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**Bheemannagari Deepika**

Student, International

Agribusiness Management

Institute, Anand Agricultural

University, Anand, Gujarat,

India

**Rajesh Reddy**

Student, International

Agribusiness Management

Institute, Anand Agricultural

University, Anand, Gujarat,

India

## Consumer perceptions, preferences, and impediments to millet consumption: A case study in Kadapa District, Andhra Pradesh

**Bheemannagari Deepika and Rajesh Reddy**

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### Abstract

Millet, valued for their nutritional abundance and ecological resilience, remain underutilized despite India's leading contribution of around 38.4% to global production, reaching 13.5 million metric tonnes (MT) in 2024. This study, conducted in Kadapa district, Andhra Pradesh, surveyed 220 consumers and 30 retailers to investigate awareness levels, preferences for foxtail millet products, and barriers to adoption. Results indicate universal awareness, with 80% of respondents affirming millets' health superiority over wheat and rice. Finger millet leads preferences (41%), yet foxtail millet uptake is minimal, with 49% citing culinary unfamiliarity as a key obstacle. Retail insights reveal sorghum's dominance, though foxtail millet shows emerging potential. Amid global millet promotion, this research advocates for innovative, accessible products and policy measures to integrate millets into Indian diets, addressing nutritional and sustainability challenges.

**Keywords:** Foxtail millet adoption, consumer awareness, millet consumption patterns, nutritional security, Kadapa district (Andhra Pradesh)

### Introduction

Kalaiselvi and Fathima (2016) observed that women in Coimbatore valued millets for their nutritional merits, diabetes control, and cost-effectiveness, with awareness tied to education and age. Kalidas and Mahendran (2017) <sup>[5]</sup> reported that 82.67% of respondents preferred millet-based idli and dosa mixes, driven by health benefits and convenience. Barratry and Rajapushpam (2018) <sup>[2]</sup> found finger millet ranking highest (70.92%) among Salem consumers, who viewed millets as nutritious and suitable for routine diets. Selvi and Malathi identified education, income, and health as key influencers of millet use in Madurai, with barriers including preparation difficulties and market scarcity.

More recent studies deepen this narrative. Sharma and Patel (2024) <sup>[7]</sup> assessed India's millet policy post-2023, noting a 15% rise in urban demand driven by health awareness and government incentives like Minimum Support Prices (MSP) in states like Chhattisgarh, with implications for Andhra Pradesh. Anitha *et al.* (2023) <sup>[1]</sup> explored millet consumption in urban India via ICRISAT data, finding 46% of respondents preferred ready-to-eat (RTE) forms, with health concerns (30%) as a primary motivator, though 40% avoided millets due to unfamiliarity in household cooking. Rao and Gupta (2024) <sup>[6]</sup> investigated rural millet preferences in Telangana, revealing foxtail millet's prominence due to its low glycaemic index and climate resilience, yet limited by processing challenges. These studies collectively affirm millets' potential but underscore persistent gaps in accessibility, culinary adaptation, and market penetration, which this research addresses in Kadapa's context.

### Results and Discussion

#### Socio-Demographic Characteristics

The respondent pool comprised 70% females (154) and 30% males (66), reflecting women's central role in dietary decision-making. Age distribution included 41% below 35 years (90), 32% between 35-55 years (71), and 22% above 55 years (48). Urban participants (60%, 132) outnumbered rural ones (40%, 88), with educational levels varying—44% graduates (97), 18% illiterate (40), and the rest with intermediate education. Occupationally, diverse professions influenced health consciousness, while 65% of households (143) had 3-5 members, impacting millet purchase volumes.

**Corresponding Author:**

**Bheemannagari Deepika**

Student, International

Agribusiness Management

Institute, Anand Agricultural

University, Anand, Gujarat,

India

## Awareness and Perceptions

Awareness of millets was universal among the 220 respondents, though in-depth analysis knowledge of nutritional benefits was less common. Health perceptions strongly favoured millets (80%, 176) over wheat (13%, 29) and rice (7%, 15). Preference leaned towards finger millet (ragi, 39%, 85), followed by sorghum (jowar, 22%, 48), with small millets like kodo (arikalu, 1%, 2) and barnyard (uddalu, 1%, 2) showing negligible appeal.

Attitudinal scores (5-point scale) confirmed millets' efficacy for diabetes and cardiac health (4.6, 143 strongly agreeing), digestion and cholesterol reduction (4.3, 89 strongly agreeing), and weight management (4.3, 83 strongly agreeing). However, taste (3.2, 30 strongly agreeing) and affordability (3.5, 37 strongly agreeing) received moderate approval, with some associating millets with low-income diets (2.9, 24 strongly agreeing).

## Consumption Patterns and Preferences

Among 209 millet users (95% of 220), consumption occurred mainly at breakfast (18%, 40) or lunch (15%, 33), with combinations like breakfast-dinner (11%, 25) also reported. Foxtail millet (korra) use was limited—38% (84) consumed it rarely, 6% (14) never, and 46% (102) used less than 1 kg monthly, indicating a preference for small packaging (0.5-1 kg). Raw grains (40%, 88) were most preferred, followed by ready-to-eat products (24%, 53) like biscuits, with ready-to-cook items (15%, 32) such as noodles less popular. Kirana shops (33%, 72) dominated raw grain purchases, while supermarkets (32%, 71) led for value-added items. Beverage preferences were slightly balanced—52% (115) opted for pure millet drinks, 48% (105) chose flavoured variants (e.g., fruit, chocolate).

## Impediments to Consumption

Barriers to millet adoption included culinary unfamiliarity (22%, 49), limited ready-to-use products (20%, 43), taste dissatisfaction (18%, 40), and resistance to dietary shifts (16%, 36). High costs (10%, 23) and inconsistent availability, especially for small millets like brown top (andukorra), further deterred uptake. Respondents highlighted processing difficulties (e.g., sieving small grains) as an additional constraint.

## Retailer Observations

The study focused exclusively in kadapa district, Andhra Pradesh, surveying a sample of 30 retail outlets across various localities, including Rameshwaram, Mydukur Road, Gandhi Road, and the central market area. The objective was to assess millet sales patterns, particularly focusing on foxtail millet (korra), and the readiness of the retail ecosystem to support millet diversification.

The analysis revealed that sorghum (jowar) was the most frequently sold millet, with 85% of retailers confirming consistent customer demand. Jowar was predominantly sourced from both local farmers and regional wholesalers, indicating a well-established supply chain. In contrast, foxtail millet showed gradual yet noticeable growth, with 40% of retailers reporting rising consumer inquiries and sales. Projections, based on current trends, estimate a 25% increase in foxtail millet sales in 2024-2025 compared to the previous year.

Finger millet (ragi) experienced peak sales during the

summer, linked to its health and hydration benefits. However, despite this seasonal popularity, rice continues to dominate the grain market with all retailers confirming its top-selling status.

Additionally, the availability of value-added millet products such as ragi idli rava, jowar idli rava, millet-based biscuits, and health drinks (malt powders) was noted in 60% of stores. Importantly, 70% of the retailers expressed interest in expanding their millet-based product range, citing growing health awareness as a key driver—though concerns remain regarding low consumer familiarity, lack of promotional efforts, and irregular supply chains.

## Statistical Insights

Statistical analysis was employed to explore relationships between variables using chi square method to assess independence:

**Residential Location and Consumption Form:** No notable relationship was observed ( $p$ -value=0.343, degrees of freedom=3, calculated value=3.33, threshold=7.81), indicating that preferences for forms like raw grains (40 rural vs. 48 urban) were similar across rural (83 respondents) and urban (126 respondents) settings.

**Residential Location and Purchase Point:** No significant connection emerged ( $p$ -value=0.139, degrees of freedom=4, calculated value=6.94, threshold=9.49), with kirana shops widely used (32 rural vs. 40 urban) irrespective of location.

**Household Income and Consumption Quantity:** No meaningful linkage was detected ( $p$ -value=0.110, degrees of freedom=12, calculated value=18.19, threshold=21.03), with less than 1 kg being typical across income levels (e.g., <4 lakh: 46 respondents).

These outcomes suggest that consumption behaviours remain consistent across demographic variations, with  $p$ -values exceeding the 0.05 significance level, indicating no substantial differences.

## Summary and Conclusion

This study confirms widespread millet awareness in Kadapa, with finger millet and sorghum preferred over foxtail millet, which faces low uptake due to culinary ignorance, taste issues, and supply gaps. Retail trends highlight sorghum's lead, with foxtail millet gaining traction. As India's millet output grows, overcoming barriers through accessible, appealing products and policy support could elevate millets' dietary role, enhancing health and sustainability outcomes.

## Recommendations

Incorporate millets into public distribution systems and midday meal schemes.

Use digital platforms to promote millets' health benefits.

Support cultivators with MSP and ecological subsidies (e.g., water credits).

Develop diverse, palatable millet products like breakfast mixes and snacks.

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