



A Study on Consumer Awareness of Functional Dairy Foods in Northern India

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ABSTRACT

Background: Functional dairy foods represent a rapidly expanding segment of the Indian dairy market, but consumer awareness varies across income groups and geographical areas in Northern India.

Methods: A primary survey of 640 consumer households was conducted across seven cities, namely Delhi, Chandigarh, Jaipur, Jammu, Karnal, Alwar and Kathua, using purposive multistage stratified random sampling during year 2024-25. Cumulative square root frequency approach, Descriptive statistics, percentages and cross-tabulation methods were used for analysis.

Result: The overall awareness was 73.75 per cent, but the awareness before explanation of functional dairy foods was only 15.47 per cent reflecting a wide knowledge gap. Awareness varied from 91.43 per cent in Delhi to 46.25 per cent in Kathua. Income had a significant effect on consumer behaviour towards functional dairy foods, with only 6.59 per cent of high-income households being fully unaware as compared to 36.11 per cent in the low-income group. Social media was the primary source of information (40.68%) followed by television advertisement (19.70%) and friends/relatives/neighbours (18.86%). The awareness gap in semi-urban and rural areas requires targeted digital communication strategies and campaigns in regional languages.

Key words: Awareness, Consumer behaviour, Functional dairy foods, Social media, Source of information.

INTRODUCTION

India is the world's largest producer of milk, with an annual output exceeding 248 million metric tonnes and a share of nearly 23 per cent in global milk production (IMARC Group, 2025). Over the years, the country's dairy sector has been undergoing a major structural change from conventional liquid milk to functional dairy foods. Functional dairy foods are those that, on account of physiologically active components, confer health benefits over and above basic nutrition (IOM/FNB, 1994). Functional dairy foods includes probiotic curd, probiotic yogurt, probiotic lassi, shrikhand, fortified milk, non-fermented probiotic drinks, malted milk products, whey protein products, baby and infant foods, fat-rich products and frozen functional desserts.

The concept of functional foods was originated in Japan in the mid-1980s under the FOSHU (Food for Specified Health Uses) regulatory framework. "The global functional dairy foods market was valued at USD 48,600 million in 2025 and is projected to reach USD 74,100 million by 2035 at a compound annual growth rate of 4.5 per cent (Future Market Insights, 2025). Within India, the fortified dairy products market stood at USD 6.2 billion in 2025 and is expected to grow at 6.27 per cent annually during years 2026-2034 (IMARC Group, 2025). The probiotic and prebiotic foods segment is projected to grow at 16.50 per cent per annum during 2025-2033 (IMARC Group, 2024)". The northern part of India is a very relevant place for a study on the awareness of functional dairy foods because states like Delhi, Haryana, Punjab, Rajasthan and Jammu and Kashmir contribute large share to the milk production and consumption of India. Cities like Delhi, Chandigarh, Jaipur and Jammu represent diverse socio-

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economic profiles whereas Karnal, Alwar and Kathua are representatives of semi-urban dynamics. Consumer awareness of functional dairy food compared to a conventional product is still limited, especially in areas outside of metropolitan centers. Studies in metropolitan Delhi showed that while brand awareness for probiotic products was high at 98.8 per cent, only 71 per cent were regular consumers (Das *et al.*, 2017). Similar patterns were also confirmed for Ranchi city by Kerketta *et al.* (2023). Dhasarathan *et al.* (2024) in Tamil Nadu reported 84 per cent awareness with television advertisement as main source of information. Arora *et al.* (2021) observed moderate awareness and low technical knowledge among consumers in Sonipat, Haryana. Shireen and Aneesh (2021) in their review on probiotic awareness in India noted that most studies were confined to urban, middle to high-income households. No such comprehensive study has been carried out in Northern India that simultaneously examines this awareness gap across income groups, area types and districts in multiple cities. Therefore, the present study was conducted to study

consumer awareness regarding functional dairy foods and their sources of information in seven selected cities of Northern India.

MATERIALS AND METHODS

The present study was conducted during 2024-25 across seven cities of Northern India. The survey was planned and coordinated from the Division of Dairy Economics, Statistics and Management, ICAR-National Dairy Research Institute, Karnal. Delhi, Chandigarh, Jaipur, Jammu were selected as main urban areas while Karnal, Alwar and Kathua represented semi-urban areas along with their adjacent rural areas.

A purposive multistage stratified random sampling design was used for the selection of sample consumer households. A total of 640 consumer households were selected: 175 from Delhi, 75 each from Chandigarh, Jaipur and Jammu and 40 each from semi-urban and rural areas of Karnal, Alwar and Kathua. Structured personal interview schedules were used for primary data collection. The entire sample was stratified into three income groups using the cumulative square root frequency approach of Dalenius and Hodges (1959) as given below:

$$L = Y^{i-1} + (Y^i - Y^{i-1})/\sqrt{f_i} \times [(i \times Sk\sqrt{L}) - S^{i-1}]$$

Table 1: Distribution of sample consumer households by location.

Area	Location	No. of consumer respondents
Urban	Chandigarh	75
	Delhi	175
	Jaipur	75
	Jammu	75
Urban total		400
Semi-Urban	Karnal	40
	Alwar	40
	Kathua	40
Semi-Urban total		120
Rural	Karnal Rural	40
	Alwar Rural	40
	Kathua Rural	40
Rural total		120
Grand total		640

Figures indicate number of respondents.

Where,

L= Number of strata.

Y^{i-1} = Lower limit of the class in which L^i lies.

Y^i = Upper limit of the class.

$\sqrt{f_i}$ = Square root of frequency of i^{th} class.

S^{i-1} = Cumulative square root of frequency of preceding class.

$Sk\sqrt{L}$ = Cumulative sum of square roots up to stratum k.

Awareness was assessed at two stages: Awareness before any explanation and aided awareness after a brief explanation accompanied by product examples. Descriptive statistics, percentages and cross-tabulations were used for analysis.

RESULTS AND DISCUSSION

Socio-economic profile of respondents

Table 1 presents the distribution of sample households by location. The total sample of 640 consumer respondents was distributed across urban (400), semi-urban (120) and rural (120) areas, with Delhi contributing the largest share of 175 respondents.

The income distribution of the sample households is shown in Table 2. More than half of the respondents (56.25%) are from the low-income group with an average monthly family income of ₹ 66,968. The middle-income group comprised 29.53 per cent (average ₹ 1,29,423 per month) and high-income group 14.22 per cent (average ₹ 2,37,014 per month). The average monthly income of a family was ₹ 1,09,590 on an average. Average incomes of the three groups were significantly different from each other as indicated by different superscripts (a, b, c). These strata are broadly in line with findings from consumer surveys on dairy products in Indian cities (Das *et al.* 2017; Kerketta *et al.*, 2023).

The summary of the socio-economic characteristics of the sample is presented below. Nuclear families were predominant with 90.00 per cent. 62.81 per cent of samples were vegetarian. The main occupation of the households was salaried employment (50.00%), followed by self-employed (35.00%) and businessman (15.00%). These features are indication of the composition of the urban, semi-urban and rural consumer populations in Northern India.

The distribution by family type, food habit and occupation is also presented graphically in Fig 1, Fig 2 and Fig 3 to facilitate visual comparison.

Table 2: Average monthly income and distribution of sample households by income group.

Income group	Income range (₹/month)	Avg. monthly income (₹)	No. of households (%)
Low-income group	Up to ₹ 91,000 ^a	₹ 66,968	360 (56.25)
Middle-income group	₹ 91,000-₹ 1,75,000 ^b	₹ 1,29,423	189 (29.53)
High-income group	₹ 1,75,000-₹ 3,72,000 ^c	₹ 2,37,014	91 (14.22)
Overall		₹ 1,09,590	640 (100.00)

Figures in parentheses indicate percentage of total respondents (N=640). Different superscripts (a, b, c) denote that average incomes are significantly different across income groups ($P < 0.05$).

Major functional dairy food brands available in Northern India

Functional dairy foods are marketed in Northern India through national cooperatives, private companies and regional dairy federations. Functional dairy foods were classified into fermented and non-fermented functional dairy foods. Table 3 shows the main brands found in the seven cities of the study.

Awareness of functional dairy foods

The awareness level of functional dairy foods across different income groups is presented in Table 4. In total 73.75 per cent of the 640 respondents were aware of functional dairy foods but only 15.47 per cent of consumers were aware before any explanation. Another 58.28 per cent aware after explanation of functional dairy foods and 26.25 per cent were still completely unaware about the products. Govindrao (2013) found 83.00 per cent awareness with functional foods in urban Maharashtra and Haripriya and Mageshwari (2021) reported 73.70 per cent awareness in Tamil Nadu. Dhasarathan *et al.* (2024) reported 84.00 per cent awareness in districts of Chennai and Salem. Chaudhari *et al.* (2024) reported that social media, books and word-of-mouth were the major sources of awareness among students in Anand. Makwana and Raval (2025) reported moderate awareness and generally positive health beliefs among consumers of probiotic dairy foods in India.

There was a clear income gradient of awareness. The proportion of those who were not aware fell from 36.11 per cent for low-income households to 6.59 per cent for high-income households. The percentage of those who were aware only after the explanation increased from 49.17 per cent in the low-income group to 78.02 per cent in the high-income group. So, income not only decides whether consumers can afford these products, but also how open they are to learning about functional dairy foods. Das *et al.* (2017) and Parasuraman *et al.* (2021) have reported similar findings.

The district wise pattern of awareness is shown in Fig 4. Delhi had the maximum overall awareness at 91.43 per cent followed by Chandigarh at 89.33 per cent and Jaipur at 80.00 per cent. Kathua had the lowest awareness at 46.25 per cent, Alwar was at 52.50 per cent and Jammu at 60.00 per cent, also far behind the urban areas average. The share of those completely unaware was between 8.57 per cent in Delhi and 53.75 per cent in Kathua.

Source of information on functional dairy foods

Table 5 presents the sources through which aware respondents (n=472) first learned about functional dairy foods. Social media was the most important source (40.68 per cent), reflecting the dominance of Instagram, YouTube and WhatsApp in the Northern Indian cities. Television advertisement was second with 19.70 per cent followed by word of mouth through friends, relatives and neighbours with 18.86 per cent. The least was from

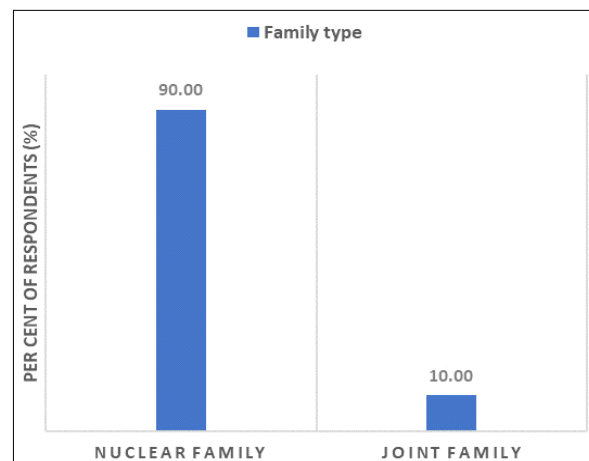


Fig 1: Distribution of sample households by family type in selected cities of Northern India (N=640).

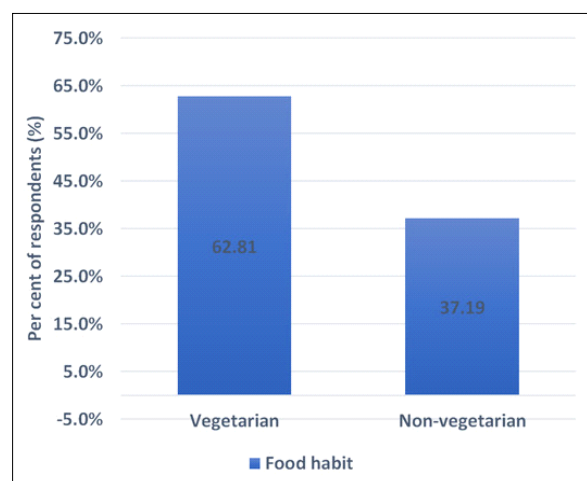


Fig 2: Distribution of sample households by food habit in selected cities of Northern India (N=640).

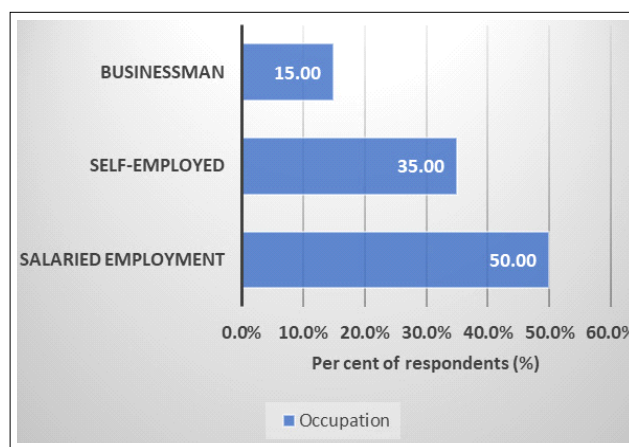


Fig 3: Distribution of sample households by primary occupation of household in selected cities of Northern India (N=640).

Table 3: Major market suppliers and brands of functional dairy foods in Northern India.

Market supplier	Product category	Brand name	Pack size/other information
Fermented products			
Amul (GCMMF)	Probiotic curd	Prolife probiotic dahi	200 g and 400 g tubs; pan-India
Mother Dairy	Probiotic curd	Nutrifit probiotic dahi	200 g and 400 g; Delhi-NCR
Nestlé India Pvt. Ltd.	Probiotic curd	ActiPlus dahi with probiotics	380 g at ₹ 77; metro cities
Verka (MILKFED Punjab)	Probiotic curd	Verka probiotic dahi	200 g and 400 g; Chandigarh, Karnal
Saras (RCDF Rajasthan)	Probiotic curd	Saras probiotic dahi	200 g cups; Jaipur, Alwar
KDIL (Kwality Dairy India Ltd.)	Probiotic curd	Dairy best fresh dahi	200 g and 400 g tubs; Delhi, Karnal
Country delight	Probiotic curd	Country delight probiotic dahi	Subscription doorstep delivery; Delhi-NCR
JKMPCL	Probiotic curd	Snowcap delight dahi	Pouch and cup packs; Jammu, Kathua
Amul (GCMMF)	Probiotic lassi	Amul prolife probiotic lassi	Pouch and cup packs; pan-India
Mother Dairy	Probiotic lassi	Nutrifit probiotic lassi	90 g tubs; Delhi-NCR
Verka (MILKFED Punjab)	Probiotic lassi	Verka probiotic lassi	Pouch packs; Chandigarh, Karnal
Saras (RCDF Rajasthan)	Probiotic lassi	Saras probiotic lassi	Pouch packs; Jaipur, Alwar
Amul (GCMMF)	Probiotic yogurt	Flaavyo Fruit Yogurt	100 g cups at ₹ 30; pan-India
Amul (GCMMF)	Shrikhand	Amul kesar shrikhand	100 g to 1 kg packs; pan-India
Nestlé India Pvt. Ltd.	Probiotic yogurt	Nestlé a+grekyo (Greek yogurt)	Cup packs; metro cities
Epigamia	Probiotic yogurt	Epigamia greek yogurt	85 g and 200 g cups; Delhi
Saras (RCDF Rajasthan)	Shrikhand	Saras shrikhand	Cup packs; Jaipur, Alwar
Verka (MILKFED Punjab)	Shrikhand	Verka shrikhand	Cup packs; Chandigarh, Karnal
Britannia Industries	Probiotic yogurt	Daily fresh probiotic yoghurt	100 g cups at ₹ 25; metro cities
Non-fermented products			
Amul (GCMMF)	Fortified milk	Amul gold/amul taaza	FSSAI + F certified; pan-India
Mother Dairy	Fortified milk	Mother dairy fortified milk	FSSAI + F certified; Delhi-NCR
Yakult Danone India Pvt. Ltd.	Non-fermented probiotic drink	Yakult original/light/mango	65 ml per bottle; ₹ 18 per bottle (₹ 90 for pack of 5); Lactobacillus casei shirota strain
Amul (GCMMF)	Non-fermented probiotic drink	Amul prolife probiotic drink	Ready-to-drink packs; pan-India
Mother Dairy	Non-fermented probiotic drink	Nutrifit probiotic drink	80 ml at ₹ 10; Delhi-NCR
Hindustan Unilever Ltd.	Malted milk foods	Horlicks/boost	Bottles and Tetra packs; pan-India
Reckitt/Heinz	Malted milk foods	Complan/protinex	Powder; 200 g to 500 g packs; pan-India
Nestlé India Pvt. Ltd.	Malted milk foods	Milo	Powder and ready-to-drink packs; pan-India
Amul (GCMMF)	Whey protein products	Amul whey protein powder	1 kg packs; pan-India
Epigamia	Whey protein products	Epigamia turbo protein	200 g cups; Delhi
Muscle blaze	Whey protein products	Muscle blaze whey active	1 kg packs; e-commerce and gymnasiums
Nestlé India Pvt. Ltd.	Baby and infant foods	NAN pro/lactogen/cerelac	Powder; regulated under FSSAI IMS Act
Yakult Danone India Pvt. Ltd.	Baby and infant foods	Danone aptamil	Powder; Stage 1, 2 and 3
Abbott India	Baby and infant foods	Similac/pedia sure/ensure	Powder; regulated under FSSAI IMS Act
Amul (GCMMF)	Baby and infant foods	Amulspray infant milk food	Powder; 200 g to 500 g packs
KDIL (Kwality Dairy India Ltd.)	Fat rich products	Dairy best livlite	85% low-cholesterol ghee
Amul (GCMMF)	Frozen products	Prolife probiotic ice cream/sugar free ice cream	125 ml to 1.25 L; ₹ 25 to ₹ 120

Source: Primary survey (2024-25) and company websites. GCMMF= Gujarat Co-operative milk marketing federation; MILKFED= Punjab state cooperative milk producers federation; RCDF= Rajasthan cooperative dairy federation; KDIL= Kwality dairy India Ltd.; JKMPCL = Jammu and Kashmir Milk Producers Co-operative Ltd.; FSSAI= Food safety and standards authority of India; IMS act= Infant milk substitutes, feeding bottles and infant foods (Regulation of production, supply and distribution) act.

newspapers at 9.75 per cent while 11.02 per cent was from Internet-based searches. This social media dominance contrasts with Dhasarathan *et al.* (2024) who found television advertisement as the primary source in Tamil Nadu and Das *et al.* (2017) who found electronic media, internet and friends as roughly equally important in Delhi. This shift towards social media is consistent with the accelerated pace of digital adoption in India, where internet and smartphone usage have expanded significantly among urban and semi-urban areas during

the period 2020-2024 which has also been noticed by Chaturvedi *et al.* (2024) in their study of consumer behaviour patterns across the Indian dairy supply chain.

Fig 5 shows the district-wise source pattern. Social media was the most used source in all the seven cities, least in Delhi (37.50 per cent) and maximum in Jaipur (46.67 per cent). Regional cooperatives Verka and Saras invest significantly in broadcast advertising in Chandigarh (23.88%) and Jaipur (21.67%), where television advertisement was more prominent. Friends/Relatives/

Table 4: Awareness status of functional dairy foods by income group.

Awareness category	Low income (n=360)	Middle income (n=189)	High income (n=91)	Total (N=640)
Aware before explanation	53 (14.72)	32 (16.93)	14 (15.38)	99 (15.47)
Aware after explanation only	177 (49.17)	125 (66.14)	71 (78.02)	373 (58.28)
Completely unaware	130 (36.11)	32 (16.93)	6 (6.59)	168 (26.25)
Total	360 (100.00)	189 (100.00)	91 (100.00)	640 (100.00)

Figures in parentheses indicate percentage of total respondents within each income group.

Table 5: Source of information on functional dairy foods among aware respondents (n=472).

Source of information	No. of aware respondents	Per cent
Social media	192	40.68
Television advertisement	93	19.70
Friends/relatives/neighbours	89	18.86
Internet	52	11.02
Newspaper	46	9.75
Total	472	100.00

Figures indicate number and percentage of aware respondents (n=472).

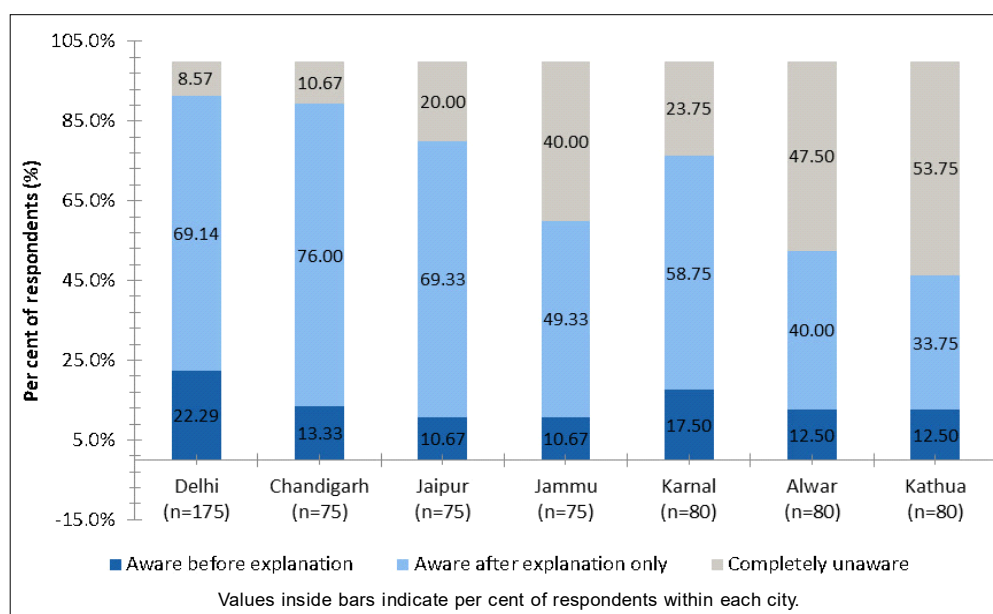


Fig 4: District-wise awareness status of functional dairy foods among sample households in selected cities of Northern India (N=640).

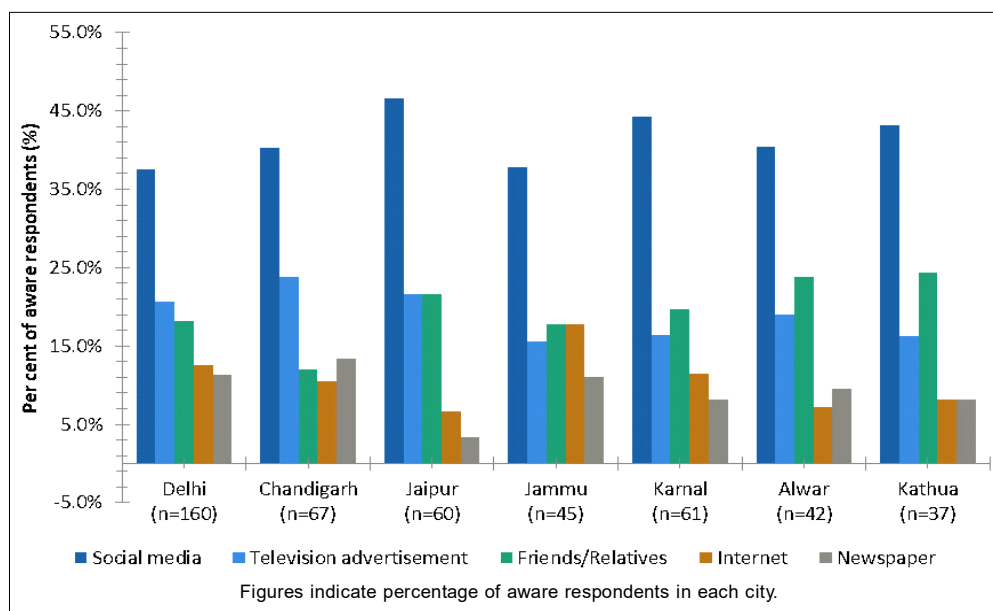


Fig 5: District-wise source of information on functional dairy foods among aware respondents in selected cities of Northern India (n=472).

Neighbours or word of mouth was relatively more significant in Alwar (23.81%) and Kathua (24.32%) in line with lower digital connectivity in smaller cities where personal networks compensate for limited media exposure. Internet was the most important in Jammu (17.78%) which might be indicative of the government-driven mobile connectivity schemes in the Union Territory.

CONCLUSION

The present study was carried out on consumer awareness of functional dairy foods in seven cities of Northern India covering 640 households during 2024-25. Overall awareness was at 73.75 per cent, but spontaneous awareness before explanation was only 15.47 per cent, showing a big difference between accidentally seeing the brand and knowing about the functional dairy foods category. Awareness rose sharply with income and urbanisation, from 63.89 per cent in low-income households to over 93 per cent in high-income households. Delhi and Chandigarh supported almost complete awareness while Kathua, Alwar and Jammu lagged far behind. Social media was the highest channel, accounting for over 40.00 per cent of information sources across all districts, followed by television advertisement. The study suggests that investment in targeted digital campaigns, regional-language social media content and on-ground awareness programmes in semi-urban and rural areas will be a good way to expand the functional dairy foods consumer base in Northern India.

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Disclaimers

The views and conclusions expressed in this article are solely those of the authors and do not necessarily represent the views of their affiliated institutions. The authors are responsible for the accuracy and completeness of the information provided, but do not accept any liability for any direct or indirect losses resulting from the use of this content.

Informed consent

Informed consent was obtained from all individual respondents included in the study prior to the primary survey.

Conflict of interest

The authors declare that there are no conflicts of interest regarding the publication of this article. No funding or sponsorship influenced the design of the study, data collection, analysis, decision to publish, or preparation of the manuscript.

REFERENCES

- Arora, S., Prabha, K., Sharanagat, V.S. and Mishra, V. (2021). Consumer awareness and willingness to purchase probiotic food and beverage products: A study of Sonapat district, Haryana. *British Food Journal*. **123**(8): 2805-2817.
- Chaturvedi, A.K., Singh, R. and Tiwari, C.K. (2024). Consumer behavioural patterns towards milk and dairy products: An analytical investigation of an Indian dairy supply chain. *Asian Journal of Dairy and Food Research*. **43**(4): 774-783. doi: 10.18805/ajdfr.DR-2175.

- Chaudhari, A., Gurjar, M.D., Kamani, K.C., Prajapati, M.C. and Makwana, A.K. (2024). A study of awareness and student's buying behaviour towards probiotic dairy products at Anand City, India. *Journal of Scientific Research and Reports*. **30(8)**: 66-72.
- Dalenius, T. and Hodges, J.L. (1959). Minimum variance stratification. *Journal of the American Statistical Association*. **54(285)**: 88-101.
- Das, A.K., Kulkarni, S.D. and Biradar, M.S. (2017). Consumption pattern and consumer preferences for fermented probiotic dairy products: A study in metropolitan Delhi. *Indian Journal of Dairy Science*. **70(4)**: 468-476.
- Dhasarathan, M., Mandal, S., Sen, B. and Singh, A. (2024). Consumption of functional dairy foods in Northern Tamil Nadu: Pattern and key drivers. *Agricultural Economics Research Review*. **37(2)**: 213-226.
- Future Market Insights (2025). Functional Dairy Products Market Size, Trends and Forecast 2025-2035. Future Market Insights, Dublin.
- Govindrao, H.P. (2013). Consumption Pattern and Consumer Preferences for Fermented Functional Dairy Foods in Mumbai and Pune. M.Sc. Thesis, ICAR-National Dairy Research Institute (Deemed University), Karnal.
- Haripriya, S. and Mageshwari, U. (2021). A study on consumer knowledge, attitude and consumption pattern of functional foods and nutraceuticals in Tamil Nadu, India. *Annals of the Romanian Society for Cell Biology*. **25(6)**: 14686-14696.
- IMARC Group (2024). India Prebiotic and Probiotic Foods Market: Size, Share, Trends and Forecast 2025-2033. IMARC Group, New Delhi.
- IMARC Group (2025). India Fortified Dairy Products Market: Size and Share Forecast 2026-2034. IMARC Group, New Delhi.
- IOM/FNB (1994). Opportunities in the Nutrition and Food Sciences. National Academy Press, Washington D.C.
- Kerketta, A., Sen, B., Chaudhary, U. and Verma, A. (2023). Consumption of dairy-based functional foods influenced by socio-economic conditions: A study in Ranchi city. *Research and Reviews: Journal of Dairy Science and Technology*. **12(2)**: 1-10.
- Makwana, A.K. and Raval, D.C. (2025). A study on consumer attitude toward functional dairy foods enriched with probiotics. *World Journal of Advanced Research and Reviews*. **28(2)**: 403-407.
- Parasuraman, B., Singh, P., Nachimuthu, S., Arumugam, V. and Kumar, A. (2021). Consumers' choice and preferences of dairy based products. *The Indian Journal of Animal Sciences*. **91(11)**: 998-1001.
- Shireen, A. and Aneesh, M. (2021). Knowledge and consumption of probiotics and prebiotics in India: A narrative review. *International Journal of Community Medicine and Public Health*. **8(10)**: 5119-5126.