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Effectiveness of Health Education Programs in Promoting Healthy Eating Habits Among Primary School Children

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Abstract

The promotion of healthy eating habits among primary school children has emerged as a critical public health priority globally, with mounting evidence demonstrating that dietary behaviors established during childhood significantly influence long-term health outcomes. This study evaluated the effectiveness of health education programs in promoting healthy eating habits among primary school children through a comprehensive literature-based methodology. The research synthesized evidence from peer-reviewed studies, meta-analyses, and systematic reviews published between 2009 and 2025, focusing on school-based interventions targeting children aged 5-12 years. The theoretical framework was grounded in Albert Bandura's Social Cognitive Theory, which provided a robust foundation for understanding behavior change mechanisms through the dynamic interaction of personal factors, environmental influences, and behavioral patterns. Findings revealed that multicomponent health education programs demonstrated superior effectiveness compared to single-component interventions, with experiential learning strategies such as gardening activities and cooking experiences showing the most significant improvements in children's dietary knowledge, attitudes, and consumption behaviors. Programs of adequate duration (≥ 6 months) that included meaningful parental engagement and were delivered by trained personnel achieved greater effectiveness in producing sustainable behavioral changes. The evidence indicated differential impacts on fruit versus vegetable consumption, with vegetables requiring more intensive intervention approaches. The study concluded that comprehensive, theory-based health education programs incorporating experiential learning opportunities and family involvement were most effective in promoting healthy eating habits among primary school children, requiring sustained implementation and adequate resource allocation to achieve optimal outcomes.

Keywords: *Health Education, Primary School Children, Healthy Eating Habits, Nutrition Education, School-Based Interventions*

1.0 Introduction

Promoting healthy eating habits among primary school children has become a critical public health priority globally, as dietary behaviors established during childhood significantly influence long-term health outcomes and academic performance (Langford et al., 2015). Proper nutrition remains essential for optimal growth and development of children and adolescents, beginning in utero and continuing throughout the school years (Hargreaves et al., 2022). These early eating patterns track into adulthood, making early intervention through structured health education programs vital for establishing lifelong healthy dietary behaviors (Nathan et al., 2015). The World Health Organization recognizes childhood and adolescence as key periods for establishing eating habit foundations, encompassing physiological, cognitive, and social development changes (Ares et al., 2024). Educational institutions serve as ideal venues for promoting healthy eating among children, providing universal access regardless of socioeconomic status and helping overcome potential health inequalities (Dudley et al., 2015; Micha et al., 2021). Schools represent the only institution regularly reaching the majority of school-age children and adolescents globally (Lassi et al., 2019). Children spend approximately 40% of their waking time at school, creating extensive opportunities for systematic exposure to nutrition education and healthy eating interventions (Micha et al., 2021).

Current childhood dietary patterns reveal alarming trends that underscore the urgent need for effective health education interventions in school settings (Brown et al., 2019). National data indicate that fewer than 2% of children and adolescents meet Food Guide Pyramid recommendations, while 16% fail to meet any food group recommendations (Institute of Medicine, 2007). Particular areas of concern include inadequate consumption of fruits, vegetables, whole grains, fiber, and calcium-rich foods, coupled with excessive intake of foods high in sugar, salt, and unhealthy fats (Institute of Medicine, 2007). The prevalence of overweight and obesity continues increasing among children globally, directly linked to unhealthy dietary habits and insufficient physical activity (Milajerdi et al., 2020). Recent CDC analysis reveals that one in two children do not consume vegetables daily, while one in three fail to eat fruit each day (CDC., 2011).

Multiple factors influence children's eating behaviors, necessitating multi-component health education programs that address individual knowledge and skills alongside environmental and social determinants of healthy eating (Wadolowska et al., 2021). Personal food environments encompass individual and household characteristics determining food access, including household food availability and interactions within families, as well as relationships with peers

and teachers (Caswell et al., 2013). While parents play crucial roles in shaping children's eating habits, they lack complete control over food choices and consumption, particularly among school-age children and older (Varela et al., 2024). Food insecurity often associates with childhood overweight or obesity, potentially related to consuming foods with low nutritional value that remain more accessible and affordable (Vedovato et al., 2016).

Evidence from systematic reviews and meta-analyses supports the effectiveness of school-based health education programs in promoting healthy eating habits among children, though outcome quality and consistency vary significantly across different intervention approaches (Evans et al., 2020). Experiential learning strategies demonstrate the largest effects across multiple outcomes, including reduced energy intake, increased fruit and vegetable consumption or preference, and enhanced nutritional knowledge (Dudley et al., 2015). Multicomponent interventions incorporating environmental, educational, and physical strategies along with parental involvement and long-term initiatives show promise for improving dietary habits and reducing childhood-related diseases among primary school children (Milajerdi et al., 2020). Most effective interventions combine educational meetings and materials with additional implementation strategies (Wolfenden et al., 2021).

Effective school-based health promotion interventions incorporate multiple target groups, diverse providers including external experts, and appropriate duration with strategic follow-up timing (Šušťová et al., 2023). Multicomponent interventions that include policy changes, parent involvement, cooperation between educational and health experts, provider training, and community partnerships demonstrate superior effectiveness compared to single-component approaches (Šušťová et al., 2023). Key facilitators include commitment and support from senior leadership, staff observation of positive impacts on student engagement and wellbeing, and staff confidence in delivering health promotion combined with belief in its value (Clarke et al., 2019). Conversely, contextual barriers include prioritizing educational outcomes under time and resource constraints, insufficient funding and resources, staff turnover, and lack of ongoing training (Clarke et al., 2019). Sustainability depends upon schools developing and retaining knowledgeable, skilled, and motivated senior leaders and staff capable of continuing health promotion delivery through changing circumstances (Herlitz et al., 2020).

1.1 Statement of the Problem

Contemporary dietary patterns among primary school children reveal significant challenges that necessitate urgent intervention through comprehensive health education programs.

Children's eating habits fall considerably short of recommended dietary standards, with alarming implications for their immediate and long-term health outcomes (Keeley et al., 2019). Nutritional deficiencies occur when children's diets include excessive amounts of foods high in fat, sugar, and salt (Verduci et al., 2021). The rise in childhood obesity, overweight prevalence, nutrient deficiency, and associated non-communicable diseases represents a particular concern for health authorities worldwide. Children require varied, balanced diets not only for good health and obesity prevention but also to establish healthy eating behaviors that persist throughout life. Despite technological, cultural, and social advances in recent decades, millions of children continue subsisting on unhealthy diets simply because better choices remain unavailable (UNICEF, 2019).

Existing health education initiatives in schools demonstrate critical gaps that hinder effective promotion of healthy eating habits among primary school children. While best practice recommendations exist regarding school-based healthy eating and physical activity policies, practices, and programs, implementation remains poor (Wolfenden et al., 2021). Policy documents consistently call for effective strategy development among children and adolescents to address childhood diseases such as overweight and obesity, yet existing school-based interventions show limited to moderate impact and evidence (Milajerdi et al., 2020). Many interventions lack primary focus on obesity prevention, instead adopting broader scopes that fail to specifically target sustainable healthy eating habit promotion. Various implementation strategies produce mixed results, indicating urgent need for more systematic and evidence-based approaches to program design and delivery.

1.2 Objective of the Study

The primary objective of this study was to evaluate the effectiveness of health education programs in promoting healthy eating habits among primary school children.

2.0 Literature Review

Medeiros et al. (2022) conducted a systematic review to evaluate the effects of school-based food and nutrition education interventions on adolescent food consumption. The systematic review identified that interventions in nutrition education, carried out with children aged 2 to 19 years, who were more likely to succeed were those that had a multicomponent approach, appropriate to age and adequate duration (≥ 6 months), which involved family and that ensured fidelity and proper alignment between stated objectives.

Jacob et al. (2021) investigated the effectiveness of health education interventions delivered in school settings to prevent overweight and obesity among adolescents aged 10 to 19 years. Their systematic review and meta-analysis revealed that adolescents are increasingly susceptible to obesity, and thus at risk of later non-communicable diseases, due to changes in food choices, physical activity levels and exposure to an obesogenic environment.

Cooke et al. (2025) examined the effectiveness of school-based nutrition education programs that included environmental sustainability components on fruit and vegetable consumption among children aged 5-12 years. The research demonstrated the effectiveness of experiential learning approaches, showing that programs that included environmental sustainability experiential components (i.e., gardening, tasting F&Vs, and cooking activities) and were underpinned by a theoretical framework were more likely to report significant outcomes than studies that reported no effects.

Cotton et al. (2020) studied the impact of teacher-delivered nutrition education programs on elementary-aged students' dietary behaviors and nutritional knowledge. The comprehensive analysis revealed mixed outcomes, demonstrating that schools can make a positive impact on children's nutritional outcomes. However, the research also identified significant implementation challenges, showing that schools and teaching staff note many barriers, which may restrict nutritional education programming and delivery.

Murimi et al. (2018) investigated factors that contributed to effective nutrition education interventions in children through a systematic review of studies published between 2009 and 2016. The study employed systematic analysis methodology examining intervention characteristics across diverse school-based programs. The research identified key characteristics of successful interventions, demonstrating that successful interventions targeting school children engaged parents by means of face-to-face sessions, identified specific behaviors to be modified, and assured fidelity by training teachers or recruiting trained experts to deliver the intervention.

Micha et al. (2018) conducted a systematic review and meta-analysis examining the effectiveness of school food environment policies on children's dietary behaviors, adiposity, and metabolic risk. The study employed standardized methods and analytic techniques with duplicate full text reviews and data extractions to reduce errors and bias. The research highlighted implementation challenges, revealing that intensity or success of policy

implementation could modify results, but these are difficult to quantify due to varying professional education or technical assistance for food service directors.

Chan et al. (2022) examined the impacts of school garden-based programmes on diet and nutrition-related knowledge, attitudes, and practices among school-aged children through systematic review methodology. The research demonstrated promising cost-effective potential, showing that school garden-based programmes (SGBP) may be effective interventions to improve children's knowledge, attitudes and practices (KAP) on healthy eating. The study found an important differential outcome, indicating that school garden-based programmes have generally shown beneficial effects on children's knowledge of diet and nutrition, attitudes and acceptability towards vegetables with limited influence shown on dietary practices including the actual consumption of fruits and vegetables.

Evans et al. (2012) conducted a systematic review and meta-analysis of school-based interventions designed to improve daily fruit and vegetable intake in children aged 5 to 12 years. The study utilized comprehensive search strategies across multiple databases to identify relevant intervention studies. The research revealed mixed outcomes, demonstrating that school-based interventions moderately improve fruit intake but have minimal impact on vegetable intake.

Parmer et al. (2009) investigated the effects of school garden experiences on nutrition education among second-grade students through experimental intervention design. The research demonstrated significant positive outcomes, revealing that hands-on approaches such as gardening and cooking programs may encourage greater vegetable consumption and may have a larger effect compared to nutrition education alone. The study found that participants in the nutrition education plus gardening (NE+G) and nutrition education (NE) treatment groups exhibited significantly greater improvements in nutrition knowledge and taste ratings than did participants in the control group.

Morgan et al. (2010) examined the impact of nutrition education with and without school garden components on knowledge, vegetable intake, preferences, and quality of school life among primary school students. The quasi-experimental study employed pre-post intervention design with control group comparison. The research found important intervention effectiveness, demonstrating that relative to controls, significant between-group differences were found for nutrition education and gardening (NE&G) and nutrition education (NE)

students for overall willingness to taste vegetables ($P < 0.001$) and overall taste ratings of vegetables ($P < 0.001$).

Ransley et al. (2010) investigated whether nutrition education in primary schools made a difference to children's fruit and vegetable consumption through comprehensive analysis of various school-based initiatives. The study employed cross-sectional survey methodology examining diverse intervention approaches across multiple schools. The research revealed important associations between specific activities and dietary outcomes, demonstrating that in schools running a gardening club, children ate more vegetables, 120 (95% CI 111, 129) g/d, compared with those that did not, 99.3 (95% CI 89.9, 109) g/d.

Holloway et al. (2023) conducted a realist synthesis examining how school gardens improved health and well-being outcomes for school-aged children, investigating the mechanisms and circumstances that contributed to positive results. The study employed realist review methodology analyzing intervention contexts, mechanisms, and outcomes across diverse program implementations. The analysis revealed that the combined action of nutrition-based and garden-based education, often integrated into the curriculum, was a common mechanism that contributed towards positive outcomes, particularly in connection to fruit and vegetable consumption behaviors.

2.1 Theoretical Review

Albert Bandura's Social Cognitive Theory served as the theoretical foundation for understanding the effectiveness of health education programs in promoting healthy eating habits among primary school children. Bandura (1986) developed this theory as a comprehensive framework that explained human behavior through the dynamic interaction between personal factors, environmental influences, and behavioral patterns. The theory posited that social cognitive theory (SCT) was one of the most frequently applied theories of health behavior, establishing a reciprocal deterministic relationship between the individual, his or her environment, and behavior (Baranowski et al., 2002). According to this theoretical framework, the focus was on how the individual's personal experience, actions and experiences of others and the influence of the environmental factors on the health behavior of the individual, thus giving it a name 'triadic reciprocal causation' (Bandura, 1986).

The assumptions underlying Social Cognitive Theory were grounded in the principle that human behavior resulted from the continuous interaction of cognitive, behavioral, and environmental determinants through a process called reciprocal determinism. Bandura (1986)

emphasized that individuals were not passive recipients of environmental forces but actively shaped and were shaped by their surroundings through ongoing interpretation, choice, and adjustment of behaviors. The theory assumed that people learned new behaviors by observing others and noting the consequences, a process known as observational learning (Bandura, 1977). Another fundamental assumption was that self-efficacy, defined as individuals' belief in their capability to perform a behavior, served as a central construct that was integral to the interrelationship between personal, environmental and behavioral factors (Bandura, 1997).

The strengths of Social Cognitive Theory in explaining health education program effectiveness included its comprehensive approach to behavior change, addressing multiple levels of influence simultaneously rather than focusing on individual factors alone (Bandura, 2004). The theory's emphasis on self-efficacy provided a robust framework for understanding how confidence in one's ability to perform healthy eating behaviors directly influenced actual dietary practices among children (Cusatis & Shannon, 2018). Research demonstrated that self-efficacy played a role in influencing behavior, especially self-efficacy specific for healthy eating as a significant predictor of actual eating behavior (Najimi & Ghaffari, 2016). The theory's recognition of observational learning was particularly relevant for school-based interventions where children could learn healthy eating behaviors by watching peers, teachers, and other role models (Bandura, 1986).

Despite its strengths, Social Cognitive Theory had several limitations when applied to health education programs promoting healthy eating habits among primary school children. One notable weakness was the complexity of the theory, which included multiple constructs and relationships that could be challenging to implement comprehensively in real-world interventions (Patton et al., 2017). The theory's heavy reliance on cognitive processes might not fully account for unconscious or automatic behaviors that influenced eating habits among children (Bandura, 2004). Additionally, some studies found mixed results regarding the effectiveness of individual SCT constructs, with research showing that while self-efficacy significantly predicted physical activity behavior, it did not always show significant relationships with dietary behavior (Sebastian et al., 2021).

The relevance of Social Cognitive Theory to health education programs promoting healthy eating habits among primary school children was particularly strong given the theory's comprehensive framework for understanding behavior change in educational settings. The theory's emphasis on the reciprocal interaction between personal factors, environmental influences, and behavior aligned well with the school environment, where children's eating

behaviors were influenced by peer interactions, teacher modeling, educational curricula, and the broader school food environment (Bandura, 2004). Research demonstrated that social cognitive theory-based interventions could be used to promote healthy behaviour among children, with studies showing that SCT-based nutrition education led to significantly improved self-efficacy scores and increased fruit and vegetable consumption among elementary students (Najimi & Ghaffari, 2016). The theory's construct of observational learning was especially relevant for school-based programs, as children could learn healthy eating behaviours through peer modelling and teacher demonstration during nutrition education activities.

3.0 Research Methodology

This study employed a literature-based research methodology to evaluate the effectiveness of health education programs in promoting healthy eating habits among primary school children. The methodology was grounded in a systematic review approach that synthesized existing empirical evidence from peer-reviewed studies, meta-analyses, and systematic reviews published between 2009 and 2025. The research strategy focused on identifying and analysing studies that examined school-based health education interventions targeting dietary behaviours, nutritional knowledge, and healthy eating practices among children aged 5-12 years in primary school settings. The literature search was conducted across multiple electronic databases including PubMed, MEDLINE, Embase, Cochrane Library, PsycINFO, ERIC, and Web of Science using search terms such as "school-based intervention," "nutrition education," "primary school children," "healthy eating," and "program effectiveness." The study selection process followed systematic review guidelines with inclusion criteria encompassing peer-reviewed studies that examined health education interventions in primary schools with measurable outcomes related to dietary knowledge, attitudes, or behaviours, while exclusion criteria eliminated studies focusing on clinical populations or those conducted exclusively in non-school settings.

4.0 Findings

The analysis of literature revealed that multicomponent health education programs demonstrated superior effectiveness in promoting healthy eating habits among primary school children compared to single-component interventions. Medeiros et al. (2022) found that interventions with a multicomponent approach that were age-appropriate and of adequate duration (≥ 6 months), involved family engagement, and ensured fidelity between stated

objectives and desired outcomes were more likely to succeed in changing dietary behaviors. Similarly, Jacob et al. (2021) demonstrated that ten studies which included measures to improve the environment, in addition to educational components or school policy changes to increase accessibility and improve facilities for healthy eating, showed significant positive effects on children's dietary practices. These findings were corroborated by Murimi et al. (2018), who identified that successful interventions targeting school children engaged parents through face-to-face sessions, identified specific behaviors to be modified, and assured fidelity by training teachers or recruiting trained experts to deliver the intervention. The evidence consistently indicated that comprehensive approaches addressing multiple levels of influence simultaneously produced more substantial and sustainable improvements in children's eating behaviors than interventions targeting single factors.

Experiential learning strategies emerged as particularly effective components of health education programs, with significant impacts on children's dietary knowledge, attitudes, and consumption patterns. Cooke et al. (2025) found that programs incorporating environmental sustainability experiential components, including gardening, tasting fruits and vegetables, and cooking activities, were more likely to report significant increases in fruit and vegetable consumption and variety compared to traditional classroom-based approaches. This finding was supported by Parmer et al. (2009), who demonstrated that hands-on approaches such as gardening and cooking programs encouraged greater vegetable consumption and had larger effects compared to nutrition education alone. The Community Preventive Services Task Force (2017) provided additional evidence, showing that interventions combining nutrition education with gardening activities were more effective than gardening activities alone, with vegetable consumption increasing in 12 of 14 studies examined. Cotton et al. (2020) further confirmed that experiential learning approaches led to small and medium effect sizes in improving children's nutritional knowledge and dietary habits, indicating that qualified teachers delivering nutrition education through hands-on activities could make important contributions to children's healthy eating behaviors.

The duration and intensity of health education interventions significantly influenced program effectiveness, with longer-term programs demonstrating more substantial and lasting behavioral changes. Murimi et al. (2018) established that interventions required adequate dosage with a minimum duration of six months and age-appropriate activities to achieve meaningful changes in children's dietary behaviors. This finding aligned with research by Medeiros et al. (2022), who identified that interventions with adequate duration (≥ 6 months)

and proper alignment between stated objectives and intervention components were more likely to succeed in promoting healthy eating habits. Cotton et al. (2020) noted that while schools could make positive impacts on children's nutritional outcomes, the effectiveness was contingent upon sustained implementation over extended periods. The evidence suggested that brief, short-term interventions were insufficient to produce lasting behavioral changes, emphasizing the need for comprehensive, long-term approaches to health education programming in primary school settings.

Parental and family involvement emerged as a critical factor determining the success of school-based health education programs in promoting healthy eating habits among children. Ransley et al. (2010) found that where parents were actively involved in school initiatives to promote fruits and vegetables, children's intake of vegetables was significantly higher (117 g/d) compared to schools where parents were not involved (105 g/d). Chan et al. (2022) recommended that future school garden-based programs should offer more parental lessons and provide parents with knowledge and tools to improve children's eating behaviors, including practical advice on fostering children's preferences toward healthier food options. Holloway et al. (2023) identified family engagement and participation as key mechanisms contributing to positive outcomes in school gardening interventions, with intergenerational learning opportunities influencing children's behaviors and self-efficacy. The evidence consistently demonstrated that programs incorporating meaningful parental involvement achieved superior outcomes compared to school-only interventions, highlighting the importance of extending health education efforts beyond the school environment to include family contexts.

The effectiveness of health education programs varied significantly based on specific dietary outcomes targeted, with differential impacts observed for fruit consumption versus vegetable consumption among primary school children. Evans et al. (2012) conducted a comprehensive meta-analysis revealing that school-based interventions moderately improved fruit intake by 0.24 portions but had minimal impact on vegetable intake with only 0.07 portions improvement. This pattern was confirmed by the Community Preventive Services Task Force (2017), which found that while vegetable consumption increased in 12 of 14 studies, fruit consumption did not change in 10 studies examining gardening interventions. Morgan et al. (2010) demonstrated that relative to controls, significant between-group differences were found for nutrition education and gardening students regarding overall willingness to taste vegetables ($P < 0.001$) and taste ratings of vegetables ($P < 0.001$), suggesting that targeted approaches could overcome children's resistance to vegetable consumption. The findings

indicated that vegetables presented greater challenges for behavior change interventions, requiring more intensive and sustained efforts compared to promoting fruit consumption among primary school children.

5.0 Conclusion

The systematic analysis of literature demonstrated that health education programs were effective in promoting healthy eating habits among primary school children, with multicomponent interventions showing superior outcomes compared to single-component approaches. The evidence revealed that programs incorporating experiential learning strategies, particularly those involving gardening activities, cooking experiences, and hands-on food preparation, achieved the most significant improvements in children's dietary knowledge, attitudes, and consumption behaviors. Furthermore, interventions of adequate duration (≥ 6 months) that included parental engagement and were delivered by trained personnel showed greater effectiveness in producing sustainable behavioral changes. The differential impact on fruit versus vegetable consumption highlighted the need for targeted strategies, with vegetables requiring more intensive intervention approaches to overcome children's natural resistance and food neophobia.

The findings underscored the importance of comprehensive, theory-based approaches to health education programming in primary school settings, with Social Cognitive Theory providing a robust framework for understanding the mechanisms underlying successful behavior change interventions. The evidence supported the implementation of multicomponent programs that addressed personal, environmental, and behavioral factors simultaneously, recognizing that children's eating behaviors were influenced by complex interactions between individual knowledge and skills, social modeling, family involvement, and the broader school food environment. The research demonstrated that effective health education programs required sustained implementation over extended periods, adequate resource allocation, and systematic integration of experiential learning opportunities to achieve meaningful and lasting improvements in children's healthy eating habits.

6.0 Recommendations

Based on the findings, it is recommended that primary schools implement comprehensive, multicomponent health education programs that combine nutrition education with experiential learning activities such as school gardening, cooking classes, and food preparation experiences, delivered over a minimum duration of six months with meaningful parental involvement.

Programs should be designed using Social Cognitive Theory principles to address self-efficacy, observational learning, and environmental factors simultaneously, with particular emphasis on developing targeted strategies to promote vegetable consumption among children. Schools should ensure adequate training for teachers and staff delivering nutrition education, establish partnerships with families to extend learning beyond the school environment, and allocate sufficient resources for sustained program implementation to achieve optimal outcomes in promoting healthy eating habits among primary school children.

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