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Consumer perception for dairy based functional products in Ranchi city

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Abstract

The present study attempted to explain some of the factors which influenced the consumer's perception regarding the consumption of the dairy-based functional foods. The monthly per capita consumption expenditure of households on the dairy-based functional foods was considered as dependent variables and influenced by the age of head of households, income of household, education of the head of households, type of occupation of the head of household and Dietary pattern of the household etc. The primary data were collected from the six wards of the Ranchi city. The perception index was slightly higher for income group III (0.709) compared to income group II (0.690) and income group I (0.642). The most important attribute for consumers was the economic attribute (0.712), followed by the safety attribute (0.691), nutrition and health attribute (0.663), and sensory attribute (0.652). The major constraints identified by consumers were lack of awareness and knowledge (0.88), followed by low availability (0.74), high price (0.71), less tasty (0.67), and low confidence (0.63). Study revealed that consumers, irrespective of their level of education or awareness of functional dairy foods, were hesitant to compromise on the flavour of dairy items, irrespective of how nutritious the product might be.

Keywords: Probiotic drinks, fortified milk, multiple regression, Likert perception index

Introduction

The health benefits of milk and dairy products are known to humanity since medieval times and may be attributed to the biologically active components that are present in milk and their suitably modulated activities produced through the action of probiotic bacteria, in the fermented milk products (Slavica and Mirjana, 2023) [12]. Milk is an essential component of the daily diet as the humans consume milk throughout their life in major regions of the world (Rani *et al.*, 2022) [8]. Besides to fresh milk, several dairy products such as cream, butter, yogurt, kefir, and cheese have been produced and consumed on very large scale (Das and Horo, 2019) [4]. The impact of dairy based functional food on human health is quantitatively relevant and has been the subject of number of investigations, on both whole products and their isolated components (Robu *et al.*, 2022b) [10]. Besides the modification of several milk components, probiotics may also act directly as preventive agents, or in therapy of some severe diseases (Agrawal and Centre, 2021). The health-promoting mechanisms of probiotic action are mostly based on the positive effect they exert on the immune response due to stimulation of natural immunity (Teoh *et al.*, 2021) [13]. Dairy-based functional foods are also one of the world's most intense areas of food product innovation (Moodi *et al.*, 2021) [6]. The global dairy-based functional food market, valued at 42.2 billion US dollars, is expected to rise at a CAGR of 4.3% from 2022 to 2032 (Future Market, 2022) [5]. Indian Dairy-based functional food market is expected to grow at the rate of 5.7% between 2022 and 2032 (Shireen *et al.*, 2021) [11]. Major. Among these products, Probiotics and Fortified Milk are the most common (Robu *et al.*, 2022a) [9]. As the consumers' perception about a product had been highly influenced by customer's own personal thoughts, opinions, and principles (Phan *et al.*, 2020) [7]. If consumers' perception were known than one can point out what were the important factors which consumers had considered before buying any product from the market. Therefore, knowing how consumers perceive dairy-based functional foods was very important for the success of the product. Studies on consumer behaviour, consumption habits, food preferences, and attitudes towards dairy-based functional foods are extremely uncommon in India and practically absent in tier 2 cities. The present study was undertaken to understand the Consumer perceptions for the dairy-based functional foods in the Ranchi city of Jharkhand.

Materials and Methods

The land of forest i.e. Jharkhand has comprised of an area of 79,714 km² with 29.61% forest area and owns about 40% of the total mineral resources of the country. The state is located in eastern India that was carved out from the former southern half of Bihar in the year 2000. The longitude and latitude coordinates of the state are 83°20' to 87°58'E longitude and 21°57' to 25°14' N latitude. The Ranchi district out of the twenty-four districts in the state has been considered for this study. Total of 180 respondents were selected from six different wards in random fashion from the Ranchi city area as thirty respondents were surveyed from each ward of the Ranchi city namely Singhmore, Kanke, Lalpur, Ratu, Harmu and Kanatlatoli.

Functional analysis

The factors would influence the consumption of dairy-based functional foods estimated by functional analysis from the collected primary data from Ranchi city. The monthly per capita consumption expenditure of households (Y) on the dairy-based functional foods was considered as dependent variables and the factors like age of head of households (X₁), income of household (X₂), education of the head of households (X₃), occupation of the head of household (X₅) and Dietary pattern of the head of household (X₆) are considered as independent variables. The linear multiple regression models were selected for further analysis since it was the best-fitted model.

The multiple regression model is represented as follows

$$Y_i = \alpha_i + \sum_{j=1}^5 \beta_j X_{ij} + \mu_i \quad \forall i = 1 \dots 180$$

Y₁ = Per capita monthly consumption expenditure of households on fortified milk (₹)

Y₂ = Per capita monthly consumption expenditure of households on probiotic drink (₹)

X₁ = Age of head of household (in years)

X₂ = Family monthly income (₹)

X₃ = Education of head of the household (Dummy variables value 0 for below graduation and value 1 for above graduation)

X₄ = Occupation of the head of household (Dummy variables value 0 for non-fixed salaried person and 1 for salaried person)

X₅ = Dietary pattern of household (Dummy variables value 0 for vegetarian and 1 for non-vegetarian)

Construction of perception index

Likert scale has been mostly utilised of the rating scales that have been created for the direct measuring of the attitudes in consumer surveys. In its final form, the scale has used either a five- or seven-points that enabled the respondents to indicate how strongly agree or disagree with a particular claim in the utility surveys. The consumer perception on the consumption of the dairy-based functional foods has been studied with a five-point Likert scale. The major four attributes were identified to obtain consumers perception for the consumption of the dairy-based functional foods for the current study - i) Nutrition and Health attributes; ii) Safety attributes; iii) Economic attributes and iv) Sensory attributes along with the five variables were also identified to study the perceived constraints of the respondents for the consumption of the dairy-based functional foods as a) High Price; b) Low Availability; c) Less tasty; d) Low confidence and e) Lack of Awareness & knowledge among the consumers of the Ranchi

city.

During the personal survey, the framed statements were put forward to the respondents in random order to avoid any type of biases. The responses were given scores for as per their level of agreement by the respondents as strongly disagree scored as (1), disagree (2), neither agree nor disagree (3), agree (4), and for strongly agree (5). The Perception Index was calculated by using the following formula as:

$$\text{Perception Index} = (5N_5 + 4N_4 + 3N_3 + 2N_2 + 1N_1) / A * N$$

N₅ Number of respondents for strongly agree

N₄ Number of respondents for agree

N₃ Number of respondents for neutral / neither agree nor disagree

N₂ Number of respondents for disagree

N₁ Number of respondents for strongly disagree

A denoted the highest weight that equalled to 05 and N was the total number of respondents i.e. 180

Results and Discussion

Determinants for consumption expenditure

The current study tried to examine various factors which effected the consumption of dairy-based functional foods. Usually, it was believed that income of household, consumers age, education level of consumers, occupation, and food habit of consumers households affect the consumption of dairy-based functional food.

The results of analysis showed that income, education, occupation and food habit of consumers had significant impact on monthly per capita consumption expenditure of fortified milk. Family monthly income was found to be significant at 1% level, education and occupation of consumers were found to be significant at 10% level and food habits of the respondents were significant at 5% level. It can be observed from the table that a unit increase in the consumers monthly income caused an increase in monthly per capita consumption of fortified milk by ₹0.0124 (Table 1). The fixed income earners were spending ₹94.40 more on fortified milk than non-fixed earners. Further consumers with education level of graduation and above had spent ₹82.15 or more than consumers which were below graduation level. Food habits too was found to had significant effect results showed that vegetarians spend ₹83.67 more than non-vegetarian consumers for the consumption of fortified milk. The results of analysis showed that income, education, and occupation of consumers have significant impact on monthly per capita consumption expenditure of probiotic drink. Family monthly income, age and education were found significant at 1% level and occupation was found significant at 5% level in the resent study conducted in Ranchi city of the Jharkhand state. A unit increase in the consumer's monthly income caused an increase in monthly per capita consumption of probiotic drink by ₹0.0038. As age increase consumers spend less money in probiotic drink by ₹ -17.18. The fixed income earners were spending ₹38.89 more than non-fixed earners. Consumers with education level of graduation and above spend ₹40.07 rupee more than consumers below graduation level.

Important attributes for dairy based functional food

The estimated relative importance for the attributes of the yakult original was shown in Figure 1. It was been discovered that source of availability (26.21) had the largest share in the average importance scores of attributes followed by health claims (22.00), quantity (20.34), price (19.84), packaging (11.59). It was observed that for yakult light the most important attribute was its health claim (37.592) followed by

the price (31.825), source of the availability (18.297), the quantity (10.281) and least important attribute was packaging of the product (2.005). The result showed that most important attribute for fortified milk by the consumers was its price (42%) followed by the quantity of milk (20%), the brand of milk (19%), the source of availability (15%) and at last one was the health claim (14%).

Consumers’ perception of dairy -based functional foods

Consumers’ perception on four important attributes namely: Nutrition and Health, Safety, Economics and Sensory were calculated. Perception Index was constructed to assess consumers’ perception of the dairy-based functional food and the results were presented in table1. The overall perception index came out to be 0.679. The magnitude of the perception index was marginally higher for the income group III (0.709), than from income group II (0.690) and income group I (0.642). Most important attribute for consumer was economic attribute (0.712) followed by safety attribute (0.691), nutrition & health (0.663) and lastly the sensory (0.652) as mentioned by Argin *et al.*, 2019 [2].

It was visible that for income group I, the economic attribute (0.697) and for income group II the economic attribute (0.741) was most important which meant above all other attributes consumers were very concerned about the pricing of the product, and then the easy accessibility of the product. The same observations were reflected in overall perception index values also where economic attribute (0.712) came out as the most important attribute. Whereas for income group III, gave most importance for safety concerns (0.747) which indicated that consumers were more sensitive towards how safely and how well researched the product. Additionally consumers also believed that government should promoted dairy-based function foods. Also, the accessibility and the affordability of the dairy-based functional foods should be increased for all the income groups among the consumers.

Constraints of the consumers

Making wise decisions required the constraints faced by the respondents on the consuming dairy-based functional foods. It made it possible for people to match their nutritional preferences with their particular needs and limits of expenditure. Understanding these constraints assisted in avoiding potential health risks as well as negative effects, if any.

Consumers perceived constraints for the consumption of dairy -based functional foods was presented in Fig. 4. Among various constraints, the highest perception score came out for the lack of awareness / knowledge (0.88) as observed in study by Ballco and Magistris, 2019. It's possible that many customers were unfamiliar with the idea of dairy-based functional foods or the particular health advantages provided by their usage. Low demand for certain goods might stem from this lack of awareness. The low availability of dairy-based functional foods scored a perception score of (0.74). In study area, dairy-based functional foods were available very sparsely limiting the consumer’s access to the products thus restricting the product consumption. High price for the dairy-based functional foods had a perception score for 0.71. Comparing functional dairy items to the conventional dairy goods might give the impression that the products were more expensive, some people might not include dairy-based functional foods in their diets by this notion only. Least taste and low confidence about the dietary advantages of the dairy-based functional foods scored 0.67 and 0.63 respectively. Consumers might have doubts or lack confidence in the effectiveness of dairy-based functional foods. Consumers could be encouraged to adopt the dairy-based functional foods by recognizing and overcoming these perceived barriers through more product innovation, better price tactics, detailed information, and the cultural sensitivity.

Table 1: Consumption of dairy-based functional foods across different income groups

Product	Particulars	Income group I	Income group II	Income group III	Overall
Probiotic Drink	Quantity (ml)	664.6	945	1238.8	949.4
	Expenditure (Rs.)	174.0	280.9	355.3	270
Fortified Milk	Quantity (l)	7.5	10	8	8.6
	Expenditure (Rs.)	365.9	501.2	689.5	518.8

Table 2: Factors affecting the monthly per capita consumption of fortified milk

Variable	Coefficients	Standard error
Intercept	-326.703	63.55
Age	-0.08211	18.34
Family Monthly Income	0.012466***	0.001
Education	82.15846*	49.68
Occupation	94.4012*	47.90
Food Habits	-83.6752**	40.05
R ² = 65%		

*** Significant at 1% level, ** significant at 5% level, * significant at 10% level

Table 3: Factors affecting the monthly per capita consumption of probiotic drinks

Variable	Coefficients	Standard error
Intercept	-23.62	20.042
Age	-17.18***	5.735
Family Monthly Income	0.00386***	0.00032
Education	40.07***	15.058
Occupation	38.89**	15.780
Food Habits	19.44	11.964
R ² = 69%		

*** Significant at 1% level, ** significant at 5% level

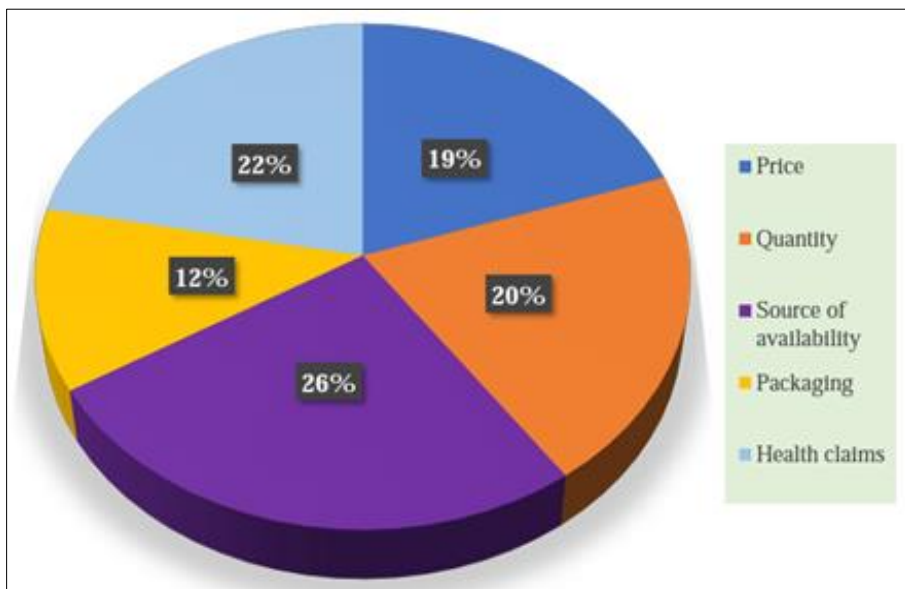


Fig 1: Relative Importance of attributes of yakult original

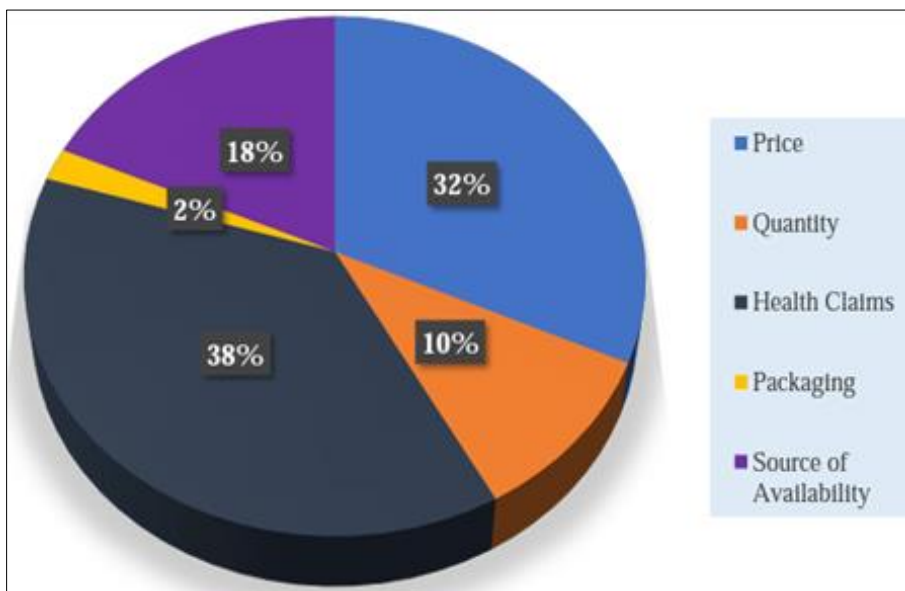


Fig 2: Relative Importance of attributes of yakult light

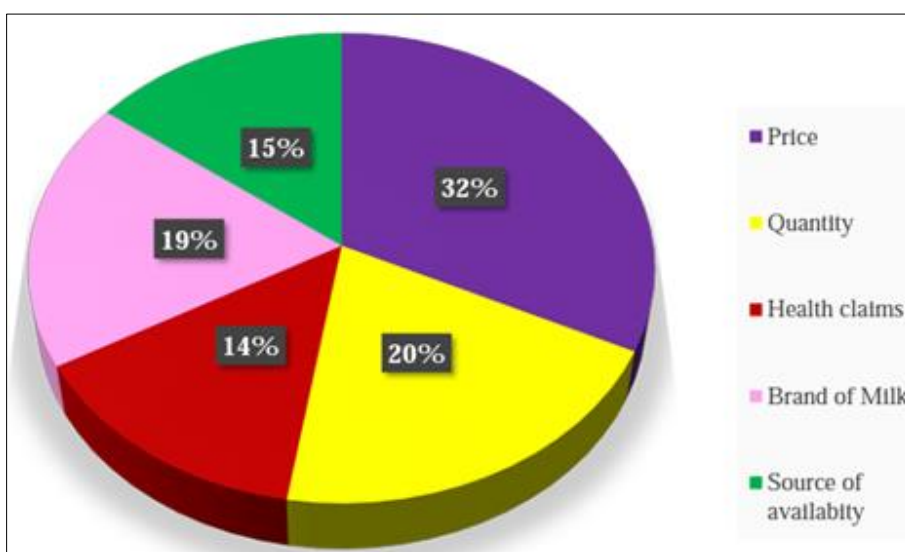


Fig 3: Relative Importance of attributes of fortified milk



Fig 4: Constraints perceived by respondents

Conclusions

The perception index was slightly higher for income group III as compared to income group II which in turn to income group I. The most important attribute for consumers was the economic attribute, followed by the safety attribute, nutrition and health attribute, and sensory attribute. The major constraints identified by consumers were lack of awareness and knowledge about the dairy based functional foods, followed by their low availability, high price, less tasty, and low confidence. The present study also pointed out that the consumers, irrespective of their level of education or awareness about the dairy based functional foods, were hesitant to compromise on the flavour of the dairy items, irrespective of how nutritious the product might be. The rising awareness of the consumers towards the health benefits of food has resulted in the development of the so-called functional foods. These added value products which refer to prevention and/or therapeutic effects of food beyond its nutritional value are especially useful for health improvement and reduction of medical care costs. The combination between health and nutrition and its potential to improve the quality of life has become one of the key attention points of consumers who are aware of and are seeking nutritional solutions to their health concerns.

Conflict of interest

Authors declared no conflict among them regarding publication of this manuscript.

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