

Consumption of Dairy-based functional Foods influenced by Socio Economic Conditions: Study in Ranchi City

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(Received: 24 June 2023; Revised: 15 July 2023; Accepted: 16 August 2023; Published: 15 September 2023)

(Published by Research Trend)

ABSTRACT: Functional dairy based foods can be defined as foods containing significant levels of biologically active components that provide specific health benefits besides the traditional nutrients. The top sources of information for dairy-based functional food among consumers in Ranchi city were TV advertisements (33%) and word-of-mouth (25%). Most of probiotic drinks were consumed occasionally as (39%) was observed nearly less than 3 times a month, while around 38% of respondents consumed fortified milk on a daily basis. Majority of the consumers had preferred retail shops to purchase the fortified milk (58%) and supermarkets for the purchase of the probiotic drinks (53%). The supermarkets were least preferred by consumers for the fortified milk (2%) while milk parlours observed least masses of consumers for the probiotic drinks (7%). The monthly average consumption of fortified milk for per capita was only 8.6 litres, with an expenditure of ₹518.8, while the corresponding figures for the probiotic drink was 949.4 ml, with an expenditure of ₹270. It was also found that the Income, education, and occupation had positively influenced the monthly per capita consumption expenditure of probiotic drinks and fortified milk, while age had significant negative impact on probiotic and food habits had significant negative impact of fortified milk. Policy makers should ensure the smooth availability of the functional dairy based products in the state.

Keywords: Functional dairy based food, probiotic drinks, fortified milk, dietary habits.

INTRODUCTION

Functional foods are described like any food items or food components that enhance the health besides ensuring the essential nutrition to human beings (Slavica and Mirjana 2023). These foods reduce the risk of lifestyle-related disorders by achieving physiological functions beyond nutritional effects (Robu *et al.*, 2022a). Functional foods should maintain their normal form of foods and may demonstrate their effects in amounts that can normally be expected to be consumed in the diet (Khalaf *et al.*, 2021). Functional milk products derive mainly from milk satisfactorily demonstrated to beneficially affect one or more target functions in the body, beyond adequate nutritional effects, in a way that significantly improves health and well being and/or reduces the risk of disease (Rani *et al.*, 2022). The term 'functional food' was introduced in Japan in mid 1980s for food products fortified with special constituents that possess advantageous physiological effects (Robu *et al.*, 2022b). Functional foods provide necessary nutrients for humans as well as to prevent nutrition-related diseases and improve physical and mental well-being of the consumers (Agrawal and Centre 2021). There is an increasing demand of functional foods in developed countries that can be explained by certain factors like increasing cost of healthcare, the steady increase in life expectancy and the desire of older people for improved quality of their later years (Moodi *et al.*, 2021). The dairy based products occupy a significant space in the

functional foods markets and, among the milk-derived functional products, probiotic and fortified milk are growing segments of this sector. Dairy-based functional foods are also one of the world's most intense areas of food product innovation. 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). Indian Dairy-based functional food market is expected to grow at the rate of 5.7% between 2022 and 2032 (Shireen *et al.*, 2021). 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 (Phan *et al.*, 2020). The present study was undertaken to understand the Consumption Pattern and Consumer Preferences for Dairy-Based Functional Foods in the Ranchi District of Jharkhand.

METHOD AND MATERIALS

Jharkhand also called as "The land of forest" has an area of 79,714 km² (30,778 sq. miles) with 29.61% forest area and owns about 40% of total mineral resources of the country. The state is located in eastern India that was carved out from the former southern half of Bihar on November 15, 2000. Its coordinates are 83°20' to 87°58'E longitude and 21°57' to 25°14' N latitude. Currently, there are twenty-four districts in the state, of which Ranchi District has been purposively selected for this study. The malnutrition is a serious public health

problem in Jharkhand state. As per Ministry of Health and Family Welfare(2016-17), 6.7% of children under the age of 5 years are Severe Acute Malnourished (SAM) in Jharkhand. The state of Jharkhand is one of the worst affected in India with acute Vitamin A and D deficiencies, to address this issue state government has launched various initiatives among which one of them is the fortification of milk. For the selection of respondents, different purchase locations dealt with dairy-based functional foods were identified in the study area. Total of 180 respondents were selected from six different wards in random fashion as thirty were selected from each of the wards of the Ranchi city namely Singhmore, Kanke, Lalpur, Ratu, Harmu and Kanatatoli. The entire sample of 180 households was post-stratified into different income groups using a cumulative frequency approach as follows

$$L_i = Y_{i-1} + (Y_i - Y_{i-1}) / \sqrt{f_i} (S_{k/L} - S_{i-1})$$

Where,

L_i = No of strata

Y_{i-1} = lower limit of the class in which L_i lies

S_k = cumulative $\sqrt{f_i}$

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

S_{i-1} = cumulative square root of the frequency of preceding class.

Y_i = upper limit of the class.

$Y_i - Y_{i-1}$ = width of the class.

Broadly three income groups were emerged from the interviewed respondents.

RESULTS AND DISCUSSION

The socio-demographic makeup of the respondent's households in various economic situations significantly affects the consumer knowledge, awareness, patterns of consumption, and consumer preferences for dairy-based functional foods (Das and Horo 2019). In the current study, the most preferred source of information for dairy-based function foods was electronic television advertisements which accounted for nearly 33 per cent. Another preferred source of information was friends & relatives which made up to 25 per cent. Only 18 per cent of consumer's source was internet and newspaper as source on information was for 12 per cent of respondents. While social media made the least contribution as only 11 per cent respondents.

The evaluation of consumers' awareness regarding dairy-based functional foods was very crucial in order to successfully placing functional foods in the Indian markets, and for the development of the dairy based functional products. It was found that 79% of the respondents were aware of fortified milk whereas 21% were unaware about the additional advantages of these products (Fig. 1) whereas for probiotic drink, 86% of the respondents were aware and 14% were unaware (Fig. 2). Nearly 69% of the consumers were using fortified milk while 31% of the consumers were non-user (Fig. 3). For probiotic drink 77% of consumers were using the product whereas 23% were non-users of the probiotic drinks (Fig. 4) due to lack of awareness.

A. Availability of dairy-based functional foods

The analysis of the availability of dairy-based functional foods was very crucial to judge which location was preferred by the consumers for purchase of dairy-based functional foods (Argin *et al.*, 2019). In case of fortified milk, it was found that majority of consumers purchased fortified milk from the retail shops (58%) which was followed by milk parlours (36%), other local shops (4%) and the least preferred location was supermarket (2%) as reflected in Fig. 5. It was very clear that consumer gave most importance to retail shops which were usually in close vicinity of households which made it very convenient for consumers to purchase the product. The fortified milk was also available in retail shops which increased its accessibility to the consumers. The various sources of the availability for the probiotic drinks were presented in Fig. 6. The study revealed that majority of the consumers had opted for supermarkets (53%) to purchase the probiotic drinks. The second most preferred location was retail store (40%) and least preferred location was milk parlour (7%). The availability of probiotic drinks was more in the supermarkets as compared to the other locations as opined by the respondents.

B. Consumption pattern for dairy-based functional foods

About 38% of respondents were using fortified milk on daily basis, around 36% consumed fortified milk occasionally while 26% of consumed rarely (Fig. 7). It was very clear from the present study that even with 79 per cent awareness about fortified milk but the daily consumption frequency was only 38 per cent. The major constraints as per respondents were the lack of awareness about the additional health and nutrition benefits of the fortified milk along with low confidence in the products quality. The frequency of consumption of probiotic drink was showed in Fig. 8. The result of analysis showed that 39% consumers used the probiotic drink rarely followed by 33% consumers used occasionally and 16% of consumers consumed probiotic drinks on daily basis while 12% consumers used probiotic drink on certain days of week only (Fig 9). Even though the probiotics drinks were very common and popular among youth consumers, daily consumption rate was only 16 per cent.

C. Classification of consumers into income groups

Usually, income has a very important role in deciding consumers' consumption expenditure on dairy-based functional foods (Teoh *et al.*, 2021). Further, consumers were classified into three different income levels using well established cumulative square root frequency method. Classification of consumers into various income groups was presented in Table 1. It could be observed that majority of respondents belonged to income group-II (61.67 per cent) followed by income group-I (26.11 per cent) and then income group-III (12.22 per cent).

The information regarding consumer's family size had been studied and presented in Table 2 for ready reference. The average family size of the consumers was found to be 5.00, out of which 3.65 were found to be

adults. Among adults, 1.83 consisted of males and females made up to 1.82. Highest number of family members was found in income group-II (5.12) and the lowest numbers of the family members were found to be in income group-III (4.77). Income group-I consisted of an average of 5.11 family members. The average number of children was found to be 1.62, out of which 0.98 and 0.64 were of male and female respectively.

The family type of the consumers was believed to have a significant impact on consumers buying habits and consumption patterns for dairy-based functional foods (Ballco and De Magistris 2019). The Table 3 showed that among all income groups, nuclear families had the highest percentage share (78.93) and total per cent share of joint family was up to (19.26). For income group-I the per cent share of nuclear family was 82.98 and for joint family were 17.02. In case of Income group-II the per cent share of nuclear family came out to be 81.08 per cent and for joint family it was 18.02. For income group-III the per cent share of nuclear family was 72.73 and for joint family it came out to be 22.73.

The food habits of consumers also had a very important role in consumption habits of dairy-based function foods. The consumer's food habit was analysed and it was observed from the Table 3 that 65.34 per cent of consumers were non-vegetarian whereas 32.45 per cent of consumers were vegetarian. Among three income groups most of the non-vegetarians were found in income group-III (72.73 per cent) and most of the vegetarians were found to be in income group-II (36.04 per cent). In case of income group I vegetarian consumer made up to 34.04 per cent and non-vegetarians made up to 63.83 per cent. For income group-II vegetarians were

36.04 per cent and non-vegetarians were 59.46 per cent. In case of income group-III vegetarians were 27.27 per cent and 72.73 per cent of consumers were non-vegetarians. The education level and occupation of the respondents was also considered. About 71.11 per cent of consumers had an educational qualification of graduation and above whereas 28.89 percent of consumers were below graduation level. Nearly 45.56 percent of consumers were employed in service sector whereas 16.67 percent of people were self-employed and about 37.78 percent of consumers were of non-working group.

Table 4 showed consumption of dairy-based functional foods across different income groups. The study showed that average per capita consumption of probiotic drink was 949.4 ml. Income group-III was consuming highest (1238.8ml) as compared to income group-II (945ml) and income group-I (664.6 ml). For fortified milk average per capita consumption was 8.6 litres. Income group II was consuming the highest amount of fortified milk (10litres) when compared to income group-III (8 litres) and income group-I was 7.5 litres.

The average per capita expenditure on fortified milk was ₹518.8 per month. Income group-III made the highest expenditure of ₹689.5 per month, income group-II spend an average of ₹501.2 per month whereas income group-I spend ₹365.9 per month. In case of probiotic drink average per capita expenditure came out to be ₹270 per month. Income group-III had the highest expenditure with ₹355.3 per month, income group-II spend an average of ₹280.9 per month whereas income group-I had spent only ₹174 per month.

Table 1: Classification of respondents into various income groups.

Income Groups	Income(₹/month)	No. of respondents	Age of head of household
Income Group I	Upto 40000	47(26.11)	41
Income Group II	40001 to 70000	111(61.67)	44
Income Group III	70001 to 120000	22(12.22)	45
Total		180(100)	42

Figures in parentheses indicates percentage

Table 2: Family size and composition of households.

Income groups	Adults			Children (<18)			Family Size
	Male	Female	Total	Male	Female	Total	
Income Group I	1.81	1.77	3.57	1.06	0.47	1.53	5.11
Income Group II	1.77	1.88	3.65	0.84	0.63	1.47	5.12
Income Group III	1.91	1.82	3.73	1.05	0.82	1.86	4.77
Overall	1.83	1.82	3.65	0.98	0.64	1.62	5.00

Table 3: Family types and food habits of households.

Particulars	Nuclear Family	Joint Family	Vegetarians (per cent)	Non-Vegetarians (per cent)
Income Group I	82.98	17.02	34.04	63.83
Income Group II	81.08	18.02	36.04	59.46
Income Group III	72.73	22.73	27.27	72.73
Overall	78.93	19.26	32.45	65.34

Table 4: Consumption of dairy-based functional foods across different income groups.

Product	Particulars	Income group 1	Income group 2	Income group 3	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 5: Difference among income groups for consumption of dairy based Probiotic and fortified milk.

Variable	Fortified Milk Consumption Expenditure		Probiotic Drink Consumption Expenditure	
	Mean value	Mean Difference (Absolute value)	Mean value	Mean Difference (Absolute value)
Income Group I	366	135**	174	107***
Income Group II	501		281	
Income Group I	366	324***	174	181***
Income Group III	690		355	
Income Group II	501	188**	281	74*
Income Group III	689		355	

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

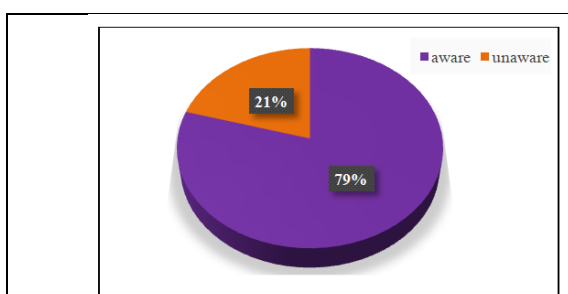


Fig. 1. Awareness status of consumers for fortified milk.

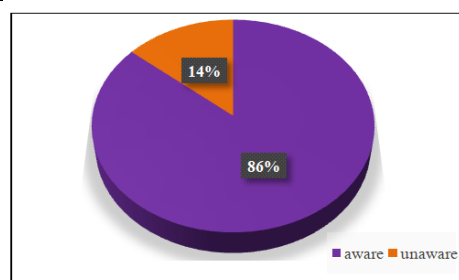


Fig. 2. Awareness status of consumers for probiotic drink.

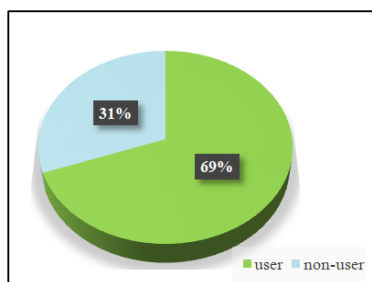


Fig. 3. Distribution of consumers based on usage of fortified milk.

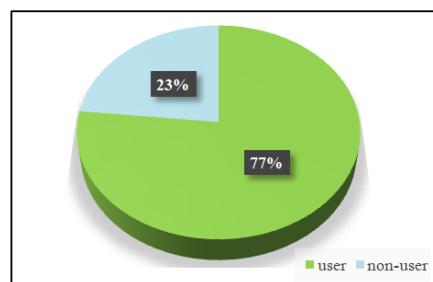


Fig. 4. Distribution of consumers based on usage of probiotic drink.

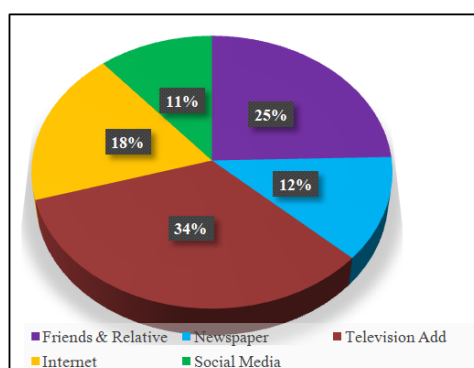


Fig. 5. Sources of information for dairy-based functional foods.

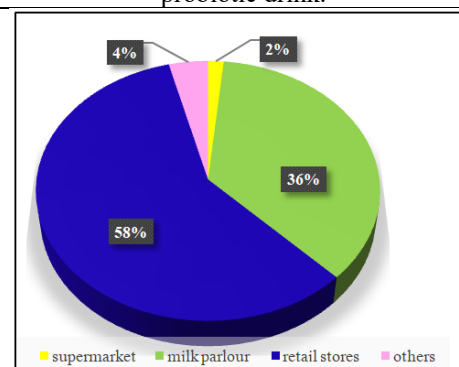
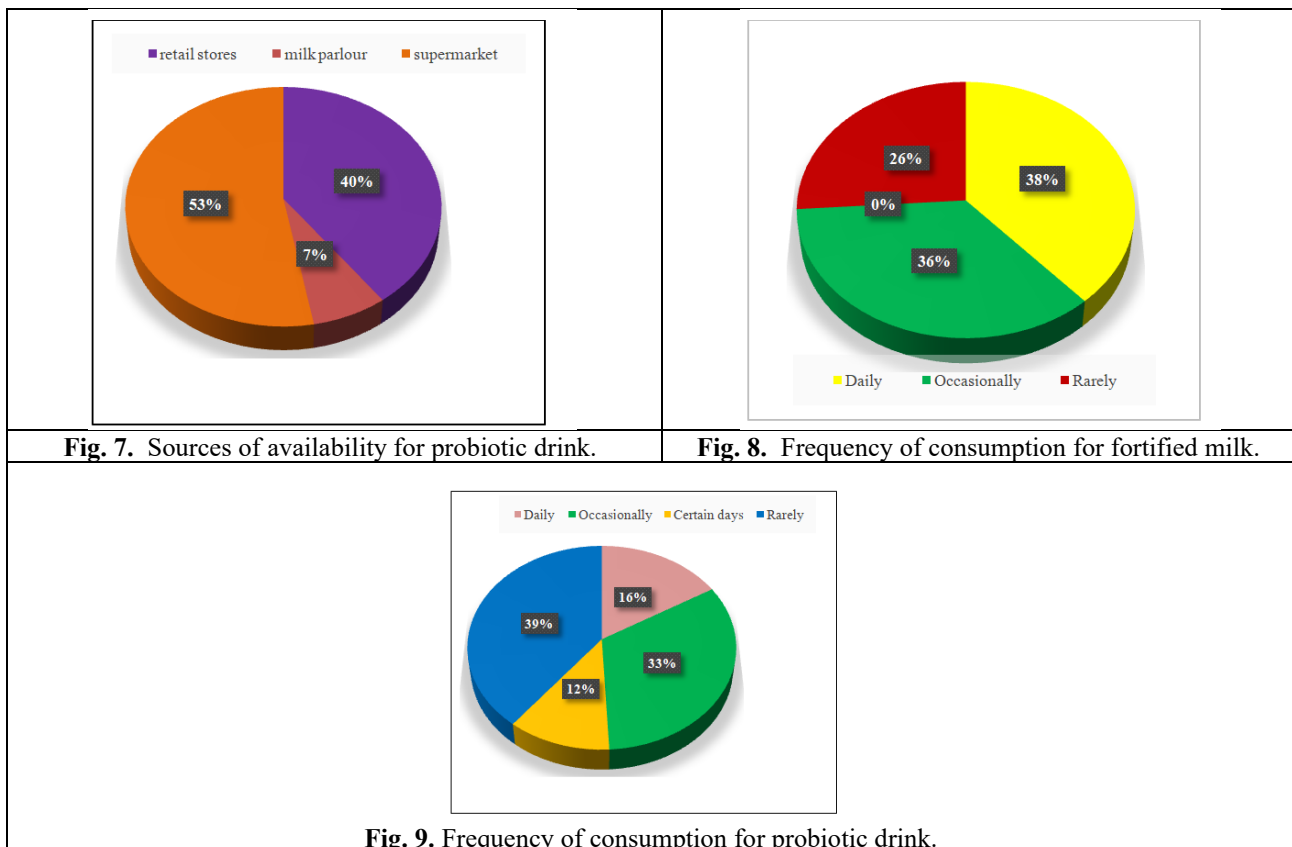


Fig. 6. Sources of availability for fortified milk.



CONCLUSIONS

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. Nearly 79% of the respondents were aware the additional health benefits of fortified milk whereas 21% were unaware whereas for probiotic drink, 86% of the respondents were aware and 14% were unaware. The most preferred source of information for dairy-based function foods was electronic television advertisements followed by friends and relatives. The probiotic drinks were consumed occasionally as compared to the fortified milk consumed on a daily basis. The majority of the consumers had preferred retail shops to purchase the fortified milk and supermarkets for the purchase of the probiotic drinks. The monthly average consumption of fortified milk for per capita was only 8.6 litres, with an expenditure of ₹518.8, while the corresponding figures for the probiotic drink was 949.4 ml, with an expenditure of ₹270. It was also found that the Income, education, and occupation had positively influenced the monthly per capita consumption expenditure of probiotic drinks and fortified milk, while age had significant negative impact on probiotic and food habits had significant negative impact of fortified milk.

FUTURE SCOPE

Sincere efforts should be taken to ensure the availability of probiotic drinks and fortified milk in the state as the monthly per capita consumption expenditure of probiotic drinks and fortified milk has increased.

Acknowledgements. The guidance of the Head of department and the continuing support of the senior as well as fellow students had been sincerely acknowledged by the first author.

Conflict of Interest. None.

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How to cite this article: Annie Kerketta, Biswajit Sen, Udit Chaudhary and Ajay Verma (2023). Consumption of Dairy-based functional Foods influenced by Socio Economic Conditions: Study in Ranchi City. *Biological Forum – An International Journal*, 15(9): 13-18.