



A Critical Review of School-Based Nutrition Education Contents: Strengths, Gaps and Ways Forward

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Abstract

Nutrition education (NE) plays a crucial role in shaping the health and well-being of schoolchildren. This paper critically examines NE contents in school education as outlined in the National Curriculum Framework (NCF)-2019, focusing on its strengths, gaps, and potential ways forward. The paper is developed reviewing literature, particularly government documents, published articles, and dissertations. The findings reveal that the NCF focuses on the basics of food and nutrition, healthy eating behaviors, locally available foods, balanced diet, essential nutrients, food adulteration, malnutrition, and the effects of junk food. Additionally, the curriculum addresses issues like food adulteration, food security, and consumer rights and partially aligns with the strategic objectives and programs of the Multi-Sector Nutrition Plan (MSNP). However, the integration of global perspectives like Sustainable Development Goals (SDGs), climate change, and sustainable agriculture are limited to integrate into the curriculum. The study recommends addressing these gaps by incorporating global perspectives on topics such as climate change, sustainable agriculture, the SDGs, and the MSNP targets.

Introduction

Good nutrition profoundly influences developing healthy eating behaviors among school-aged children (Follong et al., 2022). Nutrition education (NE), an educational strategy, aims at promoting the voluntary adoption of healthy food choices and nutrition-related behaviors that support the

health and well-being of people (Contento, 1995, 2011). NE, an effective method for all age groups, particularly school-aged children, increases the level of awareness of healthy nutrition; improves the level of nutrition knowledge, attitudes, and behaviours; and reduces the risk of many chronic diseases, particularly obesity (Hernández-Garbanzo & Daeger, 2022).

The formal field of NE started when the US Department of Agriculture 1917 introduced nutrition education as a teaching tool to improve food choices and dietary behavior (Contento, 2011). NE, a key element to promote healthy nutritional behaviors, has long been recognized as a key strategy to empower people to utilize available resources for improving nutritional behavior (FAO and United Arab Emirates University, 2019). Gil (2010) states that “NE is a part of applied nutrition that focuses its resources towards learning, adaptation, and acceptance of healthy eating habits” (McNulty, 2013, p. 5). Further FAO (2005) defines “NE as an intervention that provides people with the knowledge, skills, and motivation to make wise dietary and lifestyle choices, building thus a strong basis for a healthy and active life” (p.3). Contento (2011) comprehensively defines the meaning of NE, offering its multiple settings, where all the activities underlie, from individual to policy levels, cover its broad area. She defines,

NE is any combination of educational strategies, accompanied by environmental support, designed to facilitate voluntary adoption of food choices and other food- and nutrition-related behaviors conducive to health and well-being. NE is delivered through multiple venues and involves activities at individual, community, and policy levels. (p.11)

School-based nutrition education (SBNE) is a whole-school approach involving all school communities, including children, parents, teachers, school leaders, and community people (Medeiros et al., 2022; Upreti et al., 2023). It is an educational process supported by a healthy food environment and helps children, and their communities improve their food choices and dietary behaviors. Further,

it empowers them to act as the change agent in society (Upreti et al., 2024; Upreti et al., 2023). The epistemic understanding of SBNE goes beyond classroom-based education. It covers with several hands-on learning opportunities linking school curricula with extracurricular activities, school feeding programs, local food production systems, school gardens, and hygiene and sanitation-related practices (Antwi et al., 2020; FAO and United Arab Emirates University, 2019; Food and Agriculture Organization of United Nations, n.d.; Hawkins et al., 2020). Since multiple layers of determinants influence the nutritional behaviors of individuals, several studies (Harake et al., 2018; Melnick et al., 2022; Pérez-Rodrigo & Aranceta, 2001; Prelip et al., 2012; Scherr et al., 2014; Upreti et al., 2024) have demonstrated that using a multicomponent SBNE can effectively promote healthy eating behaviors in school-going children and adolescents. Pérez-Rodrigo and Aranceta (2001) suggest incorporating school curriculum, school meals, workplace policy, family involvement, and community partnership as the key components of the SBNE. Melnick et al. (2022) also suggest a three-dimensional concept of SBNE, such as student level (NE in the classroom), home level (parent education), and school level (policy, system, and environmental school changes). Similarly, Harake et al. (2018) suggests incorporating two main components: classroom-based NE sessions and locally prepared healthy snacks at school. Whilst Scherr et al. (2014) suggest five integrated components: NE and promotion; family and community partnerships; supporting regional agriculture; foods available in the school; and school wellness committees and policies.

NE plays a crucial role in shaping the health and well-being of students, especially at the foundational stages of their education. It empowers young individuals with the

knowledge and skills needed to make informed decisions about their food choices, which, in turn, affects their overall health, academic performance, and future well-being (Contento, 2008). In Nepal, the National Curriculum Framework (NCF)-2019 outlines the NE contents under health education subjects for basic and secondary school levels, seeking to equip students with essential knowledge about nutrition, food security, sustainable agriculture, and health promotion. The curriculum provides a critical structure for educating students on balanced diets, malnutrition, food security, and healthy eating habits. However, it is essential to critically examine how well the NCF-2019 addresses contemporary global and local issues, such as Multi-Sector Nutrition Plan (MSNP), Sustainable Development Goals (SDGs), climate change and food security, and sustainability, sustainable agriculture, and age-appropriate selection of the contents within NE. Given the context, this paper critically examines NE contents for basic and secondary schools as outlined in the NCF-2019 focusing on its strengths, gaps, and potential ways forward.

Study Methods and Procedures

The methodology of this paper is based on a narrative review approach, utilizing government documents, also known as gray literature, as the sources of information. The review focuses on the NE contents for both basic and secondary school levels, as the NCF outlines. To gather relevant materials, the first author visited and retrieved documents from the Curriculum Development Center (CDC) website (<https://www.moecdc.gov.np/en/curriculum>), ensuring that the most current and official resources were utilized for analysis. This paper also builds upon the first author's PhD dissertation (Upreti, 2023), supervised by the second author,

which involved an in-depth review. We also reviewed published papers to discuss the results of the present study.

Results and Discussion

Existing Nutrition Education Contents

Teaching NE in schools has a long history in Nepal. NE was incorporated in primary school under the Hygiene and Physical Education subject from the National Education System Planning (NESP)-1971. Since then, NE has been integral to Health and Physical Education (HPE) in school education. National Curriculum Framework (NCF)-2007 incorporated NE into science subject from grades one to five and within HPE subject from sixth to eighth grades (Government of Nepal, 2063 BS). International studies indicate that nutrition education content is often integrated into HPE, Science, or Social studies (Aydin et al., 2022; Follong et al., 2022; Moitra et al., 2021).

Ministry of Education, Science, and Technology has developed NCF-2019. According to NCF-2019, nutrition education-related contents are incorporated under 'Our surrounding' subject in grades 1-3, included in the HPE subject from fourth to eighth grades. Table 1 outlines the details of nutrition education-related contents.

Table 1

Overview of Basic School Nutrition Education Contents (Grades 1-8)

Grades	Nutrition education contents	Name of subject under which NE contents are incorporated
First	Name of daily eating foods Fresh and hygienic foods found in the locality	
Second	Foods found at home and surrounding Green vegetables and fruits found in the locality	Our Surrounding (<i>Hamro Serophero</i>)
Third	Source of daily eating foods Vegetarian and non-vegetarian foods Introduction and function of foods	
Fourth	Basic classification of foods based on sources: Plant source and animal source foods Introduction to balanced food Selection and utilization of healthy foods Introduction to junk foods Awareness against junk food consumption Introduction to nutrition and nutrients Functions of nutrients	Health, Physical and Creative Arts
Fifth	Food preservation methods Introduction to locally available foods Selection and utilization of locally available foods to prepare a balanced diet Effects of junk foods Ways to reduce junk foods consumption Introduction and importance of balanced diet Classification of foods based on their functions (Energy-giving foods, bodybuilding foods and body protective foods)	Health, Physical and Creative Arts
Sixth	Identification and utilization of locally available foods Preparing a balanced diet utilizing locally available foods Introduction to junk foods Effects of junk foods	
Seventh	Nutrients: Introduction, source, and functions Effects of pesticide used foods Effects of junk foods Selection and utilization of healthy school meals Food adulteration: Consciousness and preventive measures Introduction and causes of malnutrition Classification of malnutrition diseases (under and over nutrition)	Health, Physical and Creative Arts
Eighth	Causes, symptoms and preventive measures of malnutrition diseases: Marasmus, kwashiorkor, night blindness, anaemia, rickets, scurvy, and obesity Food security: Introduction and elements Factors to be considered protecting consumer's health	Health, Physical and Creative Arts

(Government of Nepal, 2079 BS)

Secondary school education in Nepal encompasses grades 9 to 12. NE is an optional component for students in these grades, integrated into the HPE curriculum. Table 2 provides an overview of the NE contents of secondary school education as outlined in the NCF-2019.

Table 2

Overview of Secondary School Nutrition Education Contents (Grades 9-12)

Grades	Nutrition education contents	Name of subject under which NE contents are incorporated
9-10	<ul style="list-style-type: none"> • Midday meal • Healthy meal and healthy eating behaviours • Techniques of preparation of balanced diet • Meaning and importance of nutrition • Classification of nutrients (Carbohydrates, Protein, Fats, Minerals, and Vitamins) • Introduction to malnutrition, cause, classification, and diseases caused due to malnutrition 	Health and Physical Education (Incorporated under optional subject, Group-II)
11-12	<ul style="list-style-type: none"> • Meaning and importance of healthy eating • Introduction and functions of food and nutrition • Energy giving and non-giving nutrients • Digestive system and digestion of carbohydrates, protein and fats • Junk foods and its health hazards • Selection of healthy and balanced diet • Preparation of balanced diet utilizing locally available foods • Recommendation of diet for children, adolescents, and adults • Concept and types of malnutrition 	Health and Physical Education (Incorporated under optional subject, Group-IV)

Strengths of the Existing Curriculum

Nepal's, following NCF-2019, school-level NE curriculum demonstrates several strengths across basic and secondary school. The basic school curriculum emphasizes local relevance and practical application, progressively introducing concepts such as healthy eating, food sources, and balanced diets. While retaining content from NCF-2007, NCF-2019 addresses gaps by incorporating topics like locally available foods, nutritious school meals, food adulteration, food (in)security, and consumer rights. For younger students, the content is age-appropriate, focusing on locally available foods, while secondary level

education expands on nutrient classification, digestion, malnutrition, and dietary recommendations. Practical applications, like preparing balanced diets, encourage hands-on learning experiences among basic and secondary-level students. The school level NE curriculum also aligns with MSNP by promoting healthy eating behaviors, addressing malnutrition, and encouraging the use of locally available foods. It includes topics such as balanced diets, nutrient classification, and practical meal preparation skills, supporting healthy habits in school children. The curriculum's age-appropriate approach partially reflects MSNP's focus on

communication strategies and malnutrition prevention (National Planning Commission, 2017a).

Previous studies conducted in different settings highlight that introducing food and nutrition education at the primary school level is promising approach to promoting healthy eating behaviors and to reduce the burden of chronic diseases at future (Annan et al., 2021; Aydin et al., 2022; Moitra et al., 2021; Upreti, 2023). Similarly, in Nepal, nutrition education has been integrated in HPE, Science, and Social studies curricula for years including in the NCF-2019 aims with promoting healthy behaviors among children. A scoping review by Follong et al. (2022) identifies key thematic areas of nutrition education, including nutrients, food groups, meal management, energy balance, nutrition labels, the role of nutrition in preventing lifestyle diseases, sugary drinks, portion sizes, and healthy eating choices. Notably, the existing NCF-2019 aligns significantly with these thematic areas, as demonstrated by the content presented in Tables 1 and 2. Similarly, the existing NE curriculum also aligns with public health goals, addressing malnutrition, junk food consumption, and age-appropriate diets. Its emphasis on local food consumption and balanced diets partially supports SDG 2 (Zero Hunger) and SDG 3 (Good Health and Well-being) (National Planning Commission, 2017b). We argue that by progressively building knowledge from basic to advanced topics, the curriculum establishes a solid foundation for understanding nutrition's role in health and well-being while addressing key public health concerns and promoting sustainable food practices.

Gaps in the Existing Curriculum

The curriculum demonstrates notable strengths but requires significant efforts to

scaffold the transition to complex topics like systemic causes of the triple burden of malnutrition. For instance, discussions on malnutrition and food security in Grade 8 lack alignment with global frameworks such as the SDGs. Earlier grades miss opportunities to address sustainable agricultural practices, environmental impacts of food production, and food waste reduction. While partially aligned with SDG 2 (Zero Hunger), the curriculum overlooks broader connections to SDG 3 (Good Health and Well-being) and SDG 12 (Responsible Consumption). Though existing NE contents are partially aligned with MSNP strategic objectives, gaps remain there. They include limited use of information, education and communication (IEC)/ behavior change communication (BCC) materials for health behavior change, insufficient content focused for adolescent girls, and weak interdisciplinary integration. Broader themes like sustainable food systems, climate change, and ecological challenges are yet to be uncovered. Previous studies highlight that climate change, global warming, and related disasters have exposed gaps in the existing curriculum, particularly in fostering behavioral change and promoting climate action (Dawson et al., 2022; Hurlimann et al., 2021; Teixeira & Crawford, 2022). Addressing these gaps by incorporating adaptive strategies and mitigation measures to tackle ecological challenges is crucial for enriching the school curriculum and equipping students with the knowledge and skills to respond to ecology-related issues (Newsome et al., 2023).

Additionally, the existing curriculum neglects critical global challenges like food (in) security and malnutrition, food waste, equity and access, food adulteration and safety, food marketing influencing behaviors of children and adolescents, including purchasing and consumption, food products high in salt/

sugar/unhealthy fats, body image and dietary behaviors, school-based nutrition program, importance of breastfeeding and sustainable agricultural production, which are vital for working against hunger and food insecurity and their consequences among the people at the global and local context. Previous study also emphasizes the importance of integrating global challenges, such as food access, safety, and consumer behavior, within the framework of the SDGs to foster healthy behaviors among individuals (Afsana et al., 2022).

Ways Forward

To address the gaps in the existing framework, it is imperative to integrate global perspectives, including climate change, sustainable agriculture, and the SDGs, to provide students with a broader understanding of nutrition's role in international challenges. Introducing sustainable food practices early grades is crucial, such as reducing food waste and promoting eco-friendly agriculture. The curriculum should improve the progression of complex topics like malnutrition and food security, supported by age-appropriate cognitive scaffolding. Similarly, to address the gaps identified by MSNP, the curriculum should emphasize the development and use of IEC/BCC materials, integrate targeted content for adolescent girls, and strengthen interdisciplinary approaches to tackle broader nutrition challenges, thereby fostering a holistic strategy to combat malnutrition and promote sustainable healthy behaviors.

Besides, making NE compulsory across all grades would ensure broader access and equity. Enhancing interdisciplinary connections and integrating NE content would be instrumental in fostering healthy dietary behaviors among school children (Follong et al., 2022), ultimately contributing to the development of healthy and capable human

resources for national development. These changes would make the curriculum more relevant and aligned with global initiatives.

Conclusion

The review of NE curriculum highlights its strengths in promoting healthy eating behaviors and foundational nutrition concepts. The curriculum effectively introduces age-appropriate topics, such as food sources, balanced diets, and malnutrition, progressively building students' knowledge. However, it lacks integration of global perspectives, including sustainable food practices, climate change, body image and dietary behaviors, interdisciplinary connections, school-based nutrition program, importance of breastfeeding, sustainable agricultural production, which are vital for working against hunger and food insecurity and their consequences among the people at the global and local context. Complex issues, such as nutrition's broader environmental and health impacts, are also yet to be incorporated.

To address these gaps, the curriculum should incorporate global nutrition issues aligned with the SDGs and link them to national priorities and local contexts. Emphasizing sustainability, food security, and eco-friendly agricultural practices would deepen students' understanding of the broader implications of their dietary choices. Additionally, enhancing cognitive scaffolding and introducing hands-on learning experiences would equip students to address local and global nutrition challenges effectively. Such revisions would create a more comprehensive, globally relevant, and locally connected NE framework.

Authors' Contributions

YRU conceptualized and developed the manuscript. BD edited the manuscript

critically. Both authors have read and approved the final manuscript for publication.

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication and authorship of this paper.

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