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Consumption of Soya Bean Milk as an Alternative to Dairy Milk in Boarding Secondary Schools in Bauchi Metropolis

Mary Iliya Azi, Ladi Ado
Department of Home Economics Education
Adamu Tafawa Balewa College of Education, Kangere, Bauchi State

ABSTRACT

This study investigated the consumption, acceptability, and nutritional potential of soya bean milk as an alternative to dairy milk among boarding secondary school students in Bauchi Metropolis. A descriptive survey design was adopted, involving 345 students selected from four boarding secondary schools. Data were collected using structured questionnaires and observation checklists and analysed through descriptive statistics. The findings showed that dairy milk remained the preferred option, with 34.8% consuming it daily compared to only 17.4% for soya bean milk. Awareness of soya bean milk was moderate, as 60.9% of students indicated familiarity while 39.1% were unaware of its nutritional benefits. Consumption was affected by irregular supply (reported by 59.5% of respondents) and sensory factors such as taste, aroma, and appearance. Although existing evidence indicates that fortified soya bean milk can provide comparable nutritional benefits, including adequate protein and higher iron content, preferences were shaped by limited exposure and inconsistent sensory appeal. Economic perceptions also played a role, as some students viewed soya bean milk as less accessible or less desirable than dairy milk. The study concludes that while soya bean milk has strong nutritional potential as a cost-effective and locally available alternative to dairy milk, its acceptance and consumption among boarding students remain constrained by limited awareness, irregular availability, and sensory concerns. The study recommends ensuring regular supply of soya bean milk in school feeding programs, integrating it into daily menus to increase familiarity, improving its sensory qualities through fortification or flavour enhancement, and implementing nutrition education programs to enhance awareness and informed acceptance among students.

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INTRODUCTION

Adolescence is a critical period of growth and development during which adequate intakes of high-quality protein, calcium and micronutrients (notably vitamin D, vitamin B12 and iodine) are essential for bone accretion, cognitive development and overall health. In institutional settings such as boarding secondary schools, milk and other dairy products are commonly relied upon to contribute these nutrients because they are convenient, culturally familiar and nutrient-dense (Walther et al., 2022). Globally, plant-based milk alternatives have grown in popularity for reasons that include lactose intolerance, cost, environmental concerns and changing dietary preferences; among plant beverages, soya-bean (soy) milk is the closest nutritional match to bovine milk because of its relatively high protein content and favourable amino-acid profile. However, numerous audits and reviews show that nutrient content among plant-based milks varies widely and that fortification is often required for calcium,

Corresponding author: Mary Iliya Azi
azimaryiliya@gmail.com
Department of Home Economics Education, Adamu Tafawa Balewa College of Education, Kangere, Bauchi State.

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vitamin D, vitamin B12 and iodine to match dairy's micronutrient profile (Olías et al., 2023; Walther et al., 2022).

In low- and middle-income countries, including Nigeria, school feeding programmes are being strengthened to support nutrition, attendance and local agriculture. Nigeria's Home-Grown School Feeding approach and related policy efforts create institutional demand for locally-sourced foods and offer a practical pathway for integrating locally produced alternatives when they meet nutritional and safety standards (Adeyanju, 2024; Global Child Nutrition Foundation / Nigeria, 2021). At the same time, Nigeria's soybean sector has expanded in recent years and projections indicate further growth in national soybean output — a supply-side development that raises the feasibility of producing locally-sourced soya milk for institutional use (AFEX wet-season report 2024; Tridge market forecasts 2024). Such domestic production could reduce costs and strengthen supply chains for boarding school feeding, provided products are processed too standard and appropriately fortified.

Despite this potential, important knowledge gaps remain for boarding secondary schools in Bauchi Metropolis. Key concerns are (1) whether the locally available soya-bean milk products (or on-site reconstituted soya milk) provide nutrient levels comparable to dairy milk—especially for calcium, vitamin D, vitamin B12 and iodine; (2) how acceptable soya milk is to adolescent students in a boarding environment; and (3) whether supply, cost and food-safety arrangements make routine substitution feasible. Recent analyses underline that fortified soy-based beverages most closely mimic dairy milk, but that fortification practices and product variability are inconsistent across markets making context-specific assessment essential before policy or procurement changes are made for school feeding programmes.

This study therefore assesses consumption patterns, sensory acceptability and the nutritional comparability (with emphasis on fortification status) of soya-bean milk as an alternative to dairy milk in boarding secondary schools in Bauchi Metropolis — generating the local evidence needed to inform school feeding procurement, fortification standards and implementation strategies.

STATEMENT OF THE PROBLEM

Milk is widely recognized as an essential component of adolescent nutrition because it provides protein, calcium, and other micronutrients that promote growth, bone development, and mental alertness (Walther et al., 2022). In most boarding secondary schools across Nigeria, dairy milk either fresh or powdered is the main form of milk provided in meals. However, the high cost, irregular supply, and poor storage conditions of dairy milk have created significant challenges for schools and feeding programs (Adeyanju, 2024). As a result, institutions often experience shortages or rely on low-quality substitutes that may not meet the nutritional requirements of students. At the same time, soya bean milk has emerged globally and locally as a plant-based alternative with comparable protein quality and numerous health benefits when fortified appropriately (Olías et al., 2023).

Nigeria is one of Africa's leading producers of soya-beans, and the crop is abundant in Bauchi and other northern states (AFEX, 2024). This presents an economic and nutritional opportunity for local production and consumption of soya bean milk as a sustainable substitute for dairy milk in schools (Global Child Nutrition Foundation, 2021). However, despite this potential, the level of consumption, acceptability, and nutritional adequacy of soya bean milk among students in boarding schools remain largely underexplored in Bauchi Metropolis. Existing literature emphasizes that while fortified soy milk can be nutritionally comparable to dairy, many local products are unfortified and lack adequate levels of calcium, vitamin D, and vitamin B_{12} (Johnson, 2025).

Furthermore, students' perception, taste preference, and awareness of its health benefits have not been sufficiently studied in the Nigerian context. Without empirical data, policymakers and school administrators may be reluctant to adopt soya bean milk as part of institutional feeding

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azimaryiliya@gmail.com
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programs. Therefore, this study seeks to assess the consumption patterns, acceptability, and potential of soya bean milk as an alternative to dairy milk in boarding secondary schools in Bauchi Metropolis, with the aim of informing evidence-based nutritional and policy decisions.

Objectives of the Study

The general objective of this study is to assess the consumption of soya bean milk as an alternative to dairy milk in boarding secondary schools in Bauchi Metropolis with a view to determining its acceptability, nutritional adequacy, and potential for integration into institutional feeding programs. Specifically, the objectives of the study are to:

1. Determine the level of consumption of soya bean milk among students in boarding secondary schools in Bauchi Metropolis.
2. Examine students' awareness and perception of the nutritional and health benefits of soya bean milk as compared to dairy milk.
3. Assess the factors influencing the preference of students for either soya bean milk or dairy milk.

Research Questions

This study will be guided by the following research questions:

1. What is the level of consumption of soya bean milk among students in boarding secondary schools in Bauchi Metropolis?
2. What is the level of students' awareness and perception of the nutritional and health benefits of soya bean milk compared to dairy milk?
3. What factors influence students' preference for either soya bean milk or dairy milk in boarding schools?

METHODOLOGY

This study employed a descriptive survey research design to assess the consumption of soya bean milk as an alternative to dairy milk in boarding secondary schools in Bauchi Metropolis. The research targeted all four boarding secondary schools in the metropolis: Government Girls' (Unity) College Bauchi, Hassan Usman Katsina Unity College Bauchi, Federal Government Girls' College Bauchi, and Giwo Science Academy Bauchi, encompassing students in SS1 to SS3. A purposive sampling technique was used to select 345 students who were available and willing to participate, ensuring representation across gender and class levels. Data were collected using structured questionnaires and observation checklists.

The questionnaires covered demographic information, consumption patterns, awareness, sensory acceptability, and factors influencing consumption, while observations documented actual consumption and wastage during school feeding sessions. Data collected were analyzed using descriptive statistics, including frequencies, percentages, and mean scores, to provide a comprehensive understanding of students' milk consumption patterns, sensory preferences, and factors affecting the adoption of soya bean milk as a dietary alternative in boarding schools.

RESULTS

Research Question One:

What is the level of consumption of soya bean milk among students in boarding secondary schools in Bauchi Metropolis?

Table 1: Consumption Patterns of Soya Bean Milk and Dairy Milk

Milk Type	Daily	3 – 4 Times/week	Once in a week	Rarely/Never	Total
Dairy milk	120(34.8%)	95(27.5%)	70(20.3%)	60(17.4%)	345(100%)
Soya bean milk	60(17.4%)	85(24.6%)	100(29%)	100(29%)	345(100%)

Source: Field work 2025

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In the table 1 above, the result shows that a larger proportion of students consume dairy milk daily (34.8%) compared to soya bean milk (17.4%). The result on other hand indicated that soya bean milk consumption is more irregular, with 29% of students reporting they consume it only once a week and 29% rarely or never consuming it. These patterns indicate that dairy milk remains the preferred or more accessible option in boarding schools, while soya bean milk is less frequently consumed, possibly due to availability, taste preference, or lack of awareness.

Research Question Two:
What is the level of students' awareness and perception of the nutritional and health benefits of soya bean milk compared to dairy milk?

Table 2: Awareness of Soya Bean Milk

Awareness Level	Frequency	Percentage
Aware	210	60.9%
Not aware	135	39.1%
Total	345	100%

Source: Field work 2025

The table 2 revealed that majority of students (60.9%) reported being aware of soya bean milk, indicating moderate exposure to plant-based milk alternatives. The remaining 39.1% were not aware, suggesting a need for educational interventions to increase knowledge about nutritional benefits and availability.

Research Question Three:
What factors influence students' preference for either soya bean milk or dairy milk in boarding schools?

Table 3: Availability of Soya Bean Milk

Availability Level	Frequency	Percentage
Always available	55	15.9%
Often available	85	24.6%
Occasionally available	120	34.8%
Rarely available	85	24.6%
Total	**345**	**100%**

Source: Field work 2025

The data displayed in table 3 above shows that soya bean milk is not consistently available, with only 40.5% (15.9 + 24.6) of students reporting it is always or often served. Irregular availability may discourage habitual consumption and contribute to lower acceptance compared to dairy milk.

DISCUSSION OF FINDINGS

The study found that dairy milk was more frequently consumed than soya bean milk among boarding school students. Daily consumption of dairy milk was reported by approximately 35% of students, compared to 17% for soya bean milk. This finding aligns with studies by Olías et al. (2023) and Walther et al. (2022), who reported that plant-based milk alternatives often face lower adoption rates in adolescent populations due to unfamiliarity, sensory challenges, and irregular availability. The finding underscores the importance of consistent availability and integration into school feeding programs to improve consumption of soya bean milk.

The study also revealed that approximately 61% of students were aware of soya bean milk, while 39% had little or no awareness. Students generally perceived soya bean milk as nutritionally beneficial, particularly as a protein source, although confidence in its safety was moderate. These findings are consistent with Johnson (2025) and Otolowo et al. (2022), who noted that knowledge and perception of plant-

Corresponding author: Mary Iliya Azi
azimaryiliya@gmail.com
Department of Home Economics Education, Adamu Tafawa Balewa College of Education, Kangere, Bauchi State.

based milks significantly influence consumption behavior. Awareness campaigns and nutritional education in schools can enhance students' understanding and improve adoption rates.

Furthermore, the study revealed that the consumption of soya bean milk among students was influenced by several key factors. Availability played a major role, as the product was irregularly supplied, making it difficult for students to consume it consistently. Sensory appeal including taste, aroma, and appearance also strongly affected their preference, with students showing greater acceptance when these attributes were favorable. Awareness emerged as another important factor, as students with higher nutritional knowledge were more likely to consume soya bean milk regularly. Additionally, economic considerations influenced consumption patterns, with students' perception of cost affecting their willingness to adopt soya bean milk as a habitual dietary option. These findings are in agreement with Johnson (2025) and Walther et al. (2022), who highlighted that availability, sensory attributes, knowledge, and cost are critical determinants of plant-based milk adoption in adolescents.

CONCLUSION

Dairy milk remains the dominant choice among boarding secondary school students, with higher daily consumption and minimal wastage compared to soya bean milk, largely due to its more appealing taste, aroma, and appearance. Although many students are aware of soya bean milk and its nutritional benefits, a notable proportion approximately 39% lack awareness, which contributes to lower adoption rates and underscores the need for targeted nutrition education in schools. Despite its nutritional advantages, the consumption of soya bean milk is limited by irregular availability, perceptions of cost, and sensory challenges related to taste, aroma, and appearance, with students more inclined to consume it when it is accessible, palatable, and affordable.

RECOMMENDATIONS

Based on the findings of the study, the following recommendations are proposed to enhance the adoption and consumption of soya bean milk among boarding students: Schools should ensure a regular and reliable supply of soya bean milk within their feeding programs to promote consistent consumption among students, and integrate it into daily menus particularly during breakfast or snack times alongside cereals, porridges, or teas to increase familiarity and acceptance. To further enhance its appeal, schools can work with nutritionists or local producers to improve the sensory qualities of soya bean milk, including taste, aroma, and appearance, through fortification or acceptable flavoring options. Additionally, nutrition education programs should be organized to raise awareness about the health benefits of soya bean milk, emphasizing its value as a protein-rich and iron-rich alternative to dairy milk.

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Corresponding author: Mary Iliya Azi
azimaryiliya@gmail.com
Department of Home Economics Education, Adamu Tafawa Balewa College of Education, Kangere, Bauchi State.

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azimaryiliya@gmail.com
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