



Policy and Research Recommendations for Millets: Addressing Challenges and Production Opportunities to Ensure Food and Nutritional Security

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ABSTRACT

Millets, the age-old grains woven into the fabric of traditional diets across various regions, have recently resurfaced as a promising solution to tackle the pressing challenges of food and nutritional security. These grains stand out for their wealth of essential nutrients like protein, fiber, vitamins, and minerals, making them a valuable addition to a balanced diet. Additionally, their low glycemic index renders them an excellent choice for individuals seeking to manage diabetes and obesity effectively. A standout feature of millets is their gluten-free nature, making them a highly sought-after alternative for those with gluten intolerance or sensitivity. Moreover, millets possess a unique resilience, as they thrive in adverse climatic conditions, making them a dependable food source for smallholder farmers in regions with marginal resources. Regrettably, despite their enormous potential, millets have been largely overlooked and underutilized in modern food systems. To shed light on this untapped resource, this book chapter takes a comprehensive look at the nutritional value of millets and their potential to contribute significantly to food and nutritional security worldwide. The chapter also delves into the challenges and opportunities involved in promoting millets in modern food systems, emphasizing the crucial need for policy support and investments to unlock the full potential of these age-old grains. By doing so, we can usher in a new era of sustainable, nutritious, and resilient food options that benefit both individuals and communities alike.

Keywords: Health benefits, Millets, Food security, Nutritional security, Sustainable agriculture, Traditional foods.

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INTRODUCTION

Food and nutritional security is a pressing global concern, particularly in low- and middle-income countries. While significant strides have been made in reducing hunger and malnutrition, undernourishment and micronutrient deficiencies continue to impact millions worldwide (United Nations, 2020). Adding to these challenges are the effects of climate change, water scarcity, and land degradation, which pose serious threats to food production and security, especially for smallholder farmers in marginal regions (FAO, 2020). In light of these issues, there is a growing interest in exploring alternative food sources that are nutritious, resilient, and sustainable. Among these options, millets stand out as ancient grains that have been cultivated for millennia, notably in Africa and Asia. One of the remarkable characteristics of millets is their ability to thrive in harsh climatic conditions, including drought, high temperatures, and low-fertility soils, making them an excellent choice for smallholder farmers in challenging environments (Jukanti et al., 2016).

Furthermore, millets boast high nutritional value, being rich in essential nutrients like protein, fiber, vitamins, and minerals, while also exhibiting a low glycemic index, which is beneficial for managing conditions like diabetes and obesity (Kumar et al., 2016). Additionally, their gluten-free nature provides an appealing option for individuals with gluten intolerance. Despite their potential, millets have been underappreciated and underused in modern food systems, particularly in high-income countries where wheat, rice, and maize dominate diets (FAO, 2014). Consequently, millet production and consumption have dwindled over the years, leading to a loss of genetic diversity and traditional knowledge

(UNDP, 2020). This missed opportunity hampers the promotion of millets as a viable solution to address food and nutritional security challenges. With the world facing various complex issues like climate change, population growth, and escalating food demands (Mustafa et al., 2019), the role of millets in food and nutritional security has become even more pertinent. Their resilience to environmental stressors, such as drought, makes them an ideal crop for small farmers who often grapple with these adversities. By recognizing the potential of millets and incorporating them into modern food systems, we can harness their nutritional and adaptive benefits to create a more secure and sustainable food future for all.

Millets play a pivotal role in ensuring food and nutritional security worldwide, and their significance cannot be overstated. These ancient grains are highly nutritious and incredibly versatile and sustainable, making them indispensable crops for food security in diverse regions (Noort et al., 2022). As our world grapples with the challenges posed by climate change and population growth, millets emerge as a promising solution to guarantee a sustainable and nourishing food supply for everyone. A glance at Table 1 reveals that millets stand out as an excellent source of carbohydrates, dietary fiber, and crucial minerals such as iron, calcium, and magnesium (Sarita & Singh, 2016). Moreover, millets boast noteworthy protein content, making them a valuable option for vegetarians and vegans who may encounter difficulties in meeting their protein needs through other dietary sources (Parvez & Akanda, 2019). Incorporating various millets into our diets can elevate our overall nutrient intake and bolster our overall health and well-being.

Table-1 Nutritional value of different types of millets (Chaurasia & Anichari, 2023)

Particulars	Millet Type						
	Foxtail	Pearl	Finger	Proso	Barnyard	Kodo	Little
Serving Size (1 cup cooked)	180 g	170 g	170 g	170 g	170 g	170 g	170 g
Calories (Kcal.)	170	200	170	200	180	160	200
Carbohydrates (g)	38	42	35	40	42	35	40
Protein (g)	4	5	6	4	6	4	7
Fat (g)	1	1	1	1	1	1	1
Fiber (g)	2.27	2.20	3	2.28	6	9	8
Iron (mg)	2.80	1.80	3.9	4.20	11.4	1.10	9.3
Calcium (mg)	8	28	20	8	18	27	17
Magnesium (mg)	24	95	48	48	65	48	114

2. NUTRITIONAL BENEFITS OF MILLETS

Millet, a diverse group of small-seeded grains, have been nurtured and enjoyed by various cultures worldwide for millennia (Mane et al., 2022). Lately, their widespread recognition has surged owing to the myriad of health advantages they offer and their incredible adaptability in culinary endeavors. Delving into the nutritional aspects of millets unveils their potential to enhance our overall well-being and vitality.

a) *Abundant in Digestive-Friendly Fiber:*

Millet stands out as a remarkable source of dietary fiber, crucial for maintaining optimal digestive health (Devi et al., 2014). This fiber content aids in regulating bowel movements, thwarting constipation, and reducing the risk of colon cancer. Furthermore, it plays a vital role in stabilizing blood sugar levels by slowing down carbohydrate absorption within the body.

b) *Protein Powerhouse:*

Millet boasts an impressive protein content of approximately 10-14%, surpassing many other grains in this regard (Renganathan et al., 2020). Proteins are indispensable for tissue building and repair, contributing to healthy skin, hair, and nails. Notably, millets offer a valuable protein source for vegetarians and vegans seeking diverse options for protein-rich foods (Boukid et al., 2022).

c) *Nutrient Treasure Trove:*

Millet is a rich reservoir of essential vitamins and minerals, including iron, calcium, magnesium, and zinc (Agrahar-Murugkar, 2020). Iron supports haemoglobin formation, transporting oxygen in the bloodstream, while calcium bolsters bones and teeth. Magnesium maintains the health of nerves and muscles, and zinc fortifies the immune system while promoting efficient wound healing.

d) *Steadying Blood Sugar:*

With a low glycemic index, millets are gradually digested, providing a steady supply of energy and preventing abrupt spikes in blood sugar levels. This attribute renders them an ideal dietary choice for

individuals with diabetes or those keen on sustaining balanced blood sugar levels.

e) *Naturally Gluten-Free:*

Millet naturally lacks gluten, positioning them as an excellent wheat and gluten-containing grain alternative for individuals with gluten intolerance or celiac disease. Additionally, their easy digestibility makes them an appealing option for those with sensitive digestive systems.

f) *Weight Management Support:*

Embodying low fat content, millets serve as a commendable addition to weight loss and weight management regimens. Their fiber and protein richness fosters a prolonged sense of fullness and satisfaction, aiding in curbing excessive calorie consumption.

3. POTENTIAL CONTRIBUTION TO FOOD AND NUTRITIONAL SECURITY

The significance of millets in ensuring food and nutritional security cannot be emphasized enough. These small-seeded grains have been cultivated and consumed for millennia across the globe, making them an indispensable crop for sustaining food security in various regions (Mane et al., 2022). Their remarkable nutritional value and adaptability render them vital in supporting communities facing environmental challenges, particularly small farmers dealing with drought and other stressors. Millet's ability to thrive in water-scarce or irregular conditions makes them a dependable crop, safeguarding food security and livelihoods where water resources are limited (Macauley & Ramadjita, 2015). One of the key advantages of millets lies in their rich nutrient content, encompassing essential vitamins, minerals, and antioxidants (Sarita & Singh, 2016). Abundant in iron, calcium, and zinc, these grains contribute crucially to human health by promoting strong bones, teeth, and blood vessels, and bolstering the immune system. In regions grappling with malnutrition, millets can serve as a valuable source of essential nutrients, enhancing the well-being of the population (Comerford et al., 2021).

Moreover, millets play a significant role in supporting digestive health due to their high dietary fiber content. Fiber is pivotal in

regulating bowel movements, preventing constipation, and reducing the risk of colon cancer (Ambati & Sucharitha, 2019). By slowing down carbohydrate absorption, fiber also helps control blood sugar levels, making millets a beneficial addition to diets in regions where diabetes and other chronic conditions are prevalent. Additionally, the low glycemic index of millets ensures a gradual digestion process, providing sustained energy levels and averting sudden spikes in blood sugar, making them a suitable choice for individuals with diabetes or those aiming to maintain stable blood sugar levels (Millets for Diabetes: A Complete Guide, 2023). Thus, millets stand as a versatile and nutrient-rich resource, playing a vital role in ensuring food security, combating malnutrition, and promoting overall health in diverse regions across the world.

4. FOOD AND NUTRITIONAL SECURITY

Millets, a remarkable group of small-seeded grains with a rich history of cultivation and consumption spanning thousands of years across various regions, hold immense significance in the realm of food security (Mane et al., 2022). Notably, their exceptional resilience to environmental stressors, especially drought, positions them as a lifeline for small farmers facing these challenges. Moreover, millets' high nutritional value solidifies their role as a crucial crop in ensuring food availability in diverse parts of the world (Fanzo, 2014). Ensuring food security entails addressing the complex issue of providing safe and nutritious food to all, encompassing access and the means to obtain or produce enough food to meet nutritional requirements. Millets emerge as key players in achieving food security, particularly in regions where water scarcity poses a threat and vulnerable populations grapple with food insecurity. The adaptability of millets to diverse environmental conditions, including drought, heat, and poor soil quality, demonstrates their resilience (Satyavathi et al., 2021). Requiring less water than many other crops, they thrive in water-scarce or irregular areas. Additionally, their ease of cultivation and

minimal input requirements make them a cost-effective choice for small farmers. In the face of climate change or environmental challenges that have adversely affected traditional crops, millets have proven to be dependable, consistently yielding even in adverse conditions.

Beyond their resilience, millets shine as nutritional powerhouses, offering a spectrum of health benefits. They abound in essential nutrients such as vitamins, minerals, and antioxidants. Additionally, their high protein and fiber content and low glycemic index carbohydrates make them ideal for individuals with diabetes or those seeking to maintain stable blood sugar levels (Ambati & Sucharitha, 2019). In regions grappling with malnutrition, millets step up to serve as a valuable source of essential nutrients, bolstering the health and well-being of the population (Sarita & Singh, 2016). Moreover, millets' versatility in culinary applications enhances their significance. Their adaptability in various dishes is noteworthy, from porridges to bread and even desserts.

Furthermore, their extended shelf life without compromising nutritional value further cements their position as an ideal crop for ensuring food security. Additionally, millets hold cultural significance, being an integral part of traditional cuisines, contributing to cultural heritage and identity. Millets represent a formidable force in the pursuit of food security, with their resilience, nutritional value, and culinary versatility making them an indispensable crop for diverse communities around the world.

5. CHALLENGES AND OPPORTUNITIES FOR MILLET PRODUCTION AND CONSUMPTION

Millets play a vital role in ensuring food and nutritional security, especially in regions where water scarcity and food insecurity pose significant challenges (Muthamilarasan & Prasad, 2021). However, despite their numerous benefits, millets face various obstacles that hinder their production and consumption. Nevertheless, there are opportunities to overcome these challenges

and promote the cultivation and utilization of millets. One major challenge confronting millet production is the lack of adequate investment in research and development. Regrettably, millets have been neglected by governments, researchers, and private sector entities, leading to limited understanding of their genetic diversity, cultivation techniques, and processing methods (Mal et al., 2015). This scarcity of knowledge has resulted in insufficient availability of high-quality seeds and inputs, which are crucial for enhancing yields and boosting the resilience of millet production. Another significant challenge lies in the absence of sufficient infrastructure and market connections for millet farmers. Typically grown by smallholder farmers, these individuals often encounter obstacles in accessing markets and transporting their produce to urban centers (Moyo et al., 2010). As a consequence, they may struggle to sell their harvests at fair prices, discouraging further investment in millet cultivation. Moreover, there is a lack of awareness and demand for millets among consumers. Many people remain uninformed about the nutritional benefits of millets and may perceive them as inferior or less desirable compared to other foods. Such misconceptions restrict the demand for millets, consequently limiting incentives for farmers to engage in their cultivation. Despite these challenges, opportunities exist to promote millet cultivation and consumption. One such opportunity involves investing in research and development to enhance the genetic diversity of millets and develop superior-quality seeds and inputs. By doing so, yields can be increased, and the resilience of millet production can be improved. Another avenue is to enhance market linkages and infrastructure for millet farmers. Constructing storage facilities, improving transport networks, and establishing marketplaces can better connect farmers with urban centers and consumers. These improvements can lead to better prices for farmers' produce, encouraging them to invest further in millet cultivation. Additionally, creating awareness and

increasing demand for millets among consumers can be achieved through targeted marketing campaigns that highlight their nutritional benefits and versatility in various dishes. Collaboration with chefs and food manufacturers to develop new millet-based products can also boost their appeal to consumers. Millets are invaluable for food security, but they face challenges that can be addressed through research investment, improved market linkages, and heightened consumer awareness. By seizing these opportunities, millets can play an even more significant role in securing nutrition and sustenance for communities worldwide.

6. POLICY AND RESEARCH RECOMMENDATIONS

The significance of millets in securing food and nutritional security cannot be overstated, especially in regions facing water scarcity and vulnerable to food insecurity. To further the cultivation and consumption of millets, the implementation of policy and research recommendations is paramount.

A. Policy Recommendations

- a) ***Increase funding for millet research and development:*** Governments and international organizations should allocate sufficient funds to support research and development initiatives focused on enhancing the genetic diversity of millets and developing high-quality seeds and inputs. This investment can lead to improved yields and enhanced resilience in millet production (Padulosi et al., 2015).
- b) ***Improve market linkages and infrastructure:*** Governments and international organizations should prioritize investments in critical infrastructure, such as storage facilities, transport networks, and marketplaces, which facilitate seamless connections between millet farmers and urban centers or consumers. Strengthening these linkages can ensure fair prices for farmers' produce, encouraging further investment in millet cultivation (Bjornlund et al., 2020).

- c) **Promote awareness and demand for millets:** Collaborative efforts among governments, international organizations, and non-governmental organizations are crucial to raise awareness and create demand for millets among consumers. Targeted marketing campaigns emphasizing the nutritional benefits of millets and showcasing their versatility in various dishes can elevate their popularity (Gruère et al., 2009).
- d) **Develop policies to support smallholder farmers:** Governments should formulate and implement policies that specifically cater to the needs of smallholder farmers engaged in millet cultivation. These policies may encompass subsidies for inputs, improved access to credit, and comprehensive training on effective cultivation and processing techniques (Gc & Hall, 2020).

B. Research Recommendations

- a) **Conduct research on the nutritional benefits of millets:** There is a pressing need for comprehensive research to delve into the nutritional benefits of millets and their potential role in combating malnutrition. Such research can provide valuable insights that promote millet consumption and increase consumer demand.
- b) **Conduct research on millet cultivation techniques:** Focused research on sustainable millet cultivation techniques can significantly contribute to enhancing yields. Identifying and disseminating best practices can boost the productivity of millet farming and incentivize farmers to invest in this crop.
- c) **Conduct research on millet processing techniques:** Extensive research on millet processing techniques can elevate the quality of millet-based products and make them more appealing to consumers. Identifying innovative processing methods can broaden the range of millet products available in the market.
- d) **Conduct research on millet value chains:** In-depth research on millet value chains

and the challenges faced by smallholder farmers can provide valuable insights. Understanding the intricacies of the millet market can help identify opportunities to improve market linkages, infrastructure, and promote sustainable millet cultivation.

FUTURE PROSPECTS

The future prospects of millets are promising as these nutritious and climate-resilient grains gain increasing attention for their potential to address various global challenges. Here are some key future prospects for millets:

- a) **Sustainable Agriculture and Climate Resilience:** With the growing awareness of climate change and its impact on agriculture, millets are gaining recognition for their resilience to environmental stressors like drought and heat. As water scarcity and extreme weather events become more prevalent, millets are likely to play a crucial role in sustainable and climate-resilient agricultural practices.
- b) **Nutritional Security and Health Benefits:** As the world faces the dual burden of malnutrition and diet-related non-communicable diseases, millets are being recognized as a valuable solution. Their high nutritional content, including protein, fiber, and essential micronutrients, positions them as vital to addressing malnutrition and improving public health.
- c) **Diverse Culinary Applications:** Millets' versatility in culinary applications opens up new possibilities for food innovation and product development. Their incorporation into various dishes, including bread, porridges, snacks, and desserts, presents opportunities for diverse and appealing millet-based food products.
- d) **Gluten-Free Market:** As the demand for gluten-free products increases, millets serve as an excellent alternative to gluten-containing grains. This opens up a significant market opportunity for millet-based products catering to individuals with gluten intolerance or celiac disease.
- e) **Sustainable Food Systems:** Millets' potential as a sustainable crop aligns with

the global push for more eco-friendly and regenerative food systems. Their minimal water requirements, ability to grow in diverse environments, and low carbon footprint position them as vital to sustainable agricultural practices.

- f) **Traditional and Indigenous Knowledge:** Millets are deeply intertwined with many communities' cultural heritage and traditional knowledge. The revival and promotion of millet cultivation can support local economies, preserve cultural identities, and safeguard indigenous agricultural practices.
- g) **Research and Innovation:** Ongoing research and innovation focused on millet improvement, including breeding for higher yields and better disease resistance, can further enhance their potential as a staple crop in diverse agro-ecosystems.
- h) **Global Awareness and Policy Support:** As awareness about the benefits of millets grows, there is a growing momentum for policy support and investment in millet research, production, and value chain development. Governments, international organizations, and private sector actors increasingly recognise millets' importance in achieving food and nutritional security.

CONCLUSION

Millets are important for ensuring people have enough food and nutrition, especially in places where there isn't enough water and people are weak. Millets are very healthy and can give you vitamins, minerals, and fiber that many people don't get enough of in their meals. But there are problems with growing and eating millet, such as low market demand, a lack of facilities, and not enough research and development. Millets can be promoted through focused marketing efforts, better market connections and infrastructure, and ecological farming methods. Policy and study changes are needed to help millet farmers, raise customer knowledge and demand, and improve millet's long-term viability and output. By doing this, we can work towards a more fair and healthy food supply for

everyone and make sure that millets will continue to be a key part of solving food and nutrition security problems in the future.

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REFERENCES

- Agrahar-Murugkar, D. (2020). Food to food fortification of breads and biscuits with herbs, spices, millets and oilseeds on bio-accessibility of calcium, iron and zinc and impact of proteins, fat and phenolics. *LWT*, 130, 109703.
- Bjornlund, V., Bjornlund, H., & Van Rooyen, A. F. (2020). Why agricultural production in sub-Saharan Africa remains low compared to the rest of the world—a historical perspective. *International Journal of Water Resources Development*, 36(sup1), S20-S53.
- Boukid, F., Rosell, C. M., Rosene, S., Bover-Cid, S., & Castellari, M. (2022). Non-animal proteins as cutting-edge ingredients to reformulate animal-free foodstuffs: Present status and future perspectives. *Critical Reviews in Food Science and Nutrition*, 62(23), 6390-6420.
- Chaurasia, R. K., & Anichari, N. (2023). Nutritional and health benefits of Millets: A review. *The Pharma Innovation Journal*, 12(6), 3360-3363.
- Comerford, K. B., Miller, G. D., Boileau, A. C., Masiello Schuette, S. N., Giddens, J. C., & Brown, K. A. (2021). Global review of dairy recommendations in

- food-based dietary guidelines. *Frontiers in Nutrition*, 8, 671999.
- Devi, P. B., Vijayabharathi, R., Sathyabama, S., Malleshi, N. G., & Priyadarisini, V. B. (2014). Health benefits of finger millet (*Eleusine coracana* L.) polyphenols and dietary fiber: a review. *Journal of food science and technology*, 51, 1021-1040.
- Fanzo, J. (2014). Strengthening the engagement of food and health systems to improve nutrition security: Synthesis and overview of approaches to address malnutrition. *Global food security*, 3(3-4), 183-192.
- Food and Agriculture Organization of the United Nations. Smallholders, Food Security, and the Environment. Rome, Italy: FAO; 2014.
- Food and Agriculture Organization of the United Nations. The State of Food and Agriculture 2020: Overcoming Water Challenges in Agriculture. Rome, Italy: FAO; 2020.
- Gc, R. K., & Hall, R. P. (2020). The commercialization of smallholder farming—a case study from the rural western middle hills of Nepal. *Agriculture*, 10(5), 143.
- Gruère, G., Nagarajan, L., & King, E. O. (2009). The role of collective action in the marketing of underutilized plant species: Lessons from a case study on minor millets in South India. *Food Policy*, 34(1), 39-45.
- Jukanti, A. K., Gowda, C. L., Rai, K. N., Manga, V. K., & Bhatt, R. K. (2016). Crops that feed the world 11. Pearl Millet (*Pennisetum glaucum* L.): an important source of food security, nutrition and health in the arid and semi-arid tropics. *Food Security*, 8, 307-329.
- Kumar, K., Kumar, S., & Gupta, S. K. (2016). Minor millets: A review of their nutritional properties and potential health benefits. *Journal of Agricultural and Food Chemistry*. 64(7), 1349-1359.
- Mal, B., Padulosi, S., King, O. I., & Gotor, E. (2015). Minor Millets as a Central Element for Sustainably Enhanced Incomes, Empowerment, and Nutrition in Rural India. *Sustainability*, 7(7), 2071-1050.
- Moyo, T. (2010). Determinants of participation of smallholder farmers in the marketing of small grains and strategies for improving their participation in the Limpopo River Basin of Zimbabwe (Doctoral dissertation, University of Pretoria).
- Mustafa, M. A., Mayes, S., & Massawe, F. (2019). Crop diversification through a wider use of underutilised crops: a strategy to ensure food and nutrition security in the face of climate change. Sustainable solutions for food security: combating climate change by adaptation, 125-149.
- Muthamilarasan, M., & Prasad, M. (2021). Small millets for enduring food security amidst pandemics. *Trends in Plant Science*, 26(1), 33-40.
- Noort, M. W., Renzetti, S., Linderhof, V., du Rand, G. E., Marx-Pienaar, N. J., de Kock, H. L., & Taylor, J. R. (2022). Towards sustainable shifts to healthy diets and food security in sub-Saharan Africa with climate-resilient crops in bread-type products: A food system analysis. *Foods*, 11(2), 135.
- Padulosi, S., Mal, B., King, O. I., & Gotor, E. (2015). Minor millets as a central element for sustainably enhanced incomes, empowerment, and nutrition in rural India. *Sustainability*, 7(7), 8904-8933.
- Parvez, G. M., & Akanda, K. M. (2019). Foods and arthritis: an overview. Bioactive Food as Dietary Interventions for Arthritis and Related Inflammatory Diseases, 3-22.
- Renganathan, V. G., Vanniarajan, C., Karthikeyan, A., & Ramalingam, J. (2020). Barnyard millet for food and nutritional security: current status and

Rawat et al.	Curr. Rese. Agri. Far. (2023) 4(3), 23-31	ISSN: 2582 – 7146
<p>future research direction. <i>Frontiers in genetics</i>, 11, 500.</p> <p>Sarita, E. S., & Singh, E. (2016). Potential of millets: nutrients composition and health benefits. <i>Journal of Scientific and Innovative Research</i>, 5(2), 46-50.</p> <p>Satyavathi, C. T., Ambawat, S., Khandelwal, V., & Srivastava, R. K. (2021). Pearl millet: a climate-resilient nutriceal</p>	<p>for mitigating hidden hunger and provide nutritional security. <i>Frontiers in Plant Science</i>, 12, 659938.</p> <p>United Nations Development Programme. Human Development Report 2020. New York, NY: UNDP; 2020.</p> <p>United Nations. The Sustainable Development Goals Report 2020. New York, NY: United Nations; 2020.</p>	