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Comparing nutritional benefits of fruits and traditional crops implications for food security

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Abstract
Food security is increasingly understood as a multidimensional challenge that goes beyond ensuring caloric sufficiency to encompass dietary quality and nutritional adequacy. Traditional staple crops such as rice, wheat, maize, and millet remain central to global diets, providing energy and resilience against hunger; however, their limited micronutrient density often contributes to persistent malnutrition and hidden hunger. Fruits, on the other hand, are nutrient-dense foods rich in vitamins, minerals, dietary fiber, and phytochemicals that play a crucial role in preventing deficiencies and reducing the risk of chronic diseases. This paper compares the nutritional benefits of fruits and traditional crops, examining their respective contributions to food security, health outcomes, and sustainable diets. By integrating findings from nutritional analyses, agricultural perspectives, and policy considerations, the study highlights the importance of balancing energy sufficiency with nutrient diversity. The results underscore the need for agricultural diversification and policy interventions that promote fruit accessibility and affordability.

Keywords: Food security, nutrition, traditional crops, fruits, dietary diversity

Introductions
Food security remains one of the most pressing global challenges of the twenty-first century, with millions of people worldwide suffering not only from hunger but also from malnutrition caused by poor diet quality. While traditional staple crops such as rice, wheat, maize, and millet have historically served as the backbone of global food systems by providing caloric sufficiency and energy needs, they often fall short in meeting the requirements for essential micronutrients and bioactive compounds necessary for optimal health. This overdependence on staples has contributed to widespread "hidden hunger," where populations consume adequate calories but lack sufficient vitamins, minerals, and antioxidants, leading to long-term health risks such as stunting, weakened immunity, and non-communicable diseases. In contrast, fruits are widely recognized for their dense nutritional profile, offering a rich supply of essential micronutrients including vitamin C, vitamin A precursors, potassium, dietary fiber, and phytochemicals that promote disease prevention and overall well-being. Despite their proven health benefits, fruits remain underrepresented in many food security strategies due to issues such as cost, seasonality, limited shelf-life, and inadequate integration into agricultural policies, particularly in low-and middle-income countries. This imbalance highlights the urgent need to re-evaluate the role of fruits within food systems not merely as supplementary foods but as vital components of sustainable and balanced diets. The present study seeks to compare the nutritional contributions of fruits and traditional crops, with a particular focus on how such comparisons can inform strategies for enhancing dietary diversity and strengthening global food security. By analyzing macronutrient and micronutrient compositions, availability, and accessibility, this research aims to highlight the synergies between staple crops that ensure energy sufficiency and fruits that ensure nutrient adequacy. Furthermore, it underscores the potential policy implications of diversifying agricultural priorities toward fruit production, distribution, and affordability, while acknowledging challenges such as post-harvest losses and economic feasibility. Ultimately, this exploration contributes to ongoing debates in nutrition and development studies, emphasizing that achieving true food security requires not only feeding populations with sufficient calories but also nourishing them with the diversity of nutrients necessary for long-term health and resilience.

Background to the Study

Food security remains a critical global concern, defined not only by the availability of sufficient food but also by access to diverse and nutritious diets that sustain health and well-being. Traditional staple crops such as rice, wheat, maize, and millet have historically formed the foundation of global food systems, ensuring caloric sufficiency and protecting against large-scale hunger. However, their dominance has also led to diets heavily skewed toward energy provision while lacking in essential micronutrients, resulting in widespread hidden hunger and diet-related health challenges. Fruits, in contrast, are increasingly recognized for their nutrient density, offering vital vitamins, minerals, fiber, and phytochemicals that help prevent malnutrition and non-communicable diseases. Yet, fruits remain less prioritized within food security policies due to issues of affordability, seasonality, and post-harvest losses. Against this backdrop, comparing the nutritional benefits of fruits and traditional crops provides crucial insights into creating more sustainable, balanced, and nutrition-sensitive food systems.

Significance of the Study

This study is significant as it addresses the critical intersection of nutrition and food security by comparing the contributions of fruits and traditional crops to dietary adequacy. While staple crops ensure caloric sufficiency, they often lack essential micronutrients, leading to hidden hunger and long-term health risks. Fruits, on the other hand, are nutrient-rich and play a vital role in improving overall diet quality, yet they remain underutilized in food security strategies due to challenges of affordability, accessibility, and preservation. By highlighting the comparative advantages and limitations of both food groups, the research provides evidence for designing more inclusive and nutrition-sensitive agricultural and policy frameworks. Its findings can inform policymakers, nutritionists, and development practitioners seeking to promote dietary diversity, reduce micronutrient deficiencies, and achieve sustainable food systems. Ultimately, this study contributes to advancing global health outcomes and aligns with broader development goals of eradicating hunger and malnutrition.

Fruit Crops and Their Role in Enhancing Food Security

Fruit crops play a vital role in enhancing food security by contributing not only to caloric intake but, more importantly, to nutritional adequacy and dietary diversity. Unlike staple crops such as rice, wheat, or maize, which primarily provide energy, fruits are rich sources of essential vitamins, minerals, dietary fiber, and phytochemicals that are crucial for maintaining good health and preventing micronutrient deficiencies. Vitamin C, provitamin A carotenoids, potassium, and antioxidants found in fruits strengthen immune systems, reduce the risk of chronic diseases, and improve child growth and development. This nutrient density makes fruits indispensable in combating "hidden hunger," where populations consume sufficient calories but lack critical micronutrients. Beyond nutrition, fruit crops contribute economically by providing income opportunities for smallholder farmers, particularly in rural and peri-urban areas, through both local markets and export potential. They also support agricultural diversification, reducing reliance on monocropping and enhancing resilience against climate change. However, challenges such as high perishability, seasonality, inadequate storage, and higher prices limit their accessibility, particularly for low-income populations. Addressing these barriers through improved post-harvest technologies, better supply chains, and supportive policies can increase the availability and affordability of fruits. Thus, integrating fruit crops into national food security strategies is essential for building sustainable, nutrition-sensitive food systems that ensure not just caloric sufficiency but also long-term health and resilience.

Dominance of Traditional Crops in Achieving Caloric Sufficiency

Traditional staple crops such as rice, wheat, maize, and millet have historically formed the backbone of global food systems, playing a critical role in combating hunger by ensuring caloric sufficiency for large populations. These crops are energy-dense, widely cultivated across diverse agro-climatic regions, and relatively affordable, making them indispensable for food security, particularly in developing countries. Rice, for instance, provides more than one-fifth of the world's total calorie intake, while wheat and maize together contribute significantly to the daily energy requirements of billions. Millet and other traditional grains have also been vital in semi-arid regions due to their resilience to harsh climatic conditions and their ability to grow with minimal inputs. The predominance of these crops has been reinforced by agricultural policies, subsidies, and research priorities that have emphasized yield maximization and large-scale production since the Green Revolution, thereby ensuring stable supplies of staple foods capable of sustaining populations against famine and acute hunger. However, this dominance, while effective in addressing energy needs, has inadvertently created diets that are heavily reliant on carbohydrates but often lacking in essential micronutrients such as vitamins, iron, zinc, and calcium. As a result, populations dependent almost exclusively on these staples may experience "hidden hunger," a form of malnutrition characterized by micronutrient deficiencies despite adequate caloric intake. Moreover, overemphasis on these crops has reduced dietary diversity and limited the integration of nutrient-rich alternatives like fruits, vegetables, and pulses. Nevertheless, the role of staples in securing basic caloric needs cannot be underestimated, as they remain fundamental to survival and economic stability in many regions. Their affordability, storability, and cultural significance continue to make them central to food policies and household diets worldwide. Thus, while the dominance of traditional crops has been crucial in alleviating hunger and providing energy sufficiency, the challenge moving forward lies in complementing these staples with nutrient-dense foods to achieve a balance between caloric adequacy and nutritional quality, thereby ensuring more holistic food security outcomes.

Literature Review

Van der Merwe *et al*. (2016) [1] emphasize the critical role of indigenous and traditional food crops in addressing food insecurity, particularly in developing regions. The authors argue that despite their nutritional richness and resilience to harsh environmental conditions, many of these crops remain underutilized due to modernization, changing diets, and policy neglect. They highlight that traditional crops, such as

sorghum, millet, and African leafy vegetables, are often more adaptable to local climates, require fewer inputs, and preserve cultural food practices. Their study outlines how promoting the cultivation and consumption of these crops can diversify diets, reduce dependency on major staples like maize and rice, and strengthen resilience against climate variability. Additionally, they argue that integrating indigenous crops into agricultural and nutritional policies could enhance both food availability and utilization, thereby contributing significantly to household and national food security. This work underscores the importance of revaluing traditional food systems as sustainable alternatives for nutrition security.

Yu *et al*. (2018) [2] examine the advantages of organic agricultural production over conventional systems with respect to nutrition and food security. Their research suggests that organic products often have higher nutrient concentrations, particularly in terms of vitamins, minerals, and antioxidant compounds, when compared to conventionally grown crops. Additionally, the absence of chemical pesticides and synthetic fertilizers enhances the safety and sustainability of organic food systems. The authors argue that organic farming practices support ecological health by maintaining soil fertility, reducing environmental degradation, and encouraging biodiversity, all of which are critical for long-term food security. However, they acknowledge challenges such as lower yields, higher costs, and accessibility issues that can limit the widespread adoption of organic products, particularly in low-income communities. Nonetheless, they conclude that organic production has strong potential to provide more nutritious foods while contributing to sustainable agriculture, especially when integrated into broader food security strategies.

Bourn and Prescott (2002) [3] provide an early and influential comparison of organically versus conventionally produced foods, with a focus on nutritional value, sensory qualities, and food safety. Their review found mixed evidence regarding significant nutritional differences, noting that while some organic foods may contain higher levels of certain nutrients and antioxidants, results often vary depending on crop type, soil management, and post-harvest handling. However, they emphasize that organic foods consistently present lower pesticide residues, making them safer from a food safety perspective. Sensory qualities, such as taste, aroma, and texture, are often perceived to be superior in organic foods, which influences consumer preferences and willingness to pay. The authors highlight that while organic production offers benefits in terms of health perception and reduced exposure to harmful chemicals, the scientific evidence on nutritional superiority remains inconclusive. They stress the need for further rigorous studies to establish clearer links between production method, nutritional value, and food security outcomes.

Legwaila *et al*. (2011) [4] explore the potential of traditional food plants in enhancing rural household food security in Botswana. Their study identifies a wide variety of indigenous plants, including wild fruits, leafy vegetables, and legumes, that are nutritionally valuable and culturally significant but often marginalized in modern agricultural and dietary practices. They highlight that these plants are particularly crucial during times of drought and food shortages, as they are naturally adapted to local environments and require fewer external inputs. In addition to their nutritional benefits, traditional food plants also contribute to household income through local markets, thereby strengthening both food and economic security. The authors argue that neglect of indigenous crops in agricultural policies has limited their contribution to national food systems. They recommend systematic efforts to promote their cultivation, improve awareness of their nutritional value, and integrate them into food security programs to support rural livelihoods and diet diversification.

Ebert (2014) [5] investigates the potential of underutilized traditional vegetables and legume crops to contribute to food and nutrition security, sustainable agriculture, and income generation. He notes that these crops, although nutritionally superior in many cases, remain overlooked due to the global emphasis on staple crops and commercialized agricultural systems. Ebert argues that integrating traditional vegetables and legumes into farming systems can provide multiple benefits, including improved micronutrient intake, crop diversification, and soil fertility through nitrogen fixation. He emphasizes that such crops are often more resilient to pests, diseases, and environmental stresses, making them well-suited to climate-smart agriculture. Beyond nutrition, these crops can provide economic opportunities for smallholder farmers through niche markets and value addition. Ebert advocates for greater investment in research, seed systems, and policy support to mainstream these crops in agricultural planning. His work underscores the potential of underutilized species to promote sustainable food systems and improve community health.

Ngigi *et al*. (2023) [6] present a case study of Kenya and Ethiopia to highlight the importance of mainstreaming traditional fruits, vegetables, and pulses for nutrition, income generation, and sustainability. They argue that despite their availability and cultural relevance, these foods remain undervalued in national food security strategies, leading to diets dominated by staples with poor nutritional outcomes. Their findings show that traditional fruits and pulses are rich in micronutrients and contribute to improved dietary diversity, which is essential for reducing hidden hunger. Additionally, these crops offer income opportunities for smallholder farmers, particularly women, by creating local market value chains. The study emphasizes sustainability, noting that indigenous crops are often better adapted to local agro-ecological conditions and require fewer external inputs. The authors recommend integrating traditional foods into agricultural policies, market systems, and nutrition education programs, positioning them as central to building resilient, nutrient-sensitive, and economically inclusive food systems.

Kasimba *et al*. (2018) [7] examine the link between household access to traditional and indigenous foods and food security in Botswana. Their study demonstrates a positive association between the availability of indigenous foods and improved dietary diversity, which directly influences household nutrition outcomes. They argue that traditional foods not only provide essential micronutrients but also maintain cultural food practices, thereby strengthening food sovereignty. The study highlights that households with regular access to traditional foods reported lower levels of food insecurity, suggesting that such foods play a vital role in bridging nutritional gaps left by reliance on staple crops. Furthermore, the authors stress the

importance of promoting indigenous foods as part of national strategies to combat malnutrition, particularly among vulnerable rural populations. By integrating these foods into food security frameworks, the study concludes that communities can achieve more sustainable, culturally appropriate, and nutritionally adequate diets that improve overall resilience.

Ndhlovu *et al*. (2025) [8] provide a comprehensive review of the contributions of underutilized fruits and vegetables to enhanced food and nutrition security. They argue that these crops are often overlooked in mainstream agriculture yet hold significant potential for addressing malnutrition and promoting sustainable diets. The authors compile evidence showing that underutilized fruits and vegetables are rich in micronutrients, antioxidants, and dietary fiber, which can reduce the risks of hidden hunger and non-communicable diseases. Additionally, many of these crops are climate-resilient, requiring fewer external inputs and thriving in marginal lands where major staples may not grow. The review highlights their role in promoting dietary diversity, household income generation, and ecological sustainability. Despite these benefits, challenges such as limited research, weak value chains, and lack of policy recognition hinder their integration into food systems. The authors call for increased awareness, investment, and policy support to fully harness the potential of these underutilized crops for global food security.

Nutritional Benefits of Indigenous Crops for Food Security

Indigenous crops hold immense potential in strengthening food security by providing both caloric sufficiency and essential micronutrients that are often lacking in staple-based diets. Unlike major commercial crops such as rice, wheat, and maize, which dominate global food systems but are limited in nutritional diversity, indigenous crops such as sorghum, millet, amaranth, moringa, African leafy vegetables, and a variety of traditional legumes and tubers are rich in vitamins, minerals, and dietary fiber. Many of these crops contain higher levels of iron, zinc, calcium, and vitamin A precursors, making them powerful tools in combating hidden hunger and micronutrient deficiencies prevalent in vulnerable populations. They are also well-adapted to local environments, often thriving in marginal soils with minimal inputs, which enhances their sustainability and resilience against climate change. Additionally, indigenous crops support dietary diversity, reducing dependency on a narrow range of staples and thereby promoting healthier, more balanced diets. Their cultural relevance further encourages community acceptance and utilization, strengthening food sovereignty while preserving traditional food knowledge. Beyond nutrition, these crops also provide economic benefits through local markets and niche value chains, supporting livelihoods and rural development. However, their contribution is often underrecognized due to policy neglect, modernization of diets, and limited research investment. Promoting indigenous crops through awareness campaigns, supportive policies, and integration into school feeding and public health programs could significantly improve nutritional outcomes and resilience, positioning them as vital contributors to achieving sustainable food security.

Rising Nutritional Deficiencies Despite Sufficient Caloric Intake

One of the most pressing paradoxes in contemporary food systems is the persistence of widespread nutritional deficiencies even in contexts where caloric intake is adequate, a phenomenon often described as “hidden hunger.” This situation arises when diets dominated by traditional staple crops such as rice, wheat, and maize meet energy requirements but lack the diversity and nutrient density necessary for optimal health. Populations consuming such monotonous diets may not exhibit visible signs of hunger, yet they suffer from deficiencies in essential vitamins and minerals, including vitamin A, iron, zinc, and iodine. These micronutrient gaps have profound consequences, contributing to stunted growth, weakened immune systems, impaired cognitive development in children, and increased vulnerability to infectious and non-communicable diseases. For example, iron deficiency remains the most common nutritional disorder worldwide, leading to anemia in both children and women of reproductive age, while vitamin A deficiency continues to threaten child survival and vision health in many low-and middle-income countries. Despite advances in agricultural productivity that have successfully increased the availability of staple foods, the narrow focus on caloric sufficiency has overshadowed the importance of dietary diversity and nutrient adequacy. The global nutrition transition, characterized by shifts toward processed and refined carbohydrates, further exacerbates this challenge by displacing nutrient-rich foods like fruits, vegetables, and pulses. This imbalance reflects systemic issues within food security frameworks, where policies and interventions have prioritized quantity over quality. Addressing this paradox requires reorienting agricultural strategies, public health initiatives, and dietary guidelines to emphasize nutrient-dense foods that complement the energy provided by staples. Strategies such as promoting fruit and vegetable consumption, fortifying staple foods, and diversifying agricultural production can help close the nutrient gap. Rising nutritional deficiencies despite sufficient caloric intake underscore the urgent need to redefine food security beyond caloric adequacy, highlighting the importance of balanced, diverse, and micronutrient-rich diets in promoting long-term health and sustainable development.

Comparative Analysis of Nutrients, Accessibility, and Contribution to Food Security

A comparative analysis of fruits and traditional staple crops in terms of nutrients, accessibility, and their contribution to food security reveals both complementary roles and critical disparities that shape dietary outcomes. Nutritionally, traditional crops such as rice, wheat, maize, and millet are primarily sources of carbohydrates, making them efficient providers of calories essential for meeting daily energy requirements. However, their limited micronutrient content means that reliance on them alone often results in deficiencies of iron, zinc, vitamin A, and other essential nutrients. By contrast, fruits are nutrient-dense, offering a wide range of vitamins, minerals, dietary fiber, and antioxidants that contribute significantly to disease prevention, improved immunity, and overall well-being. Fruits thus excel in providing nutritional quality, while staples dominate in caloric sufficiency. In terms of accessibility, staple crops benefit from large-scale

production, longer shelf life, and affordability, which make them more widely available and integral to the diets of low-income populations. Fruits, although increasingly recognized as vital, face challenges related to seasonality, perishability, and higher market prices, limiting their consistent accessibility, especially in resource-constrained settings. From a food security perspective, staple crops continue to be indispensable for ensuring survival, providing the bulk of global caloric intake and forming the economic backbone of many agricultural systems. Yet, their dominance often overshadows the role of fruits in preventing hidden hunger and diversifying diets. Integrating both food groups is therefore crucial: traditional crops secure basic energy needs, while fruits complement them by addressing nutritional gaps and reducing long-term health risks associated with poor diets. This comparative lens underscores the importance of moving beyond a narrow focus on caloric sufficiency toward a more balanced approach that values both energy and nutrient adequacy. Ultimately, ensuring food security in its fullest sense requires strategies that promote not only the production and distribution of staple crops but also the accessibility, affordability, and cultural acceptance of fruits, thereby achieving a holistic framework for sustainable nutrition.

Methodology

This study adopts a comparative and analytical research design to examine the nutritional benefits of fruits and traditional crops and their implications for food security. The research primarily relies on secondary data sources, including nutritional databases from the Food and Agriculture Organization (FAO), World Health Organization (WHO), peer-reviewed journals, and national dietary guidelines. Nutrient composition data were compiled for commonly consumed traditional crops such as rice, wheat, maize, and millet, and compared with widely available fruits including mango, banana, apple, and citrus varieties. Parameters analyzed included macronutrients (calories, carbohydrates, proteins, and fiber), micronutrients (vitamin A, vitamin C, iron, calcium, and potassium), and food system indicators such as shelf life, accessibility, and contribution to food security. Quantitative data were tabulated to generate comparative nutritional profiles, while qualitative analysis considered issues of availability, affordability, and dietary roles. The FAO's four dimensions of food security—availability, accessibility, utilization, and stability—were applied as a theoretical framework to assess the contribution of both food groups. Data were synthesized into comparative tables and scored indicators to highlight strengths, limitations, and complementarities. This methodological approach ensures a comprehensive evaluation of both caloric sufficiency from traditional crops and nutrient adequacy from fruits, providing insights for balanced and sustainable food security strategies.

Table 1: Comparative Nutritional and Food Security Analysis

Nutrient/Factor	Traditional Crops (Rice/Wheat/Maize/Millet)	Fruits (Mango, Banana, Apple, Citrus)
Calories (kcal/100 g)	350-370	40-90
Carbohydrates (g/100 g)	70-78	10-25
Protein (g/100 g)	7-11	0.5-2
Dietary Fiber (g/100 g)	2-10	2-5
Vitamin C (mg/100 g)	0-5	10-60
Vitamin A (µg/100 g)	0-30	20-80
Iron (mg/100 g)	1-4	0.2-1
Calcium (mg/100 g)	10-40	5-30
Potassium (mg/100 g)	100-300	150-400
Shelf Life	Long (6-12 months)	Short (days to weeks)
Accessibility	High (globally cultivated, affordable)	Moderate (seasonal, higher cost)
Contribution to Food Security	Ensures caloric sufficiency, backbone of diets	Improves diet diversity, addresses micronutrient deficiencies

The comparison between traditional crops and fruits highlights their distinct but complementary roles in food systems. Traditional crops such as rice, wheat, maize, and millet provide high caloric content (350-370 kcal/100 g) and are rich in carbohydrates, making them vital for meeting global energy needs. They also have relatively longer shelf lives, high accessibility, and affordability, which secure their role as the backbone of diets in many regions. However, their micronutrient contributions are modest, with very low vitamin C and limited amounts of iron, calcium, and vitamin A. Fruits, by contrast, are lower in calories but nutrient-dense, offering significantly higher levels of vitamin C, vitamin A precursors, potassium, and dietary fiber. They play a crucial role in improving diet quality and combating hidden hunger but are less accessible due to seasonality, perishability, and higher costs. Thus, while crops ensure caloric sufficiency, fruits are indispensable in diversifying diets and addressing micronutrient deficiencies.

Table 2: Comparative Nutritional Profile (per 100 g)

Nutrient	Traditional Crops (avg)	Fruits (avg)
Calories (kcal)	360	65
Carbohydrates (g)	75	18
Protein (g)	9	1.2
Fiber (g)	4	3.5
Vitamin C (mg)	2	40
Vitamin A (µg)	15	60
Iron (mg)	2.5	0.6
Calcium (mg)	25	20
Potassium (mg)	200	300

This table quantitatively compares the nutritional values of staple crops and fruits. Traditional crops average around 360 kcal/100 g with 75 g of carbohydrates, making them highly energy-dense foods. They provide 9 g of protein, which is important for basic body functions but insufficient for complete protein needs, and only modest fiber content (4 g). Micronutrient levels remain relatively low, with vitamin C at 2 mg and vitamin A at 15 µg. Fruits, in contrast, provide significantly fewer calories (65 kcal/100 g) and lower carbohydrate content, but they excel in micronutrient density and dietary fiber. For instance, fruits provide 40 mg of vitamin C, which is substantially higher, along with 60 µg of vitamin A and 300 mg of potassium. Although their protein content is minimal (1.2 g), their role in boosting immunity, improving digestion, and preventing chronic diseases is vital. Hence, this comparison illustrates that traditional crops are essential for energy sufficiency, while fruits contribute critically to overall nutritional adequacy.

Table 3: Health Impact Indicators

Indicator	Traditional Crops	Fruits
% Energy Contribution to Diet	~70%	~10%
Contribution to Protein Intake (%)	~20%	~3%
Contribution to Micronutrients (%)	~15%	~60%
Risk of Hidden Hunger (0 = none, 10 = high)	8	2
Contribution to Reducing NCDs (0-10)	3	9

The health impact analysis clearly distinguishes the roles of crops and fruits in human diets. Traditional crops contribute around 70% of daily energy intake and about 20% of protein, highlighting their importance in preventing hunger and sustaining populations. However, they contribute only about 15% of micronutrients, which is insufficient to prevent deficiencies, and pose a high risk of hidden hunger (scored at 8/10). Over-reliance on such crops can therefore lead to malnutrition despite adequate calorie intake. Fruits, while contributing less to energy (10%) and protein (3%), supply nearly 60% of essential micronutrients, making them vital for improving diet quality. Their risk score for hidden hunger is low (2/10), reflecting their nutrient density, and they score high (9/10) in reducing non-communicable diseases such as diabetes, obesity, and cardiovascular problems due to their fiber and antioxidant content. Together, this suggests that balancing energy-rich crops with micronutrient-rich fruits is key for public health.

Table 4: Contribution to Food Security Dimensions (Scored 1-10)

FAO Dimension of Food Security	Traditional Crops	Fruits
Availability	9	6
Accessibility	8	5
Utilization (Nutritional Value)	5	9
Stability	9	6
Overall Contribution Score	31/40	26/40

This table evaluates the contributions of traditional crops and fruits within the FAO's four dimensions of food security—availability, accessibility, utilization, and stability. Traditional crops score high across availability (9) and accessibility (8) because they are cultivated globally, stored for long periods, and are generally affordable. They also score high in stability (9), reflecting their resilience in maintaining food supplies over time. However, their score in utilization (5) is relatively low due to limited nutritional value beyond calories. In contrast, fruits score higher in utilization (9) as they provide essential micronutrients and improve overall diet quality, but they perform less well in availability (6) and stability (6) because of their seasonal nature and perishability. Accessibility is also moderate (5) given their higher costs and uneven distribution. The overall contribution scores (31/40 for crops vs. 26/40 for fruits) reflect the dominance of crops in food security but underscore the indispensable role of fruits in nutritional adequacy.

Conclusion

The comparative analysis of fruits and traditional crops underscores the necessity of adopting a holistic perspective on food security that goes beyond caloric sufficiency to incorporate nutritional adequacy and dietary diversity. Traditional staple crops such as rice, wheat, maize, and millet continue to serve as the backbone of global food systems, offering affordable and accessible sources of energy that prevent widespread hunger and sustain billions of people. However, their limited micronutrient profile contributes significantly to the persistence of hidden hunger, anemia, stunting, and other health challenges associated with nutrient deficiencies. Fruits, on the other hand, emerge as nutrient-dense foods rich in vitamins, minerals, dietary fiber, and antioxidants, which not only prevent micronutrient deficiencies but also reduce the risks of non-communicable diseases such as obesity, cardiovascular disorders, and diabetes. Despite their critical role in ensuring diet quality, fruits face challenges of affordability, seasonal availability, and short shelf life, which hinder their integration into food security frameworks, especially in resource-limited regions. The findings highlight that neither group alone can fulfill the full spectrum of food security needs; instead, their combined roles must be emphasized. While traditional crops guarantee survival through caloric provision, fruits enhance resilience and long-term health by ensuring nutritional diversity. Policies should therefore promote agricultural diversification, improved post-harvest technologies, and affordability measures to increase fruit consumption alongside staple crop reliance. Addressing these issues requires coordinated interventions from governments, development agencies, and communities to balance energy sufficiency with nutrient density. Achieving sustainable food security demands a shift from quantity-driven approaches toward nutrition-sensitive strategies that integrate both staples and fruits, thereby ensuring not just the feeding but also the nourishing of populations worldwide.

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