

**A STUDY ON UNDERSTANDING CONSUMER BEHAVIOUR: THE NEW TREND
IN INGREDIENT MARKETING-MILLETS**

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Abstract:

Despite the availability of over 250,000 edible plant species globally, modern human diets remain disproportionately dependent on three dominant staple crops: wheat, maize, and rice. Millet, a heritage grain with a long-standing history of consumption dating back to the Song Dynasty (960–1279 CE), represents a resilient, sustainable, and nutritionally rich alternative. Recognized as a staple across diverse cultures for centuries, millet offers a substantial source of carbohydrates, protein, dietary fiber, vitamins, and essential minerals. Its nutritional composition and environmental adaptability position it as a promising contributor to food security and sustainable dietary transitions.

In light of escalating challenges associated with climate change, water scarcity, and global population growth, millet's potential role within sustainable food systems is gaining increasing relevance. However, the effective integration of millet into contemporary dietary practices requires a comprehensive understanding of consumer acceptance dynamics. This study employs a qualitative research methodology to explore the personal, social, cultural, economic, and psychological factors influencing consumer decision-making processes related to the adoption, utilization, and incorporation of millet into existing dietary patterns. The findings provide critical insights into the determinants of consumer acceptance of millet as an alternative food source. The study contributes to ongoing discussions in food policy and consumer behaviour research and offers implications for the design of strategies aimed at promoting sustainable food systems and healthier dietary choices.

Keywords — Millet; Nutritional value; Consumer behaviour; Food policy; Sustainable food systems

Introduction

Millet, a group of cereal grains rich in nutrients, comes under the Poaceae family. These grains are often called "coarse cereals" or "cereals of the poor." Human diets are heavily dependent on a limited range of crop species, despite the existence of hundreds of thousands of edible plants (Hummer, 2015). A substantial proportion of these species remain neglected, underutilised, and relatively unknown, particularly among Western populations (Uljan et al., 2020). Incorporating underutilised heritage crops into contemporary dietary patterns presents

a significant opportunity to enhance dietary diversity, improve nutritional outcomes, strengthen food security, and support environmental sustainability (Gregory et al., 2019).

Globally, approximately 150 plant species are cultivated for food production, yet only around 30 crops contribute to nearly 95% of human caloric intake (Shelef et al., 2017). Among these, wheat, rice, and maize dominate, collectively accounting for approximately two-thirds of global dietary energy consumption (Shiferaw et al., 2013). These staple grains are widely consumed due to their high yields, caloric density, nutritional contribution, cultural significance, versatility in food preparation, and economic accessibility. However, prevailing agricultural practices associated with these crops have been linked to environmental degradation and may yield nutritionally inferior products compared to certain underutilised alternatives.

Wheat, in particular, remains the most extensively cultivated crop worldwide and has historically played a central role in ensuring food security, owing to its agronomic advantages and processing qualities (Erenstein et al., 2022). Nevertheless, the impacts of climate change have introduced increasing uncertainty regarding future wheat productivity (Naaz et al., 2023), with projections suggesting that some existing wheat varieties may become non-viable by 2050 (Gaydon et al., 2023). This underscores the vulnerability of global food systems and highlights the urgent need to explore resilient alternative crops (Shah et al., 2024).

Millets have emerged as a promising climate-resilient crop, recognised for their adaptability, low input requirements, and tolerance to drought and extreme environmental conditions (FAO, 2023). They exhibit rapid growth cycles, maturing in less than half the time required for wheat (Jukanti et al., 2016), and can be cultivated across diverse soil types, from clay loams to sandy soils (Chivenge et al., 2015). Furthermore, millets thrive in arid and semi-arid regions where water availability is limited (Zegada-Lizarazu and Iijima, 2005). Their resistance to pests and diseases, combined with reduced dependence on pesticides and fertilisers (Hayashi et al., 2008), and lower water requirements—approximately 30% less than maize and 70% less than rice (Orr et al., 2020)—underscore their potential as a sustainable crop in addressing contemporary agricultural challenges. Millet ranks as the sixth most important cereal crop globally in terms of agricultural production (FAO, 2023). In 2024, global millet production was estimated at approximately 31,763 MT, with India leading production, followed by Niger and China. In contrast, global wheat production in the same year was estimated at 1,270,993 MT (USDA, 2024), reflecting the comparatively smaller but significant role of millets. The designation of 2023 as the International Year of Millets by the United Nations aimed to enhance awareness of their nutritional benefits, climate resilience, and potential to support sustainable food systems and market development (FAO, 2023). Millets are naturally gluten-free and are rich in protein, dietary fibre, essential vitamins (including niacin and B-complex vitamins), and minerals such as phosphorus, calcium, zinc, and iron (Das et al., 2019). Evidence suggests that millets may offer superior nutritional profiles compared to wheat, maize, and refined rice (Jocelyne et al., 2020), and they have been associated with various health benefits (Sharma and Niranjana, 2018). Consequently, they represent a valuable dietary option for individuals with gluten intolerance or those seeking nutritionally balanced diets.

In addition to their nutritional value, millets demonstrate considerable culinary versatility. They can be incorporated into a wide range of food products, including breads, baked goods, granola, snacks, and energy bars. Traditionally, millets have been used in culturally significant dishes such as ragi roti in India, ugali in Africa, and millet porridge in China. They are also utilised in fermented beverages, complementary infant foods, and as substitutes for staple grains such as rice, pasta, and couscous. Increasing interest in millet-based product development, particularly

within the gluten-free market, reflects their growing commercial relevance (Deshpande et al., 2021). Historically perceived as a “poor man’s food,” millets are now gaining recognition as functional and health-promoting foods (Shah et al., 2024). In India, although traditionally used for animal feed, millets are increasingly marketed for human consumption and are emerging as a novel food category.

Consumer food choices play a pivotal role in shaping food production systems and policy decisions through demand-driven mechanisms (Mozaffarian et al., 2018). Therefore, understanding the factors influencing consumer acceptance of millets is essential for promoting their integration into modern diets. Extensive interdisciplinary research has explored consumer food choice behaviour, identifying a complex interplay of individual, social, and environmental determinants. Several theoretical frameworks, including the Health Belief Model (Rosenstock, 1974), Theory of Reasoned Action (Fishbein and Ajzen, 1977), and the Theory of Planned Behaviour (Ajzen, 1985), have been widely applied to examine food choice behaviours. Early work by Lewin (1943) identified four primary determinants of food choice: taste, health, cost, and social influences. Subsequent research has expanded on these dimensions to incorporate cognitive, behavioural, and motivational factors, including habit formation and hedonic preferences (Köster, 2009). Contemporary research highlights three overarching categories influencing food choice: food-related attributes (e.g., sensory characteristics, packaging, and information), individual factors (e.g., biological and psychological traits), and societal influences (e.g., cultural norms, economic conditions, and policy frameworks) (Chen and Antonelli, 2020). However, no single model fully captures the complexity of food choice behaviour (Nestle et al., 1998). Modern dietary decisions are shaped by dynamic interactions among contextual, cultural, psychological, and economic variables, as well as broader environmental and policy-related factors (Tuorila and Hartmann, 2020).

This study adopts the Theory of Trying (Bagozzi and Warshaw, 1990) as its conceptual foundation, as it emphasises individuals’ motivations and intentions to experiment with new products rather than focusing solely on consumption behaviour. This approach facilitates an understanding of factors such as curiosity, perceived risk, social influences, and anticipated challenges that shape willingness to try novel foods, including millets.

A conceptual framework based on the Theory of Trying is employed and extended to incorporate additional dimensions, including altruistic, egoistic, habitual, conditional, and functional factors. (Fig 1). These dimensions capture a broader range of influences on consumer decision-making related to novel food adoption. Altruistic motivations reflect concerns for environmental sustainability and social responsibility, whereas egoistic motivations prioritise personal benefits such as health and sensory satisfaction. Habitual factors relate to familiarity and established consumption patterns, while conditional and functional factors encompass external influences such as price, availability, accessibility, and marketing. These factors are not mutually exclusive and may interact dynamically in shaping consumer behaviour. For instance, an individual may exhibit strong environmental concerns (altruistic) and health motivations (egoistic), yet face barriers related to unfamiliarity (habitual) or limited availability (conditional). Understanding these interactions is critical for developing effective strategies to promote the adoption of millets and other novel foods (Cuevas et al., 2017).

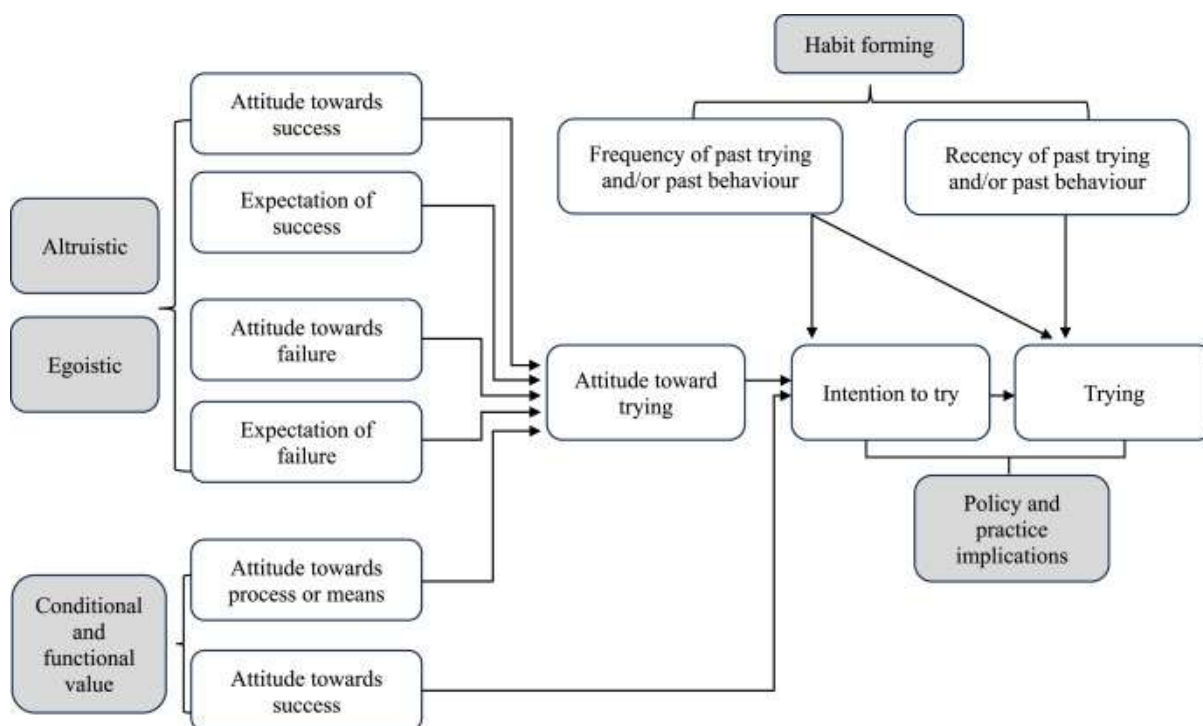


Figure 1: Conceptual framework extending the Theory of Trying Adapted from: Bagozzi and Warshaw (1990). (Source: Influencing factors towards consumer acceptance of millet as a food source, International Journal of Gastronomy and food science, Volume 40)

In the Indian context, millets are processed into a diverse range of products, including flours, ready-to-cook mixes (e.g., dosa, idli, and khichdi), snacks, pasta, noodles, and baked goods. Common varieties such as jowar, bajra, and ragi are widely utilised in traditional and modern food applications. Additionally, value-added products such as millet flakes, cookies, muesli, and ready-to-eat items are increasingly available in the market. These products are often positioned as organic and gluten-free, catering to health-conscious consumers. Major production regions include Rajasthan, Karnataka, and Maharashtra, where millets are frequently blended with other grains to enhance sensory properties and consumer.

Objectives of the Study

The study is designed with the following objectives:

- 1) To study the various opportunities involved in millet products.
- 2) To understand various factors affecting consumer behaviour towards millets consumption

Scope of the Study

The market is segmented based on the variety of product, millet type, pricing, and sales channels. In line with most nations' millet, organic foods occupy the most prominent position, with an estimated rise in the Indian populations. The study may benefit marketers, businesses, government, and academicians. This study may be able to inform marketers to understand the various opportunities evolve in the organic food industry and millet market. For scholars and academic researchers, the current study forms a basis upon which future research on various types of millets and products may be established. The findings may be resourceful in providing

viable information to academicians, researchers and consumers on various concepts related to millet products and organic foods industry.

Methodology

The research made use of primary data, which was collected using structured questionnaires. The sample size for the study consists of seventy-five respondents. The questionnaire was prepared in such a way to gather data from the respondents which will be helpful attaining the objectives of the study. The collected data was scrutinized, tabulated, and analysed using simple statistical techniques. The results are expressed as number establishing the relationships between two variables. Secondary research was conducted by using literature review from various sources to understand about the millet products as well as the consumer behaviour.

Limitations of the Study

- The main limitation of the study was time constraint.
- The sample size is limited to seventy-five respondents and hence the result of the study cannot be taken as universal.
- Findings of the survey assume that the respondents have given correct information.
- The study was conducted only in Navi Mumbai and therefore, several potential samples outside the city could not be covered.

Findings and Analysis

The findings based on the primary data collected are collectively given here. The study established the evolving opportunities and trends in the millet food industry. Most of the respondents are from urban areas and are aged between 25 to 74 years. Most of the respondents were graduates. Majority of the respondents chose millet biscuit as their preference.

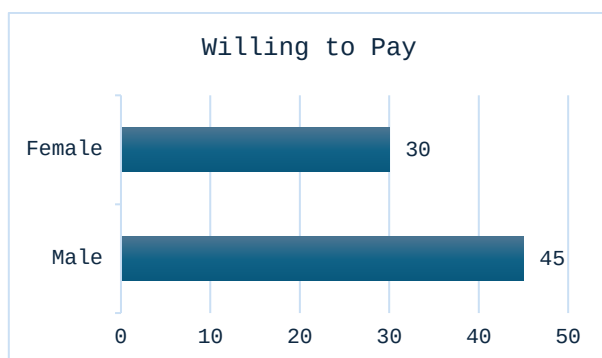


Figure 2: Willingness to pay

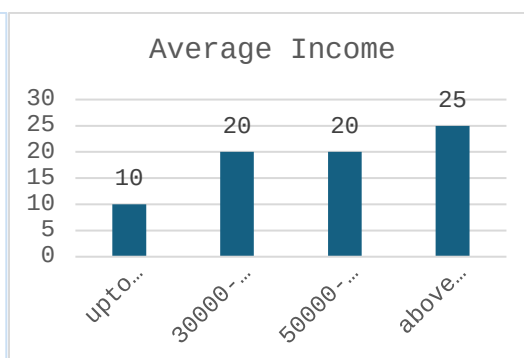


Figure 3: Average Income

Primary data from the above graph (Fig2), shows that males are willing to pay significantly more than females. There is a clear gender gap in willingness to pay, with males showing higher spending intent. This could suggest differences in perceived value, income levels, or purchasing priorities between the groups. This result suggests that the millet-based products may be worth considering **gender-based pricing strategies or targeted marketing**.

The graph (Fig3) demonstrated average income distribution across four income brackets and it is understood that the highest income group (above 1 lakh) displayed the largest value (25), indicating a relatively stronger presence or contribution from high income people. The middle-income groups (Rs.30,000–Rs.100,000) are equal (20 each), suggesting a balanced distribution in this range. The lowest income group (up to Rs.30,000) has the smallest value (10), meaning fewer individuals or lower contribution from this segment. Overall, the distribution is skewed toward higher income levels, with more weight in upper brackets compared to the lowest one.

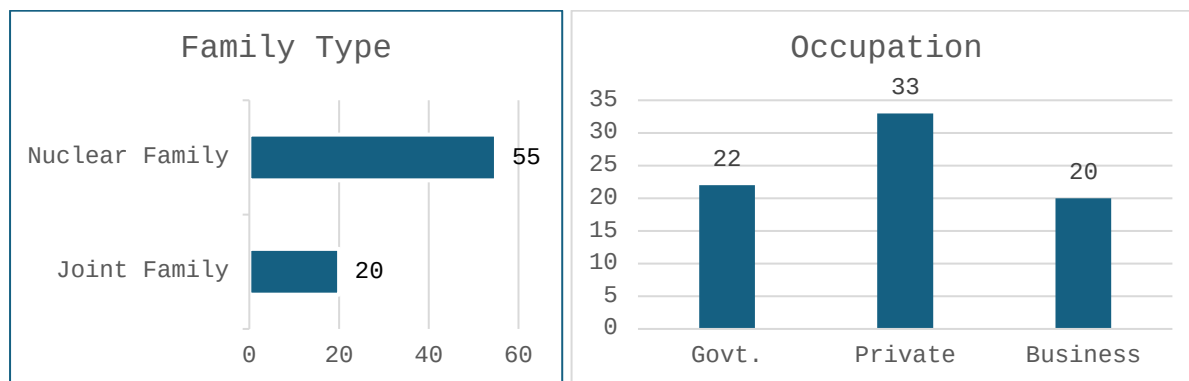


Figure 4: Preference based on Family Type **Figure 5: Preference based on occupation**

It is clear from the above graph (Fig 4) that majority belonged to nuclear families, significantly higher than joint families who had strong preference towards millets. This suggests a shift toward smaller, independent household structures. For decision-making (e.g., marketing or product design), focusing on nuclear family preferences may yield better results, though joint families still represent a notable segment.

From the graph (Fig5), it is revealed that the private sector dominates, employing significantly more people than the other two categories who have preference towards millets-based food. Government and business sectors are relatively close, with only a small difference of 2. There is a clear preference or trend toward private employment compared to self-employment (business) or public sector jobs. Overall, the data suggests that people belonging to private sector find millet-based food options better as compared to other foods, while people in business have least preference among the three.

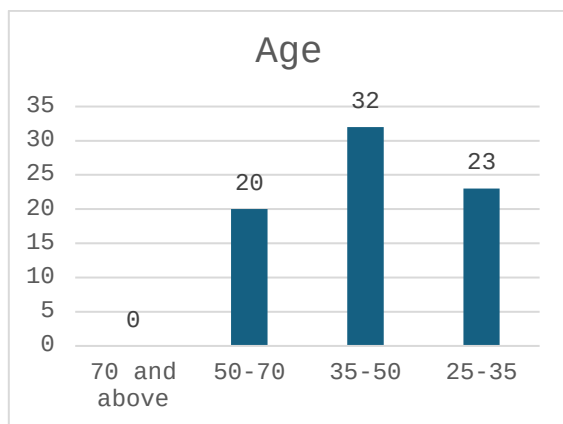


Figure 6: Age of the respondents

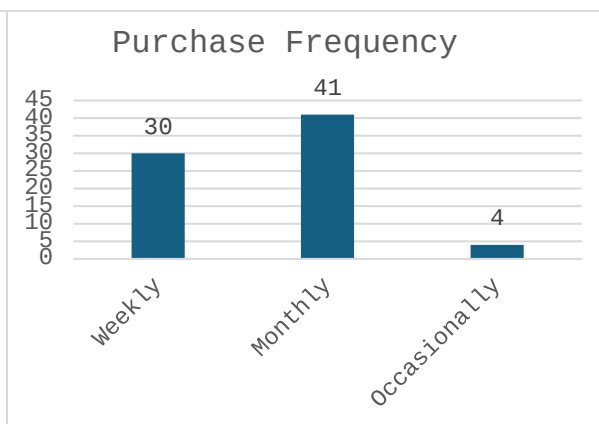


Figure 7: Purchase Frequency

The bar graph titled “Age” (Fig6) demonstrated the distribution of people across different age groups and the finding shows that the 35–50 age group dominated, indicating that most individuals fall in the middle-age category. The young adult group (25–35) also has a significant presence, but less than the 35–50 group. Participation declines in the 50–70 age group, suggesting fewer older individuals. There are no individuals aged 70 and above, indicating either absence or negligible representation in the data. The data is skewed toward middle-aged individuals, with very limited representation of older age groups and none in the senior-most category.

Majority of people preferred monthly purchases, making it the most common buying pattern. A significant number also shop weekly, indicating regular consumption habits. Very few people purchase occasionally, suggesting that infrequent buying is uncommon. Overall, the data indicated that consumers tend to follow a regular purchasing cycle, with monthly shopping being the most dominant behaviour, followed by weekly purchases, while occasional buying is rare. (Fig7).

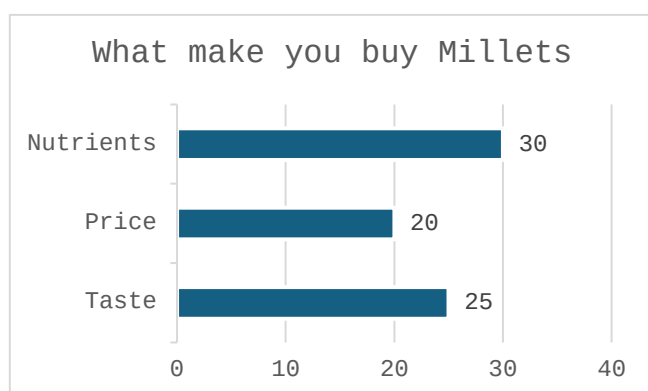


Figure 8: Reasons for purchasing millets

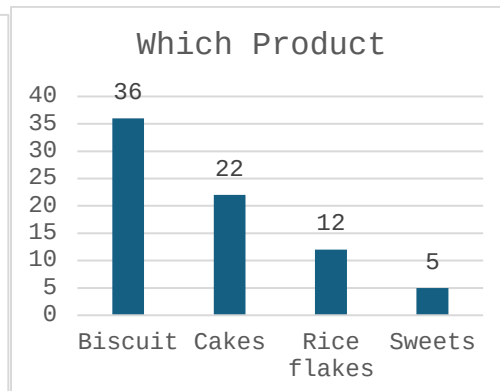


Figure 9: Various products of millets

The above graph highlights the key factors influencing purchase decisions. Nutritional value was observed to be the primary driver, indicating that most consumers chose millets for their health benefits. Taste was also an important factor, demonstrating that consumers care about flavour along with health. Price is the least influential, suggesting that buyers are willing to pay more for quality and health benefits. Consumers are mainly health-conscious, prioritizing the nutritional benefits of millets, while taste also plays a significant role and price is comparatively less important. (Fig8)

The above graph titled “Which Product” demonstrated the popularity of different millet-based products. From the above figure (Fig9), it is important to note that biscuits were the most preferred product (36), indicating strong consumer demand for convenient, ready-to-eat options. Cakes (22) held moderate popularity, suggesting baked goods are well accepted. Rice flakes (12) demonstrated lower preference, possibly due to less familiarity or usage. Sweets (5) were the least popular, indicating limited demand in this category. Consumers showed a clear preference for millet-based snack items, especially biscuits, while traditional or less common products like sweets and rice flakes are less favoured.

Conclusion

The present research contributes to a deeper understanding of consumer food choice behaviours, particularly in relation to emerging and novel food sources such as millet. It identifies key factors shaping consumer needs and preferences, which may assist in anticipating future consumption trends, informing the strategic promotion of millet, and guiding product development initiatives. The findings hold relevance for policymakers in designing interventions, including supportive policies, investment in local agriculture, and public education campaigns aimed at fostering healthier and more sustainable dietary practices at the population level. It is recommended that future studies on consumer behaviour adopt the proposed framework to systematically evaluate population-level determinants influencing individuals’ willingness to consume millet. Such an approach would enable a comprehensive examination of factors including social and subjective norms, environmental attitudes, health beliefs, accessibility, convenience, and product attributes that collectively shape consumer acceptance. Furthermore, the framework may facilitate the identification of specific demographic segments with a higher propensity to adopt millet, thereby supporting the development of targeted marketing strategies to encourage wider adoption.

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