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Education for Sustainable Food and Nutrition – Towards Criteria for Chhattisgarh Primary Schools

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ABSTRACT

There is a growing recognition of the interconnected challenges in food systems, nutrition, and sustainability [1]. As communities face climate change impacts and health disparities, holistic food and nutrition education is crucial, particularly in Chhattisgarh's primary schools. This addresses Chhattisgarh's agricultural landscape, food culture, and nutritional challenges [2] while examining global and local issues in food security and public health [3]. The sustainable food and nutrition education program aims to promote healthy eating, reduce environmental impact, and enhance community engagement [4]. Primary schools are targeted because education plays a role in shaping lifelong behaviours. An interdisciplinary approach integrates these concepts across subjects such as science and health [5] while considering Indigenous practices and agricultural traditions. Local context enhances program effectiveness [6], with community participation from parents and farmers creating comprehensive learning experiences. Innovation and technology support learning [7],and collaboration between educational institutions, government bodies, and NGOs ensures program sustainability. This initiative addresses the urgent food and nutrition challenges in Chhattisgarh's primary schools [8]

Literature Review

Incorporating sustainable food and nutrition education into primary school curricula has recently gained attention. This review examines the key aspects of implementation in Chhattisgarh's primary schools.

Curriculum Integration

Integrating sustainable food and nutrition education across subjects such as science, social studies, and health enables a comprehensive understanding (De Haan 2007, 2008). Age-appropriate modules are recommended for all grade levels. Integration with existing subjects reinforces the connection between food systems and society.

Local Context and Cultural Relevance

Local food culture and agricultural practices are crucial components of sustainable food education programs. This enhances curriculum relevance and connects students to their heritage (Galt et al., 2013). Involving local community members provides authentic learning experiences that help students understand the impact of food choices.

Promoting Healthy Eating Habits

Education on balanced diets and nutrition is essential. Focusing on seasonal produce supports local agriculture and reduces environmental impact (Gustavsson et al., 2011). The curriculum should cover meal planning and food labeling to enable informed choices.

Teacher Training and Support

The implementation of this program requires comprehensive teacher training. The literature emphasizes ongoing professional development and collaboration with experts (Hopkins & McKeown, 2002). Training should cover content and teaching methods.

Assessment and Evaluation

Assessment methods include project-based evaluations and practical demonstrations, which enable a holistic understanding of students' knowledge (Giangrande et al., 2019). Formative assessments help teachers to adjust their teaching strategies.

Policy Support and Advocacy

The literature emphasizes the importance of policy support for sustainable food education initiatives in schools. Collaboration with authorities is crucial for integrating these principles into the educational framework (Leicht et al., 2018). Advocacy should demonstrate the benefits of sustainable food education, including student health, environmental awareness, and economic benefits for communities.

Transformative Learning Approaches

A transformative learning approach encourages students to examine their assumptions, leading to lasting behavioral changes (Mezirow, 1997; Leal Filho et al., 2018). This approach creates opportunities for reflection and dialogue, helping students understand the complexities of food systems.

Community engagement through school gardens, cooking classes, and projects reinforces learning and creates real-world connections (Papenfuss et al. 2019). These experiences enhance learning while fostering responsibility for food sources.

Technology Integration

Digital tools and online resources can enhance learning experiences and provide global perspectives on food system sustainability. Longitudinal studies are needed to assess program impacts and to inform curriculum development.

Addressing Food Waste and Sustainability

The curriculum should include modules on food waste reduction and environmental impact, including composting and exploring alternatives to food packaging.

The literature supports a comprehensive and culturally relevant approach to sustainable food education in primary schools. Programs can shape environmentally conscious individuals through curriculum integration, local contexts, and teacher training.

Knowledge Gap

Research on implementing sustainable food education in primary schools in Chhattisgarh is limited.

Rationale

Education for Sustainable Food and Nutrition addresses SDGs 2 (Zero Hunger), 4 (Quality Education), and 12 (Responsible Consumption and Production) in primary schools in Chhattisgarh. This initiative promotes sustainable agriculture, nutritional awareness, and responsible consumption among students. By

integrating these concepts, schools can improve food security while providing quality education on sustainable food systems. Teaching responsible consumption can influence long-term food choices and reduce waste. However, its implementation faces challenges, including limited resources and inadequate teacher training. This study aims to identify criteria tailored to Chhattisgarh's context to enhance the program's effectiveness.

Aim/Objective

To develop criteria guiding sustainable food and nutrition education implementation in primary schools in Chhattisgarh.

Research Question

What are the essential criteria for integrating sustainable food and nutrition education into primary schools in Chhattisgarh?

Hypothesis

Establishing specific criteria for sustainable food and nutrition education will improve students' health awareness and sustainable practices.

Research Design

This study used mixed methods to explore the criteria for sustainable food and nutrition education.

Research Method

Qualitative interviews and quantitative surveys were used to gather data on current practices.

Sample size: 35 teachers, 10 school heads, and 5 curriculum experts.

Study Participants: Participants included primary school teachers, administrators, and curriculum developers from Chhattisgarh.

Inclusion Criteria: Participants had a minimum of two years of primary education experience and were currently employed in Chhattisgarh.

Exclusion Criteria: Those directly involved in education or with less than two years of experience were excluded.

Tools: Interview schedule, observation checklist, document analysis.

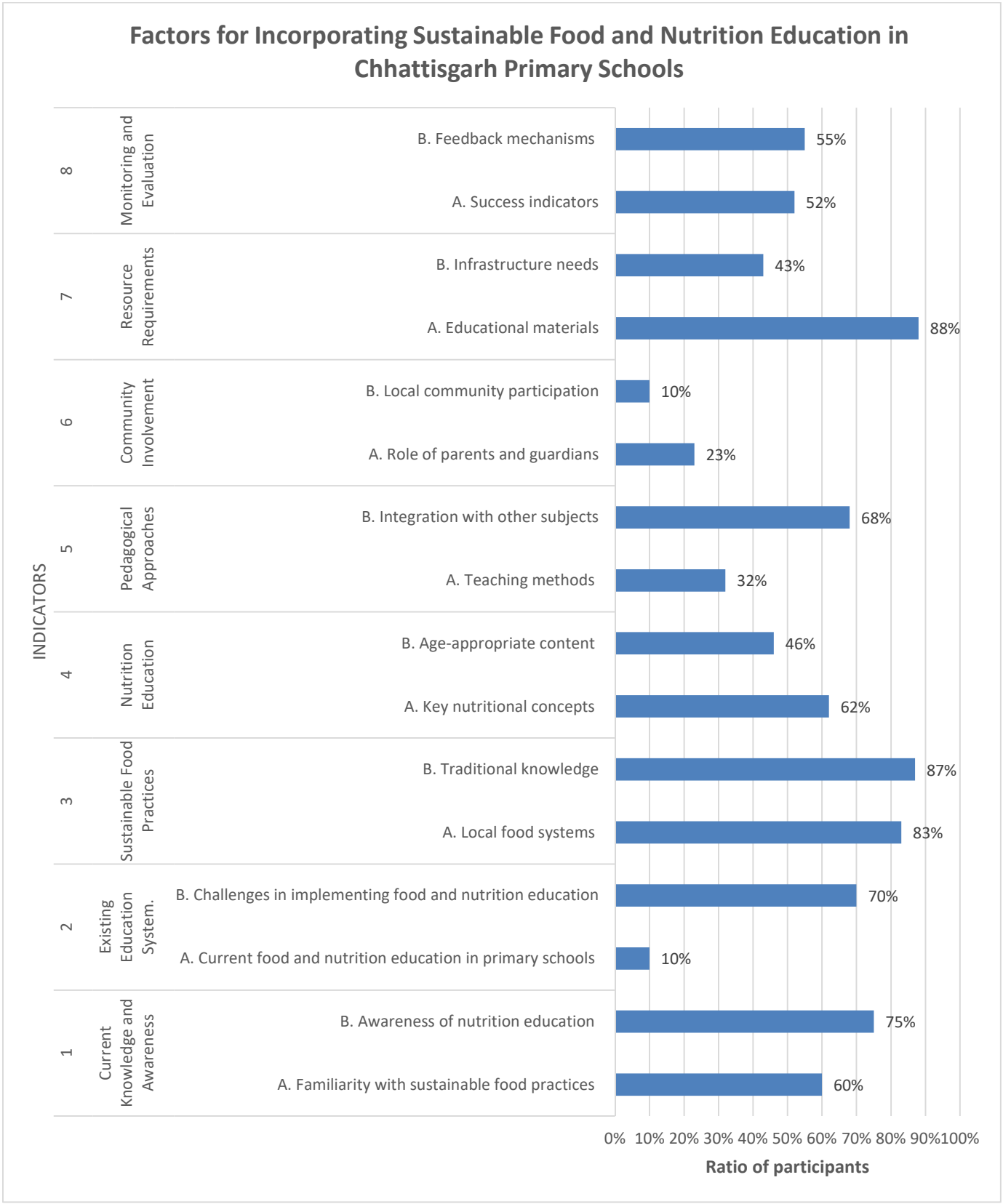
Data Collection

Data collected from participants aged 18-60 years, residing in Chhattisgarh, 0-20+ years, including different genders, working across various districts with diverse educational backgrounds

Table 1: Evaluation of Critical Factors for Incorporating Sustainable Food and Nutrition Education in Chhattisgarh Primary Schools

S. NO.	Topics	Sub-topics	Ratio of participants
1.	Current Knowledge and Awareness	A. Familiarity with sustainable food practices	60%
		B. Awareness of nutrition education	75%
2.	Existing Education System.	A. Current food and nutrition education in primary schools	10%
		B. Challenges in implementing food and nutrition education	70%
3.	Sustainable Food Practices	A. Local food systems	83%
		B. Traditional knowledge	87%
4.	Nutrition Education	A. Key nutritional concepts	62%
		B. Age-appropriate content	46%
5.	Pedagogical Approaches	A. Teaching methods	32%
		B. Integration with other subjects	68%
6.	Community Involvement	A. Role of parents and guardians	23%
		B. Local community participation	10%
7.	Resource Requirements	A. Educational materials	88%
		B. Infrastructure needs	43%
8.	Monitoring and Evaluation	A. Success indicators	52%
		B. Feedback mechanisms	55%

GRAPH 1: Evaluation of Critical Factors for Incorporating Sustainable Food and Nutrition Education in Chhattisgarh Primary Schools



Result

The results from the survey are discussed under the following topics, classified into two subtopics.

1. Current Knowledge and Awareness

A. Familiarity with sustainable food practices: 60% of stakeholders were familiar with sustainable food practices through traditional knowledge and research. Participants believed that nutritional knowledge should be included early in the curriculum.

B. Awareness of nutrition education: 75% of participants received formal nutritional education during their service period.

2. Existing Education System

A. Current food and nutrition education in primary schools: Approximately 10% of the curriculum is related to food and nutrition. Insufficient teacher support undermined the program's effectiveness. School Kitchen Gardens and Mid-Day Meals under the PM-POSHAN Yojana are flagship initiatives at the primary level.

B. Challenges in implementing food and nutrition education: 70% of the respondents faced implementation challenges. Budget constraints, limited curricula, insufficient training, and low community participation are core challenges.

3. Sustainable Food Practices

A. Local food systems: 83% rely on regional seasonal cropping for food availability. Food education integration in textbooks, school kitchen gardens, and cooking competitions for SHGs has been implemented in the MDM program. Teachers report low self-efficacy in facilitating food education due to several factors.

B. Traditional knowledge: 87% of educators encourage students to explore the cultural significance of food, including history and traditions. Indigenous foods from Chhattisgarh, such as yams, moringa, and jackfruit, are nutritious and contain micro and macro elements and vitamins.

4. Nutrition Education

A. Key nutritional concepts: 62% of faculty believed quality, quantity, timing, nutritional value, acceptance, and sustainability are essential nutritional concepts for primary education. Children learn

food safety topics, including hand washing, vegetable cleaning, food types, packaging, contamination, spoilage, poisoning, allergies, and their effects on health.

B. Age-appropriate content: 46% of educators affirmed nutrition education should start early through play-way methods, though limited to textbooks. Despite being mandatory, teachers lack adequate training.

5. Pedagogical Approaches

A. Teaching methods: 32% of faculty used lectures for nutritional instruction. Few use hands-on activities, projects, or digital tools with limited access.

B. Integration with other subjects: 68% believe that nutrition knowledge could be integrated with maths, science, and language. Preserving the nutritional value of indigenous cooking is crucial. Children easily grasp locally grown foods.

6. Community Involvement

A. Role of parents and guardians: Parental involvement is 23%. Schools organize events like Nyota Bhojan, Tithi Bhojan, and Anand Mela with parents and SHGs. Most parents work in farming, domestic work, or migrate, which limits the transfer of traditional food knowledge.

B. Local community participation: Only 10% of the community participated. In addition to SHGs in the MDM program, no collaboration exists with local organizations or experts for workshops and demonstrations.

7. Resource Requirements

A. Educational materials: Although 88% of the respondents reported that educational materials such as textbooks and digital resources are available in the local language, they are outdated. S.C.E.R.T. curriculum developers must streamline the content for accuracy. The sustainability of school feeding programs depends on the Centre (60%) and State (40%) transitions. Material distribution follows a hierarchical management approach and faces operational challenges owing to the multilevel transactions.

B. Infrastructure needs: 43% of primary schools running food programs need infrastructure maintenance. They arranged alternatives for MDM preparation, including cooking areas, storage, and water supply. School readiness faces resource resistance and communal apathy. Water harvesting,

vermicomposting pits, and kitchens require annual maintenance by the school body or in collaboration with NGOs.

8. Monitoring and Evaluation

A. Success indicators: Success is measured by the intergenerational transmission of traditional food knowledge. A total of 52% of respondents agreed that traditional food systems provide insights into sustainability and food security, emphasizing seasonal eating, local sources, minimal waste, and ecosystem-friendly agriculture.

B. Feedback mechanisms: Feedback creates inclusivity between program implementation and beneficiaries, ensuring objective outcomes. External evaluators, peers, and community participation in feedback were only 55%.

The essential criteria for integrating sustainable food and nutrition education in primary schools in Chhattisgarh are as follows:

1. Curriculum Integration: Integrate sustainable food and nutrition education into science, social studies, and health subjects, with age-appropriate modules aligned with the state curriculum [9].

1a. Science Integration: Explore the ecological impact of agricultural practices and nutritional content, emphasizing balanced diets [10].

1b. Social Studies Integration: Study local food culture, historical factors shaping food choices, and global food systems.

1c. Health Education Integration: Include healthy eating principles and food groups' roles, connecting nutrition to wellbeing [11].

2. Age-Appropriate Modules:

2a. Grades 1-3: Basic concepts of food sources and food groups.

2b. Grades 4-6: Sustainable farming and environmental impact.

2c. Grades 7-8: Global food systems and health implications [12].

3. Practical Applications: School gardens can be used for hands-on food growing experiences and cooking classes [13].

4. Cross-Disciplinary Projects: Design projects involving sustainable food systems and environmental impact assessments.

5. Assessment: Students' understanding is measured through quizzes and projects [14,15].

6. Local Context: Incorporating Chhattisgarh's food culture and nutrition needs:

6a. Local Food Culture: Explore traditional recipes and invite local chefs to share their knowledge [16].

6b. Agricultural practices: Visiting local farms and discussing sustainable farming techniques [17].

6c. Nutrition Needs: Address regional nutritional challenges and diet-related health issues [18].

7. Traditional and Indigenous Food Knowledge: Integrate traditional foods into the curriculum, emphasizing nutrition and culture. Use storytelling and elder knowledge for traditional food preparation methods [19].

7a. Culinary Arts: Design cooking classes for traditional Chhattisgarh dishes, connecting nutrition lessons with local ingredients [20].

7b. Celebrating Local Festivals: Connect lessons with festivals and traditional foods.

7c. Interactive activities: Organizing community workshops on traditional food practices and farming to promote cultural heritage [21].

8. Promote Healthy Eating: Teach a balanced diet and the benefits of local food. Encouraging seasonal and local produce consumption for sustainable food education [21].

8a. Nutritional Education: Explain the concept of a balanced diet and the role of food groups in health [22].

8b. Local Food Awareness: Introduce Chhattisgarh's local foods and their nutritional benefits. Farm-to-table concepts should be taught [23].

8c. Seasonal eating: Highlighting the benefits of seasonal eating and creating food availability calendars [24].

8d. Local market visits: Organizing market field trips for vendor interaction and local food learning [25].

8e. Awareness Campaigns: Have Students create and display campaigns promoting healthy local eating habits [26].

9. Assessment and Evaluation: Develop assessment tools to measure students' understanding of sustainable food and nutrition concepts.

9a. Written Assessments: Quizzes covering key concepts of sustainable food and nutrition, including local food systems and healthy eating principles, should be created.

9b. Project-Based Assessments: Assign research projects on sustainable food practices and community engagement projects with local farmers [27].

9c. Presentations: Students present research findings to assess their understanding depth [28].

9d. Practical Demonstrations: Assess students through cooking classes and school gardening activities [29].

9e. Portfolio Assessment: Students create portfolios showcasing their work and reflections.

9f. Peer Review: Implement peer reviews for projects. Group projects are evaluated based on contribution and quality [30].

9g. Real-World Application: Students write reflections on their field trips. Evaluate the impacts of community projects [31].

9h Continuous Assessment: Monitor participation and use formative assessments to identify areas needing reinforcement [32].

10. Teacher Training: Provide training for sustainable food and nutrition education delivery [33].

10a. Workshops: Conduct workshops with expert insights into teaching strategies.

10b. Resource Materials: Provide curriculum guides and resources tailored to the context of Chhattisgarh.

10c. Interactive Training: Facilitate hands-on activities and field visits to local farms [34].

10d. Expert Collaboration: Partner with sustainable agriculture experts for specialized training.

10e. Regular Updates: Schedule workshops to cover developments in sustainable agriculture.

10f. Online learning: Providing access to online courses covering sustainable practices.

10g. Peer Communities: Establish teacher networks to share experiences [35].

10h. In-Service Training: Conduct hands-on activities and planning sessions.

10i. School Integration: Implement mentoring programs where experienced teachers guide new staff [36].

11. Policy Support: Advocate for policies supporting sustainable food and nutrition education in primary schools through collaboration with educational authorities.

11a. Research: Documenting the impact of sustainable food education on learning outcomes and community well-being [37].

11b. Stakeholder Engagement: Engaging teachers and administrators by highlighting the benefits. Mobilizing parents to influence policymakers [38].

11c. NGO Collaboration: Partner with NGOs focused on sustainable agriculture and education for policy integration [39].

11d. Policy Recommendations: Create policy briefs outlining the benefits and recommendations based on research evidence.

11e. Educational Authority Engagement: Present the benefits of sustainable food education to policymakers and organize workshops.

11f. Policy Forums: Attend education and sustainability conferences to network with policymakers [40].

11g. Public Awareness: Media channels should be used to raise awareness and build community support.

11h Pilot Programs: Implement programs that demonstrate the success of initiatives through student presentations.

11i. Policy Evaluation: Monitoring implementation and providing feedback. Assess the effectiveness of learning and engagement.

11j. Coalition Building: Build coalitions with organizations that advocate for sustainable food education. Work to influence policies in Chhattisgarh's primary schools through stakeholder engagement. [41].

Conclusion

The integration of sustainable food and nutrition education in primary schools in Chhattisgarh shapes environmentally conscious and health-aware individuals. Through curriculum integration, local context, and healthy eating promotion, students understand their region's food culture and nutritional needs. Various evaluation methods promote critical thinking beyond memorization. Collaboration with educational authorities can embed these principles into education, thereby enabling informed and sustainable choices. This approach aims to cultivate a generation that values sustainable living and contributes to a healthier future in Chhattisgarh.

Future Scope

Future research should assess how educational strategies impact students' knowledge of sustainable food and nutrition.

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