RESEARCH ARTICLE

Millet consumption- Do Indian consumers prefer RTC and RTE small millet-based food products

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OPEN ACCESS

Additional information

Peer review: Publisher thanks Sectional Editor and the other anonymous reviewers for their contribution to the peer review of this work.

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Publisher's Note: Horizon e-Publishing Group remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Indexing: Plant Science Today, published by Horizon e-Publishing Group, is covered by Scopus, Web of Science, BIOSIS Previews, Clarivate Analytics, NAAS, UGC Care, etc See https://horizonepublishing.com/journals/index.php/PST/indexing_abstracting

Abstract

For centuries, India's diverse agricultural landscape has recognized millet as a vital source of nutrition and a resilient crop, offering a sustainable solution to address food security challenges. Alongside other small-seeded grains, millet has been traditionally regarded as a staple food in India. This study provides insights into the dynamics of the small millet market in India, highlighting the key factors driving consumer preferences, which were analyzed using the Plackett-Luce model. The analysis reveals a general decline in the area under small millet cultivation, despite improved productivity in recent years. Millet consumption patterns indicate a rising preference for other types of millets over sorghum, particularly in urban areas. Millet-based Farmers Producer Organizations (FPOs) and startups play a critical role in meeting the growing demand for millet-based products. Consumer's choices are primarily driven by factors such as availability, quality, and price, while taste, brand, and nutritional benefits, though important are comparatively less influential.

Keywords

consumer preferences; millet consumption; ready-to-cook (RTC); ready-to-eat (RTE); small millets
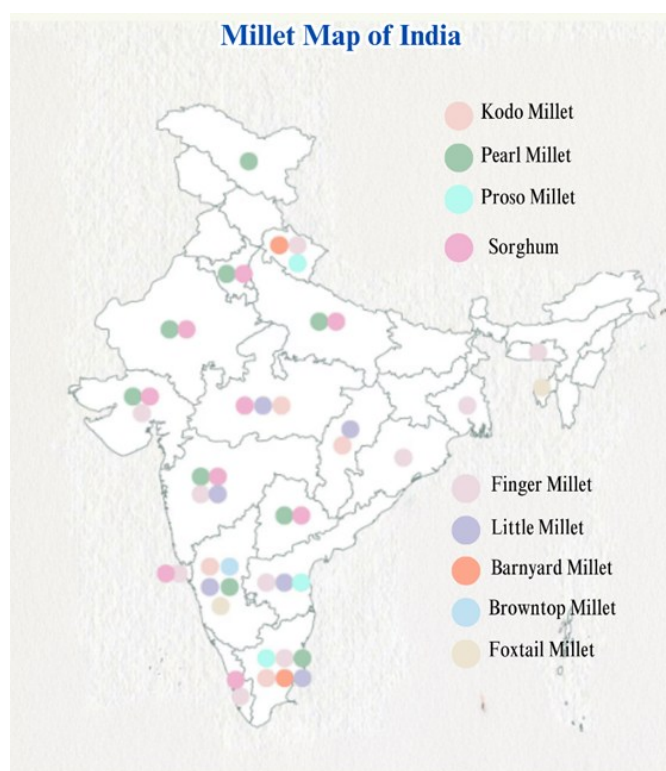
Introduction

Millets are recognized as one of the primary cereal crops cultivated by humans for a variety of domestic purposes. In today's context, where the global agri-food system faces challenges in feeding a rapidly increasing population, transitioning to resilient cereals like millet offers a promising solution. Known for their high nutritional value, millets are often referred to as "nutri-cereals" and play a crucial role in combating hunger, promoting sustainable development, adapting to climate change, and empowering rural communities.

Despite these benefits, the consumption of millets remains largely restricted to local markets (1). However, Indian consumers are increasingly demonstrating interest in millet-based products, driven by factors such as growing health awareness, the demand for gluten-free alternatives, and government initiatives promoting millets. Additionally, recent years have witnessed a notable increase in entrepreneurial ventures within the unorganized sector focused on millet-based products. Millets are typically divided into major and minor categories. Major millets include pearl millet,

finger millet, and sorghum, while minor millets encompass proso millet, foxtail millet, little millet, barnyard millet, and Kodo millet (2).

Significance of small millets in India's agricultural landscape

Millets, a group of small-seeded grains, have been a traditional dietary staple in India for centuries (3, 4). The multifaceted landscape of Indian agriculture has long recognized millet as a vital source of nutrition and robust crops, offering a sustainable solution to the nation's food security challenges (5, 6). The millet cultivation map of India, as shown in Fig. 1, illustrates that millets are cultivated across various states, spanning from Karnataka to Rajasthan and Tamil Nadu to Uttar Pradesh.


Source: Agricoop.nic.in – 2023 (7)

Fig. 1. Millet map of India.

Fig. 2 provides annual data on the area under cultivation, production and productivity of small millets from 2013–14 to 2022–23. During this period, fluctuations are observed in both the cultivation area and production levels. The area under small millets cultivation has generally decreased, particularly since 2016–17. However, productivity, expressed in tonnes per hectare, has shown a modest upward trend, particularly from 2018–19 to 2022–23, reflecting improvements in yield despite the reduction in cultivated area. The decline in cultivation area could be attributed to the factors such as a shift to more profitable crops, urbanization, or changes in climate conditions that have affected land use patterns.

Consumption pattern of millets

The food and agriculture sectors of developing countries have undergone a significant transformation in how food is produced, processed, marketed, and consumed (9-11). The Shree Anna initiative is committed to fostering the
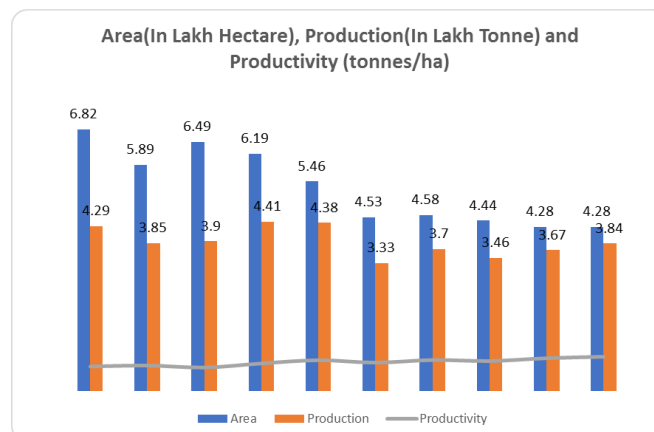
Source: Ministry of Agriculture and Farmers Welfare, Govt. of. India- 2023 (8)

Fig. 2. Area, production and productivity of small millets (2013 – 2023).

cultivation and consumption of millets across India, enhancing nutritional quality, and promoting sustainable agricultural practices (12). The detailed discussion of consumption patterns for cereals and millet is provided below.

Table 1 illustrates India's monthly per capita cereals consumption, revealing a notable difference between urban and rural populations. Rural areas consume 3.48% of coarse grains monthly, compared to 2.09% in urban areas, indicating a greater reliance on coarse grains in rural diets. Rice and wheat dominate cereal consumption in both regions, with rice slightly more favored in rural areas and wheat in urban regions.

Fig. 3 presents annual consumption trend for sorghum and other millets from 2012 to 2022. During this period, sorghum consumption exhibits a clear decline, particularly from 2012 to 2018, before stabilizing at approximately 4.5 to 4.6 million tonnes per year. Conversely, the consumption of other millets shows a consistent upward trend, particularly after 2016, peaking in 2022. This shift suggests an increasing preference for other millets over sorghum in recent years. Factors contributing to the decline in sorghum consumption include changing dietary habits, greater availability of more versatile millets, the rising popularity of rice and wheat, and perceptions of sorghum as a traditional or outdated grain. Additionally, urbanization and a preference for convenience foods may have reduced sorghum's appeal, given its longer preparation times compared to other grains.

The data highlights a stabilized but lower level of sorghum consumption and a growing demand for other millets, reflecting changing dietary preferences and increased availability. The rising demand for millets is driven by growing health consciousness, as they are nutrient-rich, gluten-free, and have a lower glycemic index than traditional grains like rice and wheat. Furthermore, millets are promoted for their resilience to climate change, requiring less water and being more sustainable for cultivation (15).

Table 2 highlights FPOs, promoted by the National Bank for Agriculture and Rural Development, in supporting millet farmers. Over 500 millet-focused start-ups and MSMEs collaborate closely with farmers, contributing to a

Table 1. Share of rice, wheat and coarse grains in total consumption of cereals in 2022–2023

India	Monthly per capita cereals consumption(Kg)	Rice(%)	Wheat(%)	Coarse grains(%)	Others cereals(%)
Urban	8.05	53.20	44.53	2.09	0.19
Rural	9.61	55.35	40.93	3.48	0.22

Source: NSSO Report no. 591: Survey on Household Consumption Expenditure: 2022-23 (13)

fragmented yet dynamic market. The government's allocations of Rs. 6.25 crores to 66 start-ups under the International Year of Millets (IYOM) 2023 underscores its commitment to increasing millet consumption and promoting rural development (17, 18).
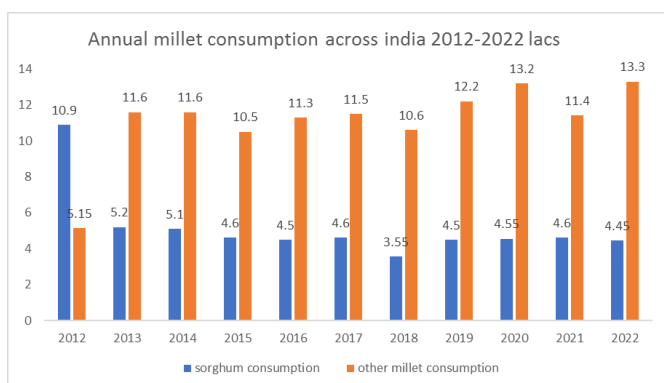
Source: APEDA and Yes Bank (2022), 'Indian Superfood Millets: A USD 2 Billion Export Opportunity', Agricultural and Processed Food Products Export Development Authority, Ministry of Commerce & Industry, Government of India. https://apeda.gov.in/milletportal/ files/Indian_Superfood_Millet_ APEDA_Report.pdf. (14)

Fig. 3. Annual Consumption of millet across India (2012 – 2022).

Currently, numerous start-ups are actively involved in promoting and developing millet-based products, leveraging technological innovations and physical

offerings. The growing interest in alternative grains is fuelled by their nutritional benefits and environmental sustainability (19). Companies' promoting healthier eating habits have introduced a range of RTC and RTE millet-based food items, including noodles, vermicelli, rawa, porridge (kanji mix), pasta, snacks, savouries, cookies, cakes, nutribars, and laddus made from major and minor millets.

This study's focuses on identifying the factors influencing consumer's preferences for RTC and RTE small millet-based food products will be instrumental in designing effective marketing strategies to boost millet consumption.

Nutritional benefits and health advantages of small millets

Small millets are highly nutritious grains, offering significant health benefits due to their high calcium content, dietary fiber, and antioxidants, which help prevent conditions such as heart disease, diabetes, and cancer (20). Additionally, millets are drought-resistant, gluten-free, and have a low glycemic index, making them ideal for those with specific dietary needs and for cultivation in regions with limited water resources (21). These climate-resilient grains are invaluable in addressing food insecurity and malnutrition (22). The gluten-free

Table 2. Millet FPOs promoted by NABARD in India

S. No.	Name of state	No. of FPOs	Major millets
1	Andhra Pradesh	22	Finger millet, Pearl millet, Foxtail millet
2	Chhattisgarh	2	Finger millet
3	Gujarat	3	Finger millet
4	Haryana	5	Pearl millet
5	Jharkhand	1	Pearl millet
6	Karnataka	50	Finger millet, Pearl millet, Foxtail millet
7	Madhya Pradesh	9	Finger millet
8	Maharashtra	1	Minor millets, Sorghum
9	Odisha	6	Finger millet
10	Rajasthan	1	Finger millet, Pearl millet
11	Tamil Nadu	21	Finger millet, Minor millets
12	Telangana	6	Finger millet, Pearl millet, Foxtail millet
13	Uttar Pradesh	1	Finger millet, Pearl millet
14	Uttarakhand	4	Finger millet, Minor millet

Source: National Bank for Agriculture and Rural Development-NABARD's ENGAGEMENT WITH MILLETS 2023 (16)

nature and low glycemic index of small millets also contribute to effective weight management and overall health improvement (23).

RTE and RTC food products

RTC meals are partially prepared food items that require the addition of specific ingredients before cooking (24). In contrast, RTE foods can be consumed immediately without any further preparation, processing, or bactericidal treatment, such as heating, making them highly convenient for today's busy consumers (25).

The global market for RTE and RTC foods was valued at US$ 181.5 billion in 2023 and US$ 12.4 billion in 2022, respectively. These markets are projected to grow to US$ 262.4 billion 2032 for RTE foods and US$ 15.4 billion by 2030 for RTC foods, with a CAGR of 4.18 % and 6.9 %, respectively. Key drivers of this growth include increasing consumer demand for convenient, time-saving food options, rising disposable incomes, urbanization leading to busier lifestyles, and the growing popularity of online food delivery services (26, 27).

In Indian, the market for RTE and RTC foods was valued at US$ 847.69 million and US$490.85 million, respectively, in 2023. These markets are expected to grow significantly, with RTE foods reaching US$ 3198.81 million by 2032, supported by a CAGR of 15.90 %, and RTC foods projected to grow at a CGAR of 16.2 % (28, 29).

The intention to consume such foods is strongly influenced by social influence, market availability, and individual preferences, highlighting the interplay between social and market dynamics in shaping consumer behaviour towards convenience food (30).

Consumer preference and factors influencing small millet-based RTC and RTE products

Ease of use and time-saving are the two most significant factors influencing both current and potential consumers of RTC meals (24). Consumer's purchase decisions for millet-based products are primarily driven by price, taste, brand, and packaging .The products promotional offers have less influence compared to price and taste (31). Families with higher income and older age groups are more willing to pay a premium for millet-based products due to their nutritional value and health benefits (32). Urban consumers are motivated to purchase millet products for their nutritional quality, while rural consumers prefer millet products for their affordability (33). RTC millet flakes made from little millet are particularly well-acceptable by modern consumers due to their sensory appeal and long shelf life (34).

Urban consumers prioritize the nutritional and health benefits of millet such as foxtail and little millet, while rural consumers often regard these grains as staple foods, with price being a significant consideration for both groups (35). The growing awareness of millets is linked to their perceived health benefits, particularly in preventing type 2 diabetes, with social media and word-of-mouth being key sources of information (36). The development of millet-based RTC and RTE products is driven by their nutritional richness and the need to address food security challenges, with food scientists showing increasing interest in creating convenience foods that cater to both traditional and modern consumer needs (37).

Price had less influence on consumer choice for RTC products compared to factors such as ease of cooking, convenience, time-saving, and satisfaction. Consumers tend to purchase such products only if they catch their eye in stores, which means that manufacturers should emphasize attractive packaging and sales promotions (38). The factors influencing consumer behavior and acceptance of millet products indicate that health benefits are the primary motivators for consumption, while high prices and flavor preferences significantly impact purchasing decisions (39). Consumers are increasingly motivated by the nutritional advantages of millet (2). RTE foods, which save time compared to homemade meals, are highly motivating, as time is a valuable resource in today's fast-paced lifestyle (40).

Effective packaging is crucial in determining a product's shelf life.. Packaging systems that extend shelf life include vacuum sealing, modified atmosphere packaging (MAP), and the use of barrier films (41).

The objectives of the study are as follows:

To study consumer preference for RTC and RTE small millet-based food products.

To study the factors influencing consumers' decisions to purchase small millet-based food products.

Materials and Methods

Study area

A sample of 100 consumers from the Namakkal District, specifically in the Rasipuram, Tiruchengode, and Sendamangalam blocks of South India, was selected for the study using purposive sampling. The participants represented a diverse range of age groups and income levels, enhancing the inclusiveness and representativeness of the study. Data were collected through personal interviews conducted at points of sale, facilitating direct interaction with respondents. A structured questionnaire was employed, covering 10 ranking factors (Table 3) alongside demographic details such as gender, age, family size, education, and family annual income, to assess consumer preferences for small millet-based (RTC) and (RTE) food products.

The frequency of factors considered in various studies is provided in Table 3. To ensure clarity and relevance, a pilot study involving 30 participants was conducted to refine the questionnaire. Based on the pilot study results, questions were adjusted to enhance the accuracy and reliability of the main study. The collected data were coded and entered into a Microsoft Excel spreadsheet, with further statistical analysis conducted using IBM SPSS version and R-Studio. A Chi-Square test was performed to assess the association between demographic factors and consumer preferences. The key factors influencing consumer's decisions to purchase small millet-based RTC

Table 3. Frequency of factors in various studies

Authors	Quality	Nutritional Benefits	Offer on the product	Price	Brand	Time-Saving	Taste	Packaging	Availability	Variety
(24)	✓			✓	✓	✓	✓	✓	✓	✓
(38)	✓	✓	✓			✓	✓		✓	
(39)	✓	✓		✓		✓	✓		✓	✓
(40)		✓	✓	✓		✓				✓
(42)	✓	✓			✓		✓	✓		✓
(43)	✓			✓	✓	✓	✓	✓		
(44)	✓	✓	✓	✓		✓	✓	✓		
(45)	✓			✓	✓	✓		✓		✓
(46)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
(47)	✓	✓		✓		✓	✓		✓	
(48)	✓	✓		✓	✓		✓	✓		
(49)	✓	✓				✓	✓		✓	✓
(50)	✓			✓	✓		✓	✓	✓	
(51)	✓	✓		✓	✓	✓		✓		
(52)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
(53)	✓	✓	✓	✓		✓	✓		✓	
(54)	✓	✓		✓			✓	✓	✓	✓
(55)	✓	✓		✓	✓	✓	✓			✓
(56)	✓	✓				✓	✓	✓	✓	
(57)		✓		✓		✓	✓	✓	✓	✓
(58)	✓				✓	✓	✓	✓	✓	
(59)	✓	✓		✓	✓		✓	✓		✓
(60)					✓	✓	✓		✓	✓
(61)	✓	✓		✓		✓	✓		✓	
(62)				✓		✓	✓	✓	✓	✓
(63)	✓	✓	✓	✓	✓		✓	✓		
(64)	✓	✓		✓		✓	✓			
(65)		✓			✓	✓	✓	✓		✓
(66)	✓	✓		✓	✓				✓	

and RTE food products were identified using the Plackett-Luce model.

Ethical clearance for the study was obtained from the relevant university authorities, adhering to the fundamental ethical principles of respect for persons, beneficence, and justice. Participant anonymity and confidentiality were strictly maintained, and informed consent was obtained from all respondents prior to their participation.

Plackett-Luce model

The Plackett-Luce model is a statistical framework designed for analysing and interpreting ranked data. It is particularly valuable in situations where respondents rank multiple items, as it enables the modelling of the probability of various ranking outcomes based on underlying parameters associated with the items.

Model Description

The Plackett-Luce model assumes that each item in a set is

associated with an intrinsic parameter, commonly referred to as a "worth" parameter, which reflects the item's likelihood of being ranked higher than other. The model's probability structure is expressed as follows:

Given a set of n items, let θ_i represent the worth parameter of item i. For a specific ranking of these items, representing as $(i_1, i_2, \ldots, i_n)$, the probability of observing this ranking is given by:

$$P(i1, i2, \ldots, in) = \prod_{j=1}^{n} \frac{\theta_{ij}}{\sum_{k=j}^{n} \theta_{ij}}$$

where:

$i_1, i_2, \ldots, i_n$ represents the observed ranking of items, with i_1 being the highest-ranked and i_n being the lowest-ranked item.

$\theta_i > 0$ for all i, signifying the non-negative worth parameters of the items (67).

In this study, the Plackett-Luce model was employed to identify the key factors influencing consumer preference for purchasing RTC and RTE small millet-based food products.

Result

Descriptive Statistics

Demographic characteristics of the respondents

Table 4 presents the demographic characteristics of the 100 respondents. Among the participants, 40% were female and 60% were male. Regarding age distributions,

Table 4. Demographic characteristics of the respondents

Variables	Frequency	%
Gender		
Male	60	60%
Female	40	40%
Age		
18-24	36	36%
25-34	32	32%
35-44	14	14%
45-54	16	16%
Above 55	2	2%
Education		
illiterate	4	4%
Primary level*	12	12%
Secondary level*	14	14%
Graduate	59	59%
Post graduate	11	11%
Job		
Employed	45	45%
students	24	24%
Home maker	31	31%
Family size		
2 members	6	6%
3 members	27	27%
4 members	47	47%
Above5 members	20	20%
Annual income		
Rs.60,000 to Rs.80,000	24	24%
Rs.80,000 to Rs.1lakh	19	19%
Rs.100,000 to Rs. 5lakh	39	39%
above 500,000	18	18%

*Note: primary level 1st to 8th, secondary level education 9th & 12th, PUC, Diploma and other equivalent studies

36% of the respondents were aged between 18 to 24 years, 32% were in the 25 to 34 age group, 14% were aged 35 to 44, 16% were between 45 to 54, and 2% were above 55 years, representing the smallest age group.

In terms of education,12% of respondents had completed primary-level education, 14% had secondary-level education, 59% were graduates, 11% held postgraduate degree, and 4% were illiterate. Employment data revealed that 45% of respondents were employed, 24% were students, and 31% were homemakers. Family size data showed that 6% of respondents had a family size of two members, 27% had three members, 47% had four members, and 20% had more than 5 members. Most of these families were nuclear or extended.

Regarding annual family income, 19% of respondents reported an income of ₹ 80,000 to ₹ 1 lakh, 24% earned ₹60,000 to ₹80,000, 39% had an income of ₹1 lakh to ₹ 5 lakhs, and 18% reported an income exceeding ₹5 lakhs.

Chi-square test

Table 5 presents the Chi-Square values and p-values for various demographic factors influencing consumer preferences for RTC and RTE small millet-based food products. The p-values highlight significant heterogeneity in preferences concerning gender and education, as these factors were statistically significant (p = 0.001** and p = 0.002**, respectively). This indicates that consumer preferences varied significantly across different gender and education levels.

Table 5. Association between consumer preference and demographic characteristics

S. No	Particulars	Chi-Square Value	$p-Value$
1	Gender	19.232	0.001**
2	Age	14.694	0.259
3	Annual Income	8.614	0.474
4	Education	31.453	0.002**

**Significance at 0.01 level

In contrast, age and annual income did not show any significant relationship with consumer preferences (p = 0.259 and p = 0.474, respectively), indicating uniformity in preferences across these demographic groups. These findings align with other studies that identified age, education, and other demographic characteristics as critical factors shaping consumers preferences (68, 69). For instance, elderly women and women with obesity were found to be more inclined to pay premium prices for healthier food options (68). Additionally, consumer understands the nutritional claims, familiarity with food items, and nutritional knowledge were also identified as important determinants of food choices (69, 70).

Plackett-Luce model factors

Table 6 highlights the factors influencing consumer preferences for RTC and RTE small millet-based food products. The analysis revealed that quality (p < 0.001**), availability (p < 0.001**), taste (p = 0.031*), and price (p < 0.001**) were significant factors, suggesting that these

Table 6. Factors influencing the consumer preference

Factors	Worthiness	Std. error	Z	p
Quality	2.34	0.23	10.011	<0.001**
Nutritional benefits	1.93	0.19	9.994	0.051
Offer on the product	1.54	0.15	9.994	0.410
Availability	2.65	0.26	10.011	<0.001**
Brand	2.08	0.20	9.994	0.050
Time-saving	1.74	0.17	9.994	0.055
Taste	1.35	0.13	9.994	0.031*
Packaging	1.93	0.19	9.994	0.124
Price	2.34	0.23	10.011	<0.001**
Variety	1.54	0.23	9.994	0.215

*Significance at 0.05 level   **Significance at 0.01

attributes play a crucial role in shaping consumer preferences. Although not statistically significant, brand also influenced consumer preference due to its high perceived value.

Nutritional benefits (p = 0.051), brand (p = 0.050), and time-saving (p = 0.055) approached significance, indicating their potential importance, though not statistically confirmed. Conversely, factors such as product offer (p = 0.410), packaging (p = 0.124), and variety (p = 0.215) showed no significant impact, suggesting that these attributes do not strongly influence consumer choices. Overall, quality, availability, taste, and price are key drivers of consumer preferences, while other factors demonstrate lesser or no influence. The findings are consistent with similar studies, which indicate that consumer preferences for food and restaurants choices are influenced by various factors. Quality attributes such as taste, price, healthiness, and nutritional claims play important roles in food choices (70, 71). Additionally, value emerged as a significant consideration alongside food quality. To enhance consumer perceptions of value, strategies such as competitive pricing, improved product quality, transparent information about sourcing and production processes, and loyalty programs can be effective (72).

Conclusion and Recommendation

In this study, we assessed the factors influencing consumer preferences for small millet-based RTC and RTE food products in India. The findings highlight that factor such as availability, quality, price, and brand significantly impact consumer choices, indicating that these attributes play a crucial role in driving demand for millet-based products. Given the growing consumer preference for small millet-based products, producers and marketers should prioritize improving product availability while maintaining high quality at competitive prices. Enhancing taste profiles and leveraging branding strategies could further attract health-conscious consumers, especially as nutritional benefits and time-saving conveniences become increasingly valued.

To capitalize on these insights, stakeholders in the small millet industry should focus on scaling up production while ensuring consistent quality. Additionally, RTC and RTE millet-based products should be priced reasonably, and retailers should maintain adequate stock levels. Marketing efforts should highlight the health benefits and convenience of small millet-based products, targeting both rural and urban consumers. Investing in attractive packaging and expanding product variety could further strengthen consumer appeal.

Moreover, policymakers should consider supporting initiatives to enhance the supply chain infrastructure for small millets, improving access to markets and reducing transaction costs. Encouraging consumer awareness about the nutritional advantages of small millets and promoting their inclusion in daily diets could also drive sustained demand, supporting the growth of the small millet market in India. Ultimately, by aligning product attributes with consumer preferences, the small millet industry can better meet the needs of diverse consumer segments, fostering wider adoption and contributing to the overall growth of the market. Future studies with larger sample sizes, including both rural and urban consumers, may reveal regional differences in consumer preferences, offering further insights.

Authors' Contributions

VP carried out the conceptualization, methodology, data collection, data analysis and drafted the original manuscript. SH supervised the project, managed its administration and contributed to review and editing. AR, AV, and VA supervised the project and managed its administration. All authors read and approved the final manuscript.

Compliance with Ethical Standards

Conflict of interest: Authors do not have any conflict of interests to declare.

Ethical issues: None

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work, the authors used ChatGPT to improve language and readability, to reduce grammatical errors and to frame opt words and sentences ensuring that the manuscript has specific terminologies for the beneficiaries. After using this tool/service, the authors reviewed and edited the content as needed and takes full responsibility for the content of the publication.

References

1. Jain P, Kumar L, Singh S, Gaikwad KK. Trends in packaging of millets and millet-based processed products. Curr Food Sci Technol Rep. 2024;2(1):65-75. https://doi.org/10.1007/s43555-023-00013-5

2. Reddy MM, Babu GP, Vasanthi R, Murthy BR. Factors influencing the consumption pattern of millets and millet-based products in Kurnool district of Andhra Pradesh. Health. 2012;112:1.

3. Londhe D, Gundeti MS. Perspective on- 'Millet for Health' initiatives by Ayush Institutes across India based on the Hon'ble Prime Minister's Millet-promotion call through Mann ki Baat. J Res Ayurvedic Sci. 2023;7(Suppl 1):S31-S33. https://doi.org/10.4103/jras.jras_108_23

4. Pandey SR, Ranjan AR, Kumari J. Assessing the effects of organic amendments on soil fertility. J Divers Stud. 2023;2(2):9-12. https://doi.org/10.51470/jod.2023.2.2.09

5. Lokur A, Donde KJ, Pius J. MILLETS–2023: A transdisciplinary approach to its resurgence and sustainability. Allied Publishers; 2023.

6. Bajpai P, Ravichandran R. The potential of millet grains: A comprehensive review of nutritional value, processing technologies and future prospects for food security and health promotion. J Cereal Res. 2024;15(2):157-69. https://doi.org/10.25174/2582-2675/2023/136711

7. Agricoop. Millet map of India. 2023. Available from: https://agridashboard.dac.gov.in/.

8. Ministry of Agriculture and Farmers Welfare, Govt. of India. 2023. Available from: https://agriwelfare.gov.in/.

9. Busch L, Bain C. New! Improved? The transformation of the global agrifood system. Rural Sociol. 2004;69(3):321-46. https://doi.org/10.1526/0036011041730527

10. Deshingkar P, Kulkarni U, Rao L, Rao S. Changing food systems in India: resource sharing and marketing arrangements for vegetable production in Andhra Pradesh. Dev Policy Rev. 2003;21(5-6):627-39. https://doi.org/10.1111/j.1467-8659.2003.00228.x

11. Henson S, Reardon T. Private agri-food standards: Implications for food policy and the agri-food system. Food Policy. 2005;30 (3):241-53. https://doi.org/10.1016/j.foodpol.2005.05.002

12. Hidangmayum N, Gomadhi G, Ramasamy M, Ejilane S, Chitra K, Rajeswari E, et al. Shree Anna (Millets): Promoting nutrition and sustainability in agricultural millets map of India. Eur J Nutr Food Saf. 2024;16(8):237-46. https://doi.org/10.9734/ejnfs/2024/v16i81511

13. Ministry of statistics and programme implementation. Share of Coarse Grains in Total Consumption of Cereals. 2023. Available from: https://mospi.gov.in/sites/default/files/publication_reports/Report_591_HCES_2022-23New.pdf.

14. APEDA, Yes Bank. Indian superfood millets: A USD 2 billion export opportunity. Agricultural and Processed Food Products Export Development Authority, Ministry of Commerce and Industry, Government of India; 2022. Available from: https://apeda.gov.in/milletportal/files/Indian_Superfood_Millet_APEDA_Report.pdf.

15. Singh RP, Qidwai S, Singh O, Reddy BR, Saharan S, Kataria SK, et al. Millets for food and nutritional security in the context of climate resilient agriculture: A review. Int J Plant Soil Sci. 2022;39(10):939-53. https://doi.org/10.9734/ijpss/2022/v34i232504

16. National Bank for Agriculture and Rural Development (NABARD). NABARD's Engagement with Millets. 2023. Available from: https://www.nabard.org/nabard-annual-report-2022-23.aspx.

17. Startup India. Startup India: A Platform for Indian Startups. 2022. Available from: https://www.startupindia.gov.in/.

18. LiveMint. Agriculture Ministry Funded 66 Startups to Promote Millet Consumption. 2023. Available from: https://www.livemint.com/industry/agriculture/agriculture-ministry-funded-66-startups-to-promote-millet-consumption-tomar-11669296330435.html.

19. Temgire S, Borah A, Kumthekar S, Idate A. Recent trends in ready to eat/cook food products. 2021;10(5):211-17. https://doi.org/10.22271/tpi.2021.v10.i5c.6207

20. Bhat S, Nandini C, Tippeswamy V. Significance of small millets in nutrition and health- A review. Asian J Dairy Food Res. 2018;37(1):35-40. https://doi.org/10.18805/ajdfr.dr-1306

21. Anita MB, Santosh NB. Nutritional and health benefits of millets. Ayushdhara. 2023;10(5):20-25. https://doi.org/10.47070/ayushdhara.v10i5.1317

22. Singh R, Singh R, Singh PK, Singh O. Climate smart foods: Nutritional composition and health benefits of millets. Int J Environ Climate Change. 2023;13(11):1112-22. https://doi.org/10.9734/ijecc/2023/v13i113261

23. Maurya R, Boini T, Misro L, Radhakrishnan T, Sreedharan AP, Gaidhani D. Comprehensive review on millets: Nutritional values, effect of food processing and dietary aspects. J Drug Res Ayurvedic Sci. 2023;8(Suppl 1):S82-S98. https://doi.org/10.4103/jdras.jdras_123_23

24. Udaiyar U, Com M. A study on increasing popularity of ready-to-cook products among women in Mumbai Metro city. Multidiscip Peer Rev J. 2018;3(3):192-200.

25. Jaroni D, Ravishankar S, Juneja V. Microbiology of ready-to-eat foods. In: Ready-to-Eat Foods Microbial Concerns and Control Measures. Boca Raton: CRC Press; 2010. p. 1-6. https://doi.org/10.1201/ebk1420068627-c1

26. IMARC Group. Global RTE and RTC market report. 2023. Available from: www.imarcgroup.com.

27. Contrivedatum Insights. RTE and RTC food products market analysis. 2023. Available from: www.contrivedatuminsights.com.

28. Credence Research. Market analysis of Ready-to-Eat and Ready-to-Cook food products in India. 2023. Available from: www.credenceresearch.com.

29. TechSci Research. Indian RTE and RTC food market outlook. 2023. Available from: www.techsciresearch.com.

30. Contini C, Romano C, Scozzafava G, Casini L. Food habits and the increase in ready-to-eat and easy-to-prepare products. In: Food Hygiene and Toxicology in Ready-to-Eat Foods. 1st ed. Amsterdam: Elsevier; 2016. p. 3-14. https://doi.org/10.1016/b978-0-12-801916-0.00001-7

31. Pravallika D, Rao BD, Chary DS, Devi N. Market strategies for promotion of millets: A critical analysis on assessment of market potential of Ready to Eat (RTE) and Ready to Cook (RTC) millet based products in Hyderabad. Asian J Agric Ext Econ Sociol. 2020;38(12):147-55. https://doi.org/10.9734/ajaees/2020/v38i1230507

32. Mohanraj T, Balaji P, Karthikeyan C, Vidhyavathi A, Kathiravan M. Consumer preferences on millet-based value-added products in northern Tamil Nadu. 2023. https://doi.org/10.22271/maths.2023.v8.i5sb.1176

33. Banu A, Ganapathy MS, Girish MR, Shankara MH, Begum SS, Gowda VG, Kumar TL. Consumer preferences for the products of minor millets in Tumakuru district of Karnataka, India. Int J Environ Climate Change. 2022;12(11):2214-20. https://doi.org/10.9734/ijecc/2022/v12i1131215

34. Takhellambam RD, Chimmad BV, Prkasam JN. Ready-to-cook millet flakes based on minor millets for modern consumer. Journal of Food Science and Technology. 2016;53:1312-18. https://doi.org/10.1007/s13197-015-2072-0

35. Durgad AG, Joshi AT, Hiremath G. Consumer preference for foxtail and little millets in north eastern region of Karnataka. 2021. https://doi.org/10.46852/0424-2513.1.2021.13

36. Reddy R, Patel D. A study on consumers' awareness and preference towards millets and its products in Vizianagaram district, Andhra Pradesh, India. Asian Journal of Agricultural Extension, Economics and Sociology. 2023;41(6):9-16. https://doi.org/10.9734/ajaees/2023/v41i61915

37. Jaybhaye R, Pardeshi I, Vengaiah P, Srivastav P. Processing and technology for millet-based food products: a review. Journal of Ready to Eat Food. 2014;1(2):32-48. https://doi.org/10.15740/has/fsrj/6.2/285-291

38. Garg P, Saxena A, Singh A. Evaluation of consumer behaviour towards RTC products in district of US Nagar. International Journal of Research in Economics and Social Sciences. 2016;6(5):103-12.

39. Alekhya P, Shravanthi AR. Buying behaviour of consumers towards millet-based food products in Hyderabad district of Telangana, India. Int J Curr Microbiol Appl Sci. 2019;8(10):223-36. https://doi.org/10.20546/ijcmas.2019.810.023

40. Velankar S, Anekar K. Pandemic and people perception and preferences towards ready to eat/ready to cook food vis a vis home cooked food. Int J Adv Innov Res. 2023;96.

41. Hoek A, Pearson D, James S, Lawrence M, Friel S. Healthy and environmentally sustainable food choices: Consumer responses to point-of-purchase actions. Food Qual Prefer. 2017;58:94-106. https://doi.org/10.1016/j.foodqual.2016.12.008

42. Gurbuz IB, Macabangin M. Factors affecting consumer's behaviour on purchasing and consumption of food products. 2019;19(1):215-22.

43. Annunziata A, Scarpato D. Factors affecting consumer attitudes towards food products with sustainable attributes. Agric Econ. 2014;60(8). https://doi.org/10.17221/156/2013-agricecon

44. Chaudhury R. Determinants of consumer behavior in buying RTE foods. J Bus Retail Manag Res. 2010;5(1).

45. Saxena DS. A study of factors affecting brand switching for processed and packed ready-to-cook food packs. SSRN. 2018. https://doi.org/10.2139/ssrn.3164049

46. Liew J, Zain NM, Hashim D, Bakar TA, Mahshar M, Rosli F, editors. An exploration of the key factors affecting consumer buying behaviour of instant food products: A case study of Kota Bharu. IOP Conf Ser Earth Environ Sci. IOP Publishing; 2021. https://doi.org/10.1088/1755-1315/756/1/012014

47. Kumar A, Dwivedi P, Singh V, Siwach A. Factors that influence the buying behaviour of ready to eat food products. Asian J Agric Ext Econ Sociol. 2023;41(5):106-10. https://doi.org/10.9734/ajaees/2023/v41i51906

48. Patel D, Rathod R. Ready to eat food perception, food preferences and food choice: a theoretical discussion. World J Multidiscip Res Dev. 2017;3(8):198-205.

49. Munjal N, Noida G. Consumers' expectations towards ready-to-cook food-an empirical study of Delhi/NCR. Recent Trends in Decision Sciences and their Implications for Business. 2019;99-110.

50. Kokkar L, Nandrajog AB. Behaviour of adolescents towards ready-to-eat products (A survey of Malwa region of Punjab). Mangalmay J Manag Technol. 2018;8(1):1-6.

51. Roy SK, Khatun A. Influencing factors for ready-to-cook food purchase intentions: A two-stage approach. SN Bus Econ. 2023;4(1):10. https://doi.org/10.1007/s43546-023-00611-4

52. Islam N, Tahsin N, Tarrannum N, Salihee RZ, Tarannum S, Sujana JTM, editors. Factors influencing the consumers' perceptions towards frozen and ready-to-cook food products in Bangladesh. Proceedings of the 1st Global International Conference; 2019. https://doi.org/10.2139/ssrn.4924728

53. Babu RS, Balaji V, Gajenderan V. Factors influencing the purchase intentions of ready-to-eat food products among the consumers in Chennai city. Int J Res-GRANTHAALAYAH. 2021;8:172-81. https://doi.org/10.29121/granthaalayah.v8.i12.2020.2702

54. Azmat N, Agnihotri K. A comprehensive review on motivational factors influencing consumer's preferences towards convenience food products: An Indian perspective. The Indian Renaissance: Aatm-Nirbhar Bharat Transforming India's Management Landscape. 2023;119.

55. Rista EA, Nuraeni S. Analyzing factors considered by career housewives in Bandung, Indonesia in using ready-to-cook (RTC) product in daily life. 2023. https://doi.org/10.55057/aje.2023.4.3.2

56. Inbalakshmi M, Govindarajan K, Banu CV, Vijayanand V. A study on consumer preference towards instant food products. TSM Business Review. 2014;2(1):68.

57. Malhotra G, Ranjan J. A comparison of consumer's choice to brand packaged foods in India: an empirical investigation. International Journal of Business Competition and Growth. 2013;3(2):139-49. https://doi.org/10.1504/ijbcg.2013.056486

58. Khurana N, Goyal P. Consumer perception towards instant food products-a study of youngsters in India. Itact Journal on Management Studies. 2021;7(04):1483-87.

59. Rathee R, Rajain P, Kuchhal A. Ready-to-eat products: Perspective of working women. Int J Manag Technol Eng. 2018;8(7):5985-6000.

60. Malhotra G, Malhotra A. An empirical investigation of consumer's preference in RTE market. The Business and Management Review. 2014;5(3):1. https://doi.org/10.1504/IJBEX.2013.050574

61. Dutt R, Khan MI. Consumer preferences for buying behaviour towards modern food retailing in India. From the Desk of the Chief Editor. 2015;4.

62. Raj S, Mishra B. Socio-demographic factor and selected buying behavioral attributes of purchasing convenience food: Multiple correspondence analyses to explore the relationship. Parikalpana: KIIT Journal of Management. 2020;16(1 and 2):84-107. https://doi.org/10.23862/kiit-parikalpana/2020/v16/i1-2/204559

63. Mor K, Sethia S. An investigation of consumer buying behavior for food products: an empirical study of rural and urban areas of Haryana. Global J Manag Bus Res. 2015;15(8):7-11.

64. Dhir B, Singla N, Jain R. Relationship between consumption of convenience foods and health status of the working women. Current Journal of Applied Science and Technology. 2020;39(3):87-94. https://doi.org/10.9734/cjast/2020/v39i330518

65. He B. Strategic dynamics and growth opportunities in the ready-to-eat food industry: A comprehensive analysis of "Wei Zhi Xiang". Highlights in Business, Economics and Management. 2024;40:1219-26. https://doi.org/10.54097/8ng5kh81

66. Nivetha T, Uma K. A study on buying behavior of nutri cereals

among the consumers in Coimbatore district, Tamil Nadu. Current Journal of Applied Science and Technology. 2021;40 (41):11-15. https://doi.org/10.9734/cjast/2021/v40i4131603

67. Cheng W, Hüllermeier E, Dembczynski KJ. Label ranking methods based on the Plackett-Luce model. In: Proceedings of the 27th International Conference on Machine Learning (ICML-10); 2010. pp. 215-22.

68. Alsubhi M, Blake M, Nguyen T, Majmudar I, Moodie M, Ananthapavan J. Consumer willingness to pay for healthier food products: A systematic review. Obesity Reviews. 2023;24 (1):e13525. https://doi.org/10.1111/obr.13525

69. Mogendi JB, De Steur H, Gellynck X, Makokha A. Consumer evaluation of food with nutritional benefits: a systematic review and narrative synthesis. International Journal of Food Sciences and Nutrition. 2016;67(4):355-71. https://doi.org/10.3109/09637486.2016.1170768

70. Ballco P, Gracia A. Tackling nutritional and health claims to disentangle their effects on consumer food choices and behaviour: A systematic review. Food Quality and Preference. 2022;101:104634. https://doi.org/10.1016/j.foodqual.2022.104634

71. Font-i-Furnols M, Guerrero L. Consumer preference, behavior and perception about meat and meat products: An overview. Meat Science. 2014;98(3):361-71. https://doi.org/10.1016/j.meatsci.2014.06.025

72. Zanetta LDA, Xavier MC, Hakim MP, Stedefeldt E, Zanin LM, Medeiros CO, et al. How does the consumer choose a restaurant? An overview of the determinants of consumer satisfaction. Food Research International. 2024;114369. https://doi.org/10.1016/j.foodres.2024.114369