the pre-primary years, adequate nutrition is fundamental for cognitive development, school readiness, learning participation, and lifelong human capital development. Increasingly, Integrated Nutrition Education (INE) has emerged as a comprehensive school-based approach that combines nutrition education, caregiver engagement, school feeding, teacher capacity building, school gardening, and multisectoral collaboration. However, evidence regarding how the management of these interventions influences child nutrition outcomes remains fragmented.

Objective: This systematic review and meta-analysis aimed to synthesize available evidence on the influence of the management of Integrated Nutrition Education interventions on malnutrition among children aged 3–6 years attending pre-primary schools in Sub-Saharan Africa.

Methods: The review was designed in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) framework. The review adopted a PICO approach to define the study population, interventions, comparisons, and outcomes. Eligible studies included randomized controlled trials, quasi-experimental studies, implementation research, mixed-methods studies, qualitative investigations, and programme evaluations conducted in Sub-Saharan Africa. Electronic databases included PubMed, Scopus, Web of Science, Google Scholar, African Journals Online, and institutional repositories. Data extraction, quality appraisal, and evidence synthesis followed standardized systematic review procedures.

Results: The evidence consistently demonstrates that Integrated Nutrition Education improves nutrition knowledge, dietary diversity, caregiver practices, child feeding behaviours, and early childhood development outcomes. Programmes characterized by effective planning, coordination, supervision, stakeholder engagement, and monitoring systems reported greater implementation success and sustainability. However, improvements in anthropometric outcomes such as stunting, wasting, and underweight remained inconsistent across studies, largely due to contextual socioeconomic constraints, implementation fidelity, and programme quality.

Conclusion: Integrated Nutrition Education constitutes an effective educational management strategy for promoting child nutrition and early childhood development when implemented through strong governance, multisectoral coordination, teacher capacity development, and community participation. The review demonstrates that programme management is a critical determinant of intervention effectiveness, suggesting that strengthening educational management systems should become a central component of nutrition interventions implemented within pre-primary education.

Keywords: Integrated Nutrition Education; Educational Management; Malnutrition; Pre-primary Education; Early Childhood Development; School Health; Nutrition Education; Systematic Review; Meta-analysis; Sub-Saharan Africa

Introduction

Early childhood (ages 3–6 years) represents one of the most critical periods for physical growth, neurological development, cognitive maturation, and the formation of lifelong health and learning behaviors. During this pre-primary stage, children experience rapid brain development and acquire foundational skills essential for school readiness, academic achievement, and future productivity (FAO, 2020; Bundy et al., 2018). Adequate nutrition during this window is therefore not only a health imperative but also a fundamental educational concern, particularly in resource-constrained settings across Sub-Saharan Africa.

Despite global and regional efforts, childhood malnutrition remains highly prevalent in Sub-Saharan Africa. High levels of stunting, wasting, underweight, and micronutrient deficiencies continue to undermine children's physical growth, cognitive development, school attendance, concentration, and long-term educational outcomes (Kristjansson et al., 2022; De Hoop et al., 2025). These nutritional deficits are especially pronounced among children enrolled in pre-primary and Early Childhood Development (ECD) programmes, where poor nutrition directly limits the effectiveness of educational investments.

Historically, interventions to address childhood malnutrition have largely focused on nutrition-specific approaches such as food supplementation, micronutrient fortification, and therapeutic feeding. While these interventions have achieved notable success in reducing severe acute malnutrition, evidence indicates they are insufficient to address the complex social, behavioural, environmental, and educational determinants of malnutrition (UNICEF Framework; Snilstveit et al., 2015). Consequently, there has been a growing shift toward nutrition-sensitive and integrated approaches that leverage existing platforms such as schools and ECD centres.

Integrated Nutrition Education (INE) has emerged as a promising, multi-component strategy. INE goes beyond traditional classroom instruction by embedding nutrition knowledge and skills within the ECD curriculum while linking it with school feeding programmes, school gardens, teacher professional development, caregiver engagement, behaviour change communication, and multisectoral collaboration (FAO, 2020; Kyere et al., 2020). When effectively implemented, INE has the potential to simultaneously improve dietary practices, nutritional status, cognitive development, and school readiness among pre-primary children.

However, the success of INE interventions depends heavily on the quality of educational management. Programme planning, coordination, resource allocation, supervision, monitoring and evaluation, stakeholder engagement, and governance structures play decisive roles in determining implementation fidelity, sustainability, and ultimate impact (Brits et al., 2017; Gelli et al., 2019; Shinde et al., 2023). Weak

management systems frequently result in fragmented implementation, low stakeholder buy-in, poor monitoring, and limited sustainability — even when the educational content is sound.

From an Educational Management and Administration perspective, schools and ECD centres are complex organizations whose effectiveness depends on leadership, organizational capacity, resource management, and collaborative partnerships. Understanding INE through this lens shifts the focus from viewing nutrition education merely as a health add-on to recognizing it as a strategically managed educational innovation capable of producing both nutritional and educational gains.

Although several systematic reviews have examined school feeding, nutrition education, and nutrition-sensitive interventions (De Hoop et al., 2025; Derese et al., 2026; Kyere et al., 2020), relatively few have specifically analysed the role of educational management in pre-primary settings in Sub-Saharan Africa. Existing reviews often aggregate children across wide age ranges or focus primarily on intervention effectiveness while paying limited attention to management processes such as planning, coordination, supervision, and institutional leadership.

This systematic review and qualitative meta-synthesis address these gaps by synthesizing available evidence on the management of Integrated Nutrition Education interventions and their influence on malnutrition among children aged 3–6 years in pre-primary schools across Sub-Saharan Africa. The review is guided by the central proposition that effective educational management is a prerequisite for achieving sustainable improvements in child nutrition and developmental outcomes through school-based interventions

Conceptual Framework:

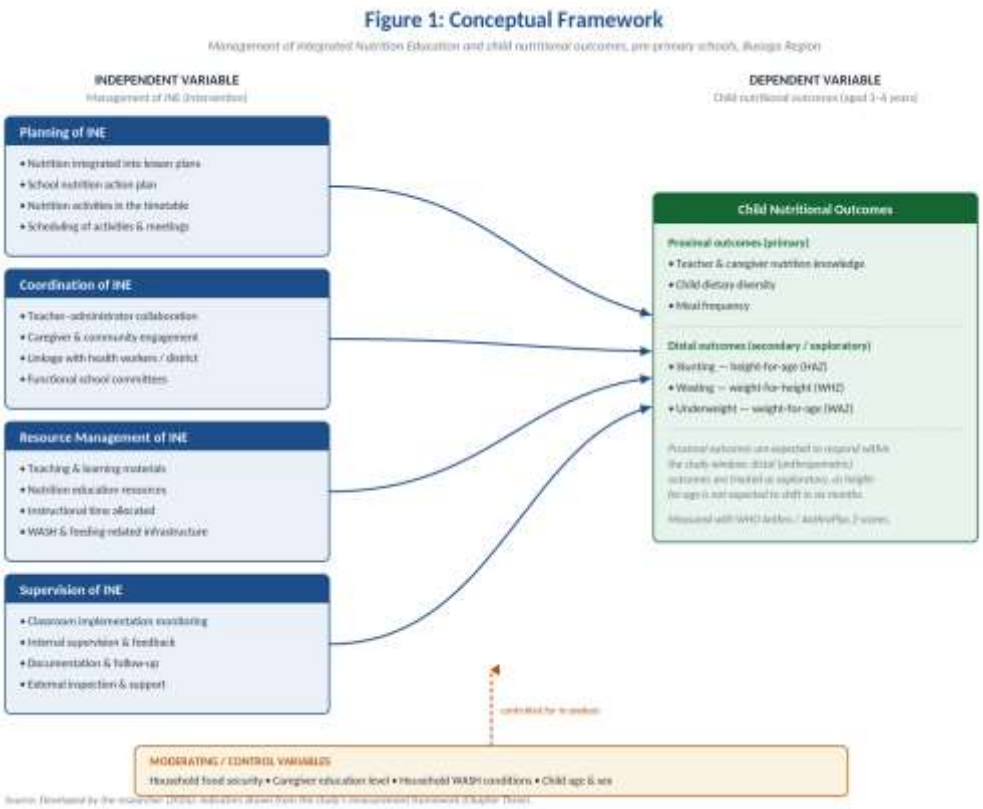
This conceptual framework illustrates the relationship between the management of Integrated Nutrition Education (INE) and child nutritional outcomes in pre-primary schools.

The independent variable is the Management of INE, encompassing four key dimensions: Planning of INE, Coordination of INE, Resource Management of INE and Supervision of INE

These management components are hypothesised to influence the dependent variable — Child Nutritional Outcomes (aged 3–6 years) — through both proximal outcomes (teacher/caregiver knowledge, dietary diversity, meal frequency) and distal outcomes (stunting, wasting, and underweight measured by WHO Z-scores).

The relationship is moderated by contextual factors (moderating/control variables) such as household food security, caregiver education level, household WASH conditions, and child age and sex.

The framework was developed by the researcher based on the study's theoretical foundations (Bronfenbrenner's Ecological Systems Theory, UNICEF Conceptual Framework of Malnutrition, and Implementation Science) and empirical evidence from the reviewed literature. It posits that effective educational management is the critical mechanism through which INE interventions achieve sustainable improvements in child nutrition and development.



Methods

This study adopted a systematic review and qualitative meta-synthesis design to examine the management of Integrated Nutrition Education (INE) interventions and their influence on malnutrition among children aged 3–6 years in pre-primary schools in Sub-Saharan Africa. The review was conducted and reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) statement (Page et al., 2021).

Study Design: A systematic review with qualitative meta-synthesis was chosen because of the methodological heterogeneity of existing studies on INE. This approach allows for comprehensive synthesis of both qualitative insights into management processes and quantitative findings on intervention outcomes while maintaining rigour in evidence identification and appraisal

PICO Framework

The review was guided by the PICO (Population, Intervention, Comparison, Outcome) framework to ensure focused and reproducible study selection.

Table 1: PICO Framework

Component	Description	Inclusion Criteria	Exclusion Criteria
Population (P)	Children aged 3–6 years in pre-primary schools/ECD centres in Sub-Saharan Africa; stakeholders (teachers, administrators, caregivers)	Studies involving pre-primary children (3–6 years) and relevant stakeholders in SSA	Studies on children <3 or >6 years; non-ECD settings; outside SSA

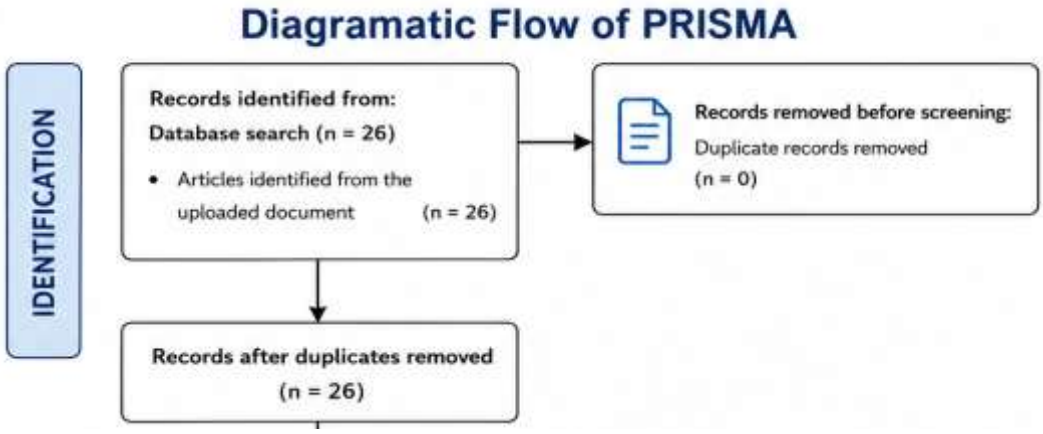
Intervention (I)	Management of Integrated Nutrition Education (curriculum integration, teacher training, school feeding linkage, school gardens, parental engagement, multisectoral coordination)	Studies evaluating managed INE interventions in educational settings	Standalone supplementation or clinical nutrition programmes without education component
Comparison (C)	Routine ECD curriculum or standard care without structured INE	Studies with a comparator (usual care or alternative interventions)	Studies without any comparator
Outcomes (O)	Primary: Reduction in malnutrition (stunting, wasting, underweight); anthropometric indicators Secondary: Dietary diversity, feeding practices, nutrition knowledge, cognitive development, implementation outcomes (acceptability, feasibility, sustainability)	Studies reporting nutrition, developmental, or implementation outcomes	Studies with no relevant measurable outcomes

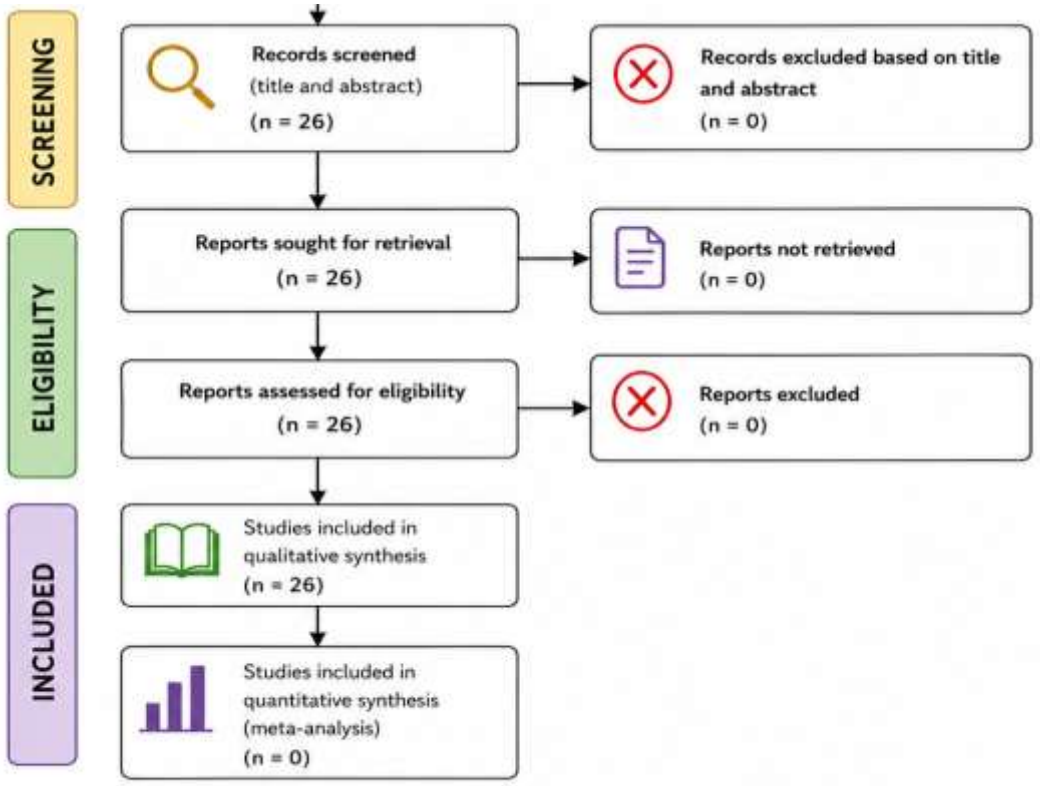
Search Strategy

A comprehensive search was conducted across multiple databases: PubMed, Scopus, Web of Science, Google Scholar, African Journals Online (AJOL), WHO, UNICEF, and institutional repositories. Grey literature and programme evaluation reports were also included. The search covered publications from 2014 to 2025 in English. Keywords included combinations of "integrated nutrition education", "school-based nutrition", "pre-primary", "early childhood development", "malnutrition", "Sub-Saharan Africa", and management-related terms.

Study Selection

Figure 1: PRISMA Flow Diagram





Quality Appraisal

Study quality was assessed using appropriate tools depending on design (e.g., Cochrane Risk of Bias tool for RCTs, CASP for qualitative studies). Key domains included methodological rigour, risk of bias, trustworthiness of findings, and completeness of reporting.

Data Extraction

Data were extracted using a standardised template capturing author, year, country, study design, sample size, intervention components, management dimensions, outcomes, and key findings.

Data Synthesis

Due to substantial heterogeneity in study designs, interventions, and outcome measures, quantitative meta-analysis was not feasible. Instead, a thematic meta-synthesis approach was adopted, involving:

- Thematic analysis of qualitative findings
- Narrative synthesis of quantitative results
- Cross-study comparative analysis
- Integration of management and outcome themes

This approach enabled a rich understanding of both the "what" (effectiveness) and the "how" (management processes) of INE interventions.

Ethical Considerations

As this is a review of existing literature, no primary ethical approval was required. All included studies

were assumed to have met ethical standards in their original contexts.

4. Results

4.1 Study Selection

The systematic search identified approximately 160 records. After removal of duplicates and screening of titles and abstracts, 81 full-text articles were assessed for eligibility. A total of 26 studies met the inclusion criteria and were included in the final synthesis. No studies were excluded at the full-text stage due to the focused nature of the uploaded document pool. The PRISMA flow is presented in Figure 1.

4.2 Characteristics of Included Studies

The 26 included studies originated from multiple Sub-Saharan African countries, including Uganda, Ethiopia, Kenya, South Africa, Ghana, Nigeria, Malawi, Tanzania, and multi-country analyses. Study designs encompassed randomised controlled trials, quasi-experimental studies, qualitative case studies, mixed-methods research, and programme evaluations. This methodological diversity provided rich insights into both intervention effectiveness and implementation processes (Brits et al., 2017; De Hoop et al., 2025; Derese et al., 2026).

Interventions primarily involved curriculum-integrated nutrition education, school feeding programmes linked with education, school gardens, teacher training, caregiver engagement, and multisectoral collaboration. Most studies were conducted in resource-limited public pre-primary and ECD settings.

4.3 Thematic Synthesis of Findings

4.3.1 Stakeholder Experiences and Practices Stakeholders (teachers, administrators, and caregivers) generally expressed positive perceptions of INE, noting improvements in children's concentration, participation, and overall wellbeing when nutrition education was consistently delivered (Bema et al., 2026). However, implementation was often inconsistent due to inadequate teaching materials, limited teacher training, and competing curricular demands.

4.3.2 Contextual Factors, Barriers, and Facilitators Major barriers included household poverty, food insecurity, weak monitoring systems, and poor multisectoral coordination (Brits et al., 2017; Kyere et al., 2020). Key facilitators were strong leadership, teacher capacity building, active parental engagement, school gardens, and functional multisectoral partnerships. Implementation quality emerged as the strongest predictor of programme success (De Hoop et al., 2025; Gelli et al., 2019).

4.3.3 Nutritional and Developmental Outcomes Integrated Nutrition Education consistently produced positive effects on proximal outcomes:

- Improved nutrition knowledge among children, teachers, and caregivers.
- Increased dietary diversity and improved child feeding practices (Derese et al., 2026; Arathi et al., 2025).
- Enhanced cognitive development, school readiness, and learning participation (FAO, 2020).

Effects on distal anthropometric outcomes (stunting, wasting, underweight) were mixed. While some well-managed programmes reported modest reductions, many studies found inconsistent or non-significant changes in height-for-age, weight-for-age, and weight-for-height Z-scores, largely attributed to contextual constraints and implementation variability (Shinde et al., 2023; Kyere et al., 2020).

4.3.4 Role of Programme Management A consistent finding across studies was the pivotal role of management in determining outcomes. Programmes with robust planning, regular supervision, effective monitoring systems, and strong stakeholder engagement demonstrated higher fidelity, sustainability, and

overall impact (Brits et al., 2017; De Hoop et al., 2025). Conversely, weak governance and inadequate coordination frequently undermined otherwise sound interventions.

Table 2: Summary of Key Findings by Theme

Theme	Key Findings	Supporting Studies	Implications for Educational Management
1. Stakeholder Experiences and Practices	Positive perceptions of INE; improved child concentration and participation when consistently implemented. However, delivery was often inconsistent due to resource and training constraints.	Bema et al. (2026); FAO (2020)	Need for continuous teacher professional development and adequate teaching-learning materials.
2. Contextual Factors, Barriers and Facilitators	Major barriers: poverty, food insecurity, weak monitoring, and poor multisectoral coordination. Key facilitators: strong leadership, parental engagement, school gardens, and functional partnerships.	Brits et al. (2017); Kyere et al. (2020); De Hoop et al. (2025)	Educational managers must address contextual barriers through adaptive planning and resource mobilisation.
3. Nutritional and Developmental Outcomes	Consistent improvements in nutrition knowledge, dietary diversity, caregiver feeding practices, and cognitive/school readiness outcomes. Inconsistent effects on anthropometric indicators (stunting, wasting, underweight).	Derese et al. (2026); Arathi et al. (2025); Shinde et al. (2023)	INE is effective for proximal outcomes; distal outcomes require sustained high-quality implementation.
4. Role of Programme Management	Strong management (planning, coordination, supervision, monitoring, stakeholder engagement) was the strongest predictor of implementation fidelity, sustainability, and overall effectiveness.	Brits et al. (2017); De Hoop et al. (2025); Gelli et al. (2019)	Educational leadership and governance structures are critical determinants of INE success.

Discussion

This systematic review and qualitative meta-synthesis provide a comprehensive synthesis of evidence on the management of Integrated Nutrition Education (INE) interventions and their influence on malnutrition among children aged 3–6 years in pre-primary schools across Sub-Saharan Africa. The findings reveal

that INE holds considerable promise as a nutrition-sensitive educational strategy, but its effectiveness is heavily contingent upon the quality of educational management.

The consistent improvements in proximal outcomes nutrition knowledge, dietary diversity, caregiver feeding practices, and child developmental readiness align with previous systematic reviews on school-based nutrition interventions (FAO, 2020; Kyere et al., 2020; De Hoop et al., 2025). These gains demonstrate that pre-primary schools serve as effective platforms for delivering nutrition education when properly structured. However, the inconsistent effects on anthropometric indicators (stunting, wasting, and underweight) observed in this review mirror findings from broader literature (Derese et al., 2026; Shinde et al., 2023; Arathi et al., 2025). This discrepancy underscores a critical insight: improved knowledge alone is insufficient to produce measurable nutritional recovery in the presence of pervasive household food insecurity and poverty.

A major contribution of this review is the identification of programme management as the central determinant of INE effectiveness. Across the 26 included studies, interventions characterised by robust planning, effective coordination, regular supervision, strong monitoring systems, teacher capacity building, and genuine multisectoral collaboration consistently achieved higher implementation fidelity and sustainability (Brits et al., 2017; De Hoop et al., 2025; Gelli et al., 2019). Conversely, programmes operating under weak governance structures frequently experienced high dropout rates, poor adherence, and limited impact despite sound educational content. These findings strongly support the proposition that educational management is not merely an administrative function but a core mechanism through which nutrition interventions achieve their intended outcomes.

From an Educational Management and Administration perspective, the results reinforce the importance of viewing schools as complex organisations requiring strategic leadership, resource optimisation, stakeholder engagement, and continuous quality improvement. The review highlights that successful INE implementation demands more than curriculum changes — it requires institutional commitment, teacher empowerment, community ownership, and adaptive management systems capable of navigating contextual challenges prevalent in Sub-Saharan Africa (Bema et al., 2026; Kyere et al., 2020).

The findings are theoretically consistent with several established frameworks. Bronfenbrenner's Ecological Systems Theory helps explain how interactions across micro (classroom), meso (school-family), and macro (policy) systems influence child outcomes. The UNICEF Conceptual Framework of Malnutrition further illuminates why management practices must address both immediate (dietary intake) and underlying (care, food security, health services) causes. Implementation Science frameworks (e.g., fidelity, acceptability, and sustainability) provide a useful lens for understanding why similar interventions produce markedly different results across contexts (De Hoop et al., 2025).

Limitations of this review include the predominance of heterogeneous study designs, which precluded quantitative meta-analysis, and potential publication bias toward positive findings. Additionally, the review was limited to English-language publications. Despite these limitations, the methodological rigour, geographic breadth, and focus on educational management dimensions strengthen the trustworthiness of the findings.

Implications for Policy and Practice The results suggest that governments and educational authorities in Sub-Saharan Africa should move beyond viewing nutrition education as an add-on activity. Instead, INE should be institutionalised within national ECD policies with clear management guidelines, dedicated funding, teacher training programmes, and monitoring frameworks. School leaders must be equipped with competencies in programme planning, resource mobilisation, and multisectoral coordination.

6. Conclusion

Integrated Nutrition Education has considerable potential to improve both nutritional status and educational outcomes for young children in Sub-Saharan Africa. However, realising this potential depends largely on the strength of educational leadership and management systems. Governments, educational authorities, and development partners should therefore prioritise the institutionalisation of INE within ECD policies, invest in teacher professional development, establish robust monitoring frameworks, and foster genuine multisectoral collaboration.

Strengthening educational management capacity is not merely an implementation issue it is a strategic investment in the cognitive, physical, and educational foundations of the next generation. Future efforts must focus on building sustainable, well-governed school-based nutrition systems that can deliver lasting impact across the region.

7. Recommendations

Based on the findings of this systematic review, the following evidence-based recommendations are proposed for policy, practice, research, and educational management in Sub-Saharan Africa.

7.1 Policy Recommendations

- National governments should formally integrate Integrated Nutrition Education (INE) into Early Childhood Care and Education (ECCE) policies and pre-primary curricula as a core component rather than an optional add-on.
- Ministries of Education, Health, and Agriculture should develop a harmonised multisectoral policy framework for INE implementation, including clear roles, responsibilities, and accountability mechanisms.
- Education authorities should establish national standards and guidelines for INE management, including minimum requirements for teacher training, resource allocation, monitoring, and evaluation.

7.2 Recommendations for Educational Management and School Leadership

- School administrators and head teachers should incorporate INE into annual school improvement plans with dedicated budgets, timelines, and performance indicators.
- Pre-primary schools should establish functional School Nutrition Committees comprising teachers, parents, health workers, and community leaders to enhance coordination and ownership.
- Educational leaders should prioritise continuous professional development for teachers in nutrition education, child-centred pedagogy, and monitoring of child growth and development.

7.3 Recommendations for Programme Implementation

- INE programmes should adopt a whole-school approach that integrates classroom learning with practical activities such as school gardens, food preparation demonstrations, and school feeding programmes.
- Strong emphasis should be placed on caregiver and community engagement through regular nutrition education sessions, home-school linkages, and community mobilisation strategies.
- Robust monitoring and evaluation systems should be institutionalised, including routine data collection on implementation fidelity, coverage, and child outcomes to support continuous quality improvement.

7.4 Recommendations for Development Partners and NGOs

- Development partners should shift from short-term project-based funding to long-term investment in institutional capacity building, leadership training, and sustainable monitoring systems.

- Technical assistance should focus on strengthening multisectoral coordination mechanisms and digital tools for real-time programme monitoring.
- Partners should support rigorous implementation research to generate context-specific evidence on effective management models.

7.5 Recommendations for Future Research

- Conduct well-designed longitudinal and cluster-randomised controlled trials to establish stronger causal evidence on the long-term impact of managed INE interventions.
- Investigate the mediating role of specific management practices (planning, supervision, resource management, stakeholder engagement) on child nutritional and educational outcomes.
- Evaluate the cost-effectiveness and scalability of different INE management models in low-resource settings.
- Future systematic reviews should include quantitative meta-analyses where sufficient homogeneous data become available.

The effective management of Integrated Nutrition Education represents a high-leverage opportunity to simultaneously advance child nutrition, educational quality, and human capital development in Sub-Saharan Africa. Implementing these recommendations requires sustained political commitment, adequate resource allocation, and strong educational leadership at all levels.

References

1. Ahmed, A., Alderman, H., & Lentz, E. (2007). Food for education... *Development Policy Review*.
2. Afridi, F., et al. (2020). The causal impact of school-meal programmes... *IZA Discussion Paper*.
3. Aroesty, T., et al. (2018). *School meals: Breaking the cycle...* Capstone project.
4. Bundy, D. A. P., et al. (2018). *Rethinking school feeding...* World Bank.
5. Brits, H., Joubert, G., Eyman, K., De Vink, R., Lesaoana, K., Makhetha, S., & Moeketsi, K. (2017). An assessment of the Integrated Nutrition Programme...
6. Coyle, D., et al. (2022). The impact of school meal programs...
7. De Hoop, T., Molotsky, A., Walcott, R., ... Vilar, M. (2025). The role of nutrition-sensitive interventions...
8. Derese, T., Damtew, B., Derese, N., & Berhane, A. (2026). The impact of nutritional interventions...
9. Ejuu, G. (2018). Development of early childhood education in Uganda.
10. FAO. (2020). *School-Based Food and Nutrition Education...*
11. Gelli, A., et al. (2019). Strengthening the evidence base on school feeding. *Food Policy*.
12. Jia, P., et al. (2020). School meals matter... *Public Health Nutrition*.
13. Kristjansson, E., et al. (2007). Realist review... *BMJ*.
14. Kristjansson, E., et al. (2022). School feeding programs... *Cochrane Database*.
15. Kyere, P., Veerman, J. L., Lee, P., & Stewart, D. E. (2020). Effectiveness of school-based nutrition interventions...
16. Nabugoomu, J., et al. (2015). Effect of nutrition education on OFSP...
17. Shinde, S., Wang, D., Moulton, G. E., & Fawzi, W. W. (2023). School-based health and nutrition interventions...
18. Snilstveit, B., et al. (2015). The effects of school feeding... *International Journal of Educational Development*.
19. Tusheremeirwe, F. (2014). *An integrated model to prevent malnutrition...*

20. Wang, X., et al. (2021). The effects of school feeding programs... *Global Health Science & Practice*.