

A study on Consumer's Knowledge, Attitude and Consumption pattern of Functional Foods and Nutraceuticals in Tamil Nadu, India

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Abstract

In recent days, consumers are more anxious about their health and foster extra care to their lifestyle and diet and this has led to the growing demand for functional foods. Monitoring consumers' attitudes towards functional foods and nutraceuticals is essential to corroborate consumers' needs and expectations. The objective of the current study is to congregate data that can be availed by nutritionists, dietitians, and the food industry to improve the acceptance of functional foods and nutraceuticals.

A questionnaire was developed to collect information about the knowledge and attitude on functional foods and their health benefits, sources of information, and awareness of health claims and consumption trends of commercially available functional foods and nutraceuticals. With a response rate of 79.8 %, 398 respondents answered the pre-tested questionnaire. 74.2% of the respondents were able to explain functional foods and nutraceuticals. The study had recorded a positive attitude of respondents with good knowledge of functional foods. But the consumption trend of commercial functional foods and nutraceuticals was relatively less compared to the knowledge and positive attitude exhibited by the respondents. This study has thrown up the statement that good knowledge of functional foods and a positive attitude does not necessarily lead to the purchase and consumption of these products by the consumers. Other factors determining consumer acceptance should be explored.

Key words: Functional foods, nutraceuticals, knowledge, attitude

I. Introduction

The holistic concept "Let food be thy medicine and medicine be thy food" is relevant in all times of our living. There is a bloom of a novel category of foods called functional foods accentuating the role of food and diet in promoting health and disease prevention.

The National Academy of Sciences' (Food and Nutrition Board, 1994) defined functional foods as "any modified food or food ingredient that may provide a health benefit beyond the traditional nutrients it contains". DeFelice who coined the term nutraceutical defines it as "a food (or part of a food) that provides medical or health benefits, including the prevention and/or treatment of a disease"(Brower, 1998). Functional foods and nutraceuticals are appraised as the novel therapeutic approach to prevent or attenuate lifestyle disease and promote health and wellness. Heasman and Melletín (2001) argued that functional foods represent an essentially new direction in food marketing which is based on people's fear about their health and possible future disease risk. Functional food markets change continuously and the competition to win consumers favour is becoming more intense (Menrad, 2003). Urala and Lahteenmaki (2007) had argued that regular attitude monitoring is needed to see how the attitudes towards functional foods are developing as the products become more familiar and they may be approaching the status of conventionally foods. On reviewing the literature, it was found that there has been a minimal investigation into the

information related to functional foods and their consumption trends. The current study aimed to bring about data on awareness, attitude, and consumption patterns of commercially available functional foods and nutraceuticals.

II. Methodology

This research work was undertaken as an online survey. A questionnaire was developed to collect information about the knowledge and attitude on functional foods and their health benefits, sources of information and awareness of health claims, and consumption of functional foods and nutraceuticals. It was reviewed for content validity and reliability. The internal consistency of the questionnaire was tested using Cronbach's Alpha (α) and an acceptable score of 0.7 was obtained. The final questionnaire was pilot tested on 15 respondents and the desired minor changes were incorporated. The time required for completing the questionnaire was approximately 10 minutes. The questionnaire was mailed to randomly selected 500 individuals aged 18 to 60 years, during the month of June-August 2020. The data collected was coded and descriptive, Pearson's Chi Square and Spearman's Rank Correlation statistical techniques were analysed using SPSS 14.0 software.

III. Results and Discussion

Characteristics of Study Sample

With a response rate of 79.8%, 398 respondents participated in the study. A majority of them were female (88.5 %) and only 11.5 % were male 72.1% of the study population were in the age group of 18-25 years, 19.1% and 8.8% belonged to 26-40 years and 41-60 years category respectively. 42.7 % respondents were possessing post- graduation or higher educational qualification, 41.5 % were graduates and 15.8% qualified higher secondary examination. Household income, type of family and food habits of the respondents can be inferred from Table 1.

Table 1: Characteristics of Study Sample

Frequency (%)	
Gender	
Male	46 (11.5%)
Female	352 (88.5%)
Age	
18- 25 years	287 (72.1%)
26-40 years	76 (19.1%)
41-60 years	35 (8.8%)
Educational Qualification	
Higher Secondary	63 (15.8%)
Graduation	165 (41.5%)
Post-Graduation / Higher	170 (42.7%)
Household Income per month	
Below 30000	116 (29.1%)
Rs 30000- Rs 50000	103 (25.9%)
Rs 50000- Rs 100000	104 (26.1%)
Above Rs 100000	75 (18.9%)
Type of Family	
Joint	97 (24.4%)
Nuclear	301(75.6%)
Food Habit	
Vegetarian	140 (35.2%)

Non-Vegetarian	258 (64.8%)
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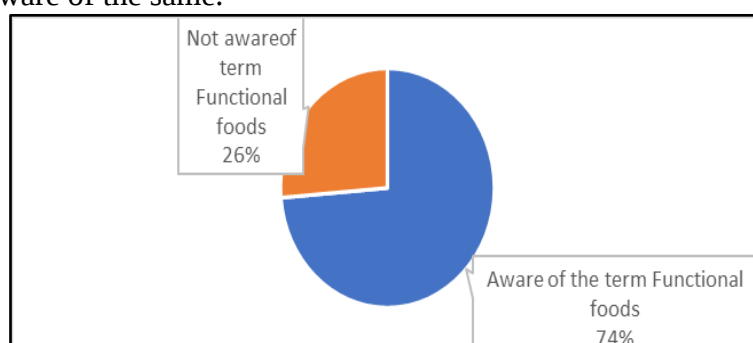
Date shown in frequency and percentages n (%)

Health status of study population

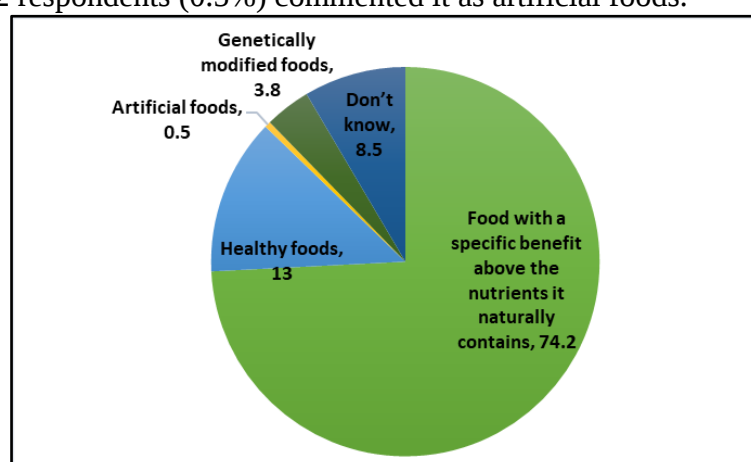
Study respondents were asked about their self or family members suffering from common health problems with an option of choosing more than one health issue. 151 respondents (37.8%) reported an association with diabetes, 37 respondents (9.3%) or their family members have cardio vascular problem, 16.1% (64 respondents) related self or family with obesity. 95 members (23.9%) associated themselves and their family with hypertension. 40.5 % of the respondents stated that they were not having any health problems.

Awareness and knowledge on Functional foods and their health benefits

73.7% of the respondents were knowledgeable of functional foods/nutraceuticals, and 26.3 % were not aware of the same.

**Figure 1: Awareness of functional foods (n=398)**

Out of 398 respondents, 296 members (74.2%) explained functional foods as food with a specific benefit above the nutrients it naturally contains. 13% respondents defined functional foods as healthy foods. 8.5 % members stated that they do not know the best explanation for functional foods. 3.8 % considered the functional foods as genetically modified foods and 2 respondents (0.5%) commented it as artificial foods.



*Data is represented as percentage of respondents (n= 398)

Figure 2: Perceived explanation of functional foods.**IV. Knowledge Score**

The score of knowledge per question was calculated using the formula given by KAP Manual published by FAO (2014). Score of knowledge per question = (Sum of correct responses by all respondents) / (Total number of respondents). For the question on awareness of functional foods a score of 1 point was allotted for “Yes” and 0 for the answer “No”. For

the question on perceived explanation of functional foods a score of 2 points was allotted to the right answer. The total score for the knowledge component was 3. The combined mean knowledge score of the respondents was found to be 2.22 ± 1.10 .

Table 2: Knowledge score classified by Education / Age

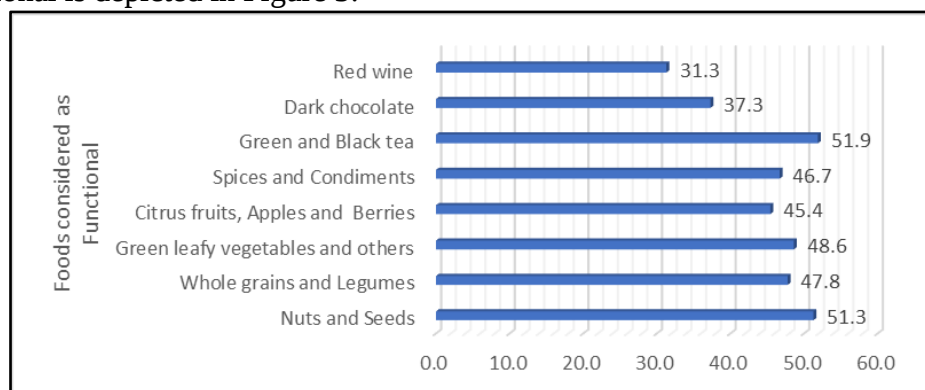
Education	Knowledge score Mean ± SD	p value*	Age	Knowledge score Mean ± SD	p value*
Higher secondary (n=63)	2.08 ±1.09	0.001*	18-25 years (n= 287)	2.19± 1.10	0.394
Graduation (n=165)	2.09±1.15		26-40 years (n=76)	2.29±1.10	
Post-graduation/ Higher (n=170)	2.46 ±1.01		41-60 years (n=35)	2.18± 1.09	
Mean Knowledge Score (n= 398): 2.22 ± 1.10.					

* Chi-Square analysis p < 0.05 statistically significant

Chi Square test of association showed a significant relationship between educational level of respondents and their knowledge score. There was no significant association between the respondent's knowledge score and their age.

Foods identified as functional foods

Though 74.4 % of respondents could define and explain functional foods, the average of responses for the foods considered to be functional was only 46.5%. 20.6 % of the respondents took up the don't know option. The data on respondents' knowledge on foods that are functional is depicted in Figure 3.



*Respondents could choose multiple foods. Data is represented as % of respondents (n= 398)

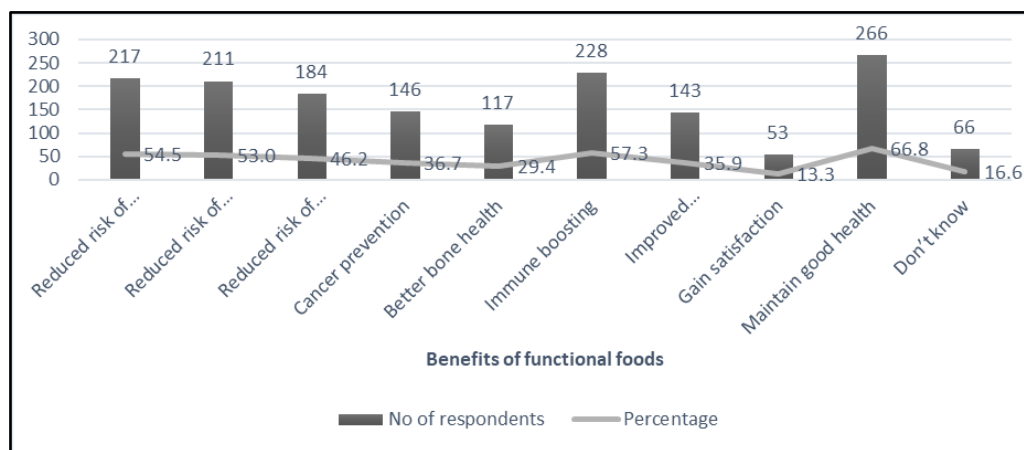
Figure 3: Foods that are considered to be functional by respondents.

Perceived benefits of functional foods

Herath *et al* (2008) stated that “Key driver of receptivity towards functional foods and nutraceuticals appears to be perceptions of disease threat and the claims on the preventative properties of these products does not seem to have a major impact.” Urala *et al* (2003) and Frewer *et al* (2003) had expressed the opinion that consumers are more likely to prefer functional foods over the conventional foods if they perceive the functional food products to be healthier.

Respondents were asked to relate the health benefits associated with functional foods (Figure 4). 54.5% of the respondents considered that functional foods would reduce the risk

of hypertension and cardiovascular disease. 212 respondents (53.1%) perceived it to reduce the risk of diabetes. 66.9 % respondents considered maintenance of good health ,184 respondents were in favour of reduced risk of obesity or weight gain. 36.8 % of the study respondents associated the health benefits of functional foods to cancer prevention and 57.4 % regarded them to be immune boosting. 29.6 % of respondents adjudged functional foods to better bone health. 16.5% respondents did not know the health benefits of functional foods.

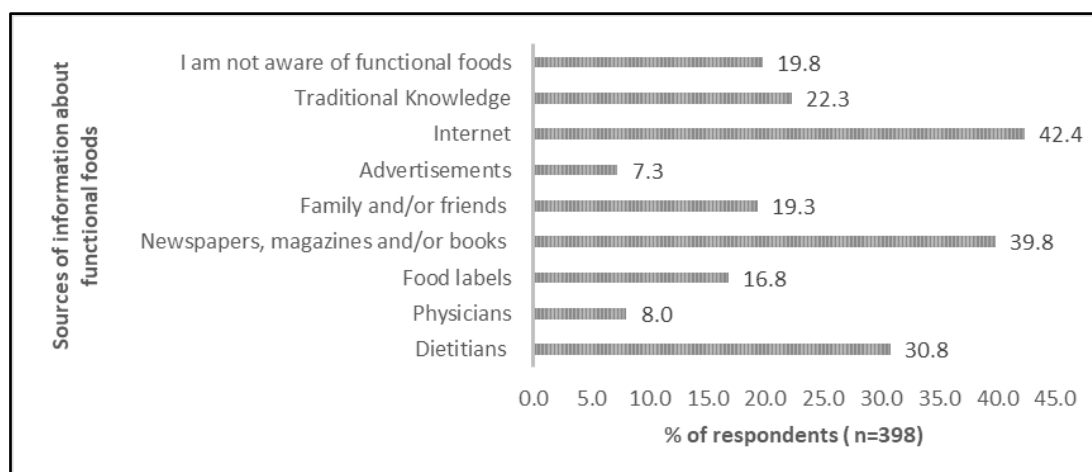


*Respondents could choose multiple options. Data is represented as number of respondents and percentage (n= 398)

Figure 4: Perceived benefits of Functional foods.

Sources of information about functional foods

Urala *et al* (2003) stated that “Nutrition and health information, and the source of this information, has the potential to influence acceptance of functional food products by communicating the health benefits of such products”. Related to awareness and knowledge, for the question how did you get to know about functional foods or nutraceuticals, respondents were given choice to choose multiple options from the common sources of information provided. The chosen sources of information being dietitians, physicians, food labels, print media, family/friends, advertisements, and the internet. (Figure 5)



*Respondents could choose multiple options. Data is represented as percentage of respondents (n= 398)

Figure 5: Sources of information about functional foods.

Respondents Attitude towards Functional Foods

Urala N & Lähteenmäki L (2004) and Patch *et al* (2005) had stated that positive attitudes towards functional foods have a great influence on the intention to consume these products. In the words of Labrecque *et al* (2006) positive attitudes are related to the awareness and knowledge of the health benefits of these foods.

Attitudinal Score

Respondents were asked about their opinions on functional food-related statements, based on a 3-point Likert scale (No/ Not good/ Not confident =1; Neutral/ Not sure/Ok/so-so=2; Yes/Good/Confident=3). The attitudinal scores related to functional foods are presented in Table 3.

78.7% of the study population responded that it's important to add functional foods to our diet. The mean Likert score was 2.77 ± 0.47 . A score of 2.68 ± 0.48 was obtained for the respondents' belief on health promoting and disease prevention role of functional foods. 68.92 % of the respondents were positive about it and 29.32 % were not sure of disease prevention role of functional foods and 1.75 % denied any role of functional foods in disease prevention.

Opinion on safety of functional foods

On the important aspect of safety of functional foods and nutraceuticals, Likert score value of 2.45 ± 0.50 was obtained. Only 45.11% of the respondents were confident about the safety, 44.86 % reported in mid-way (Ok-ok/So-so) and 10.03 % declared that they were not confident.

A majority of the respondents (54.64%) were not sure whether functional foods or nutraceuticals if used in excess would be deleterious. 31.08% reported that if used in excess its harmful and 14.29 % reported that its not harmful.

Willingness to afford a higher price

When the respondents were questioned about their willingness to afford a higher cost for functional foods, we obtained a mean Likert score of 2.41 ± 0.65 . 124 respondents (31.15%) were willing to pay a higher price, 170 respondents (42.71 %) were not sure about their stand and 104 (26.13 %) of respondents acclaimed that a higher price cannot be taken.

Chambers *et al*. (2006) and Urala and Lahteenmaki (2007) reported that consumers were willing to pay more for functional foods if they believed in their benefits.

Seechurn *et al* (2009) had reported that his study respondents opinionated functional foods as more expensive compared to conventional ones. Menrad and Sparke (2006) in their research study reported that the price of functional foods was the main disincentive in the consumption of functional foods.

Readiness to compromise on taste

67.42 % respondents were likely to adjust on the taste of functional foods and 32.58% denied any compromise. The mean Likert score obtained was 2.35 ± 0.94 . This is a valuable information for budding entrepreneurs and the food industry in large to consider in their new functional food product development. The opinion received here is in contrast to the study by Verbeke (2006) where the respondents were not willing to compromise on the taste of functional foods.

Table 3: Respondents Attitude towards Functional Foods

Attitudinal Construct- 3-point Likert Scale (No/ Not good/ Not confident =1; Neutral/ Not sure/Ok/so-so=2; Yes/Good/Confident/ =3) [#] Reverse coding(Agree=1, Not sure =2, Disagree = 3)	Mean Likert Score Value$\pm$ SD
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Importance of adding functional foods in diet each day	2.77±0.47
Health promoting and disease prevention role of functional foods	2.68± 0.48
Safety of functional foods and nutraceuticals	2.45±0.50
Functional foods, if consumed in excess can be harmful [#]	1.83±0.65
Willingness to afford a higher cost for functional foods	2.05±0.76
Preference towards the incorporation of functional ingredients in commonly consumed ready to eat foods	2.41±0.65
Readiness to compromise on the taste of functional foods	2.35±0.94
Mean Attitudinal Score	2.36±0.30

Table 4: Attitude Score classified by Education / Age

Education	Attitude score Mean ± SD	p value*	Age	Attitude score Mean ± SD	p value*
Higher secondary (n=63)	2.33± 0.26	0.001*	18-25 years (n= 287)	2.35±0.29	0.122
Graduation (n=165)	2.33±0.28		26-40 years (n=76)	2.34±0.31	
Post-graduation/ Higher (n=170)	2.41±0.33		41-60 years (n=35)	2.41±0.36	
Mean Attitude Score (n=398): 2.36±0.30					

* Chi-Square analysis $p < 0.05$ statistically significant

Chi Square analysis showed significant association ($p < 0.05$) between educational level of respondents and their attitudinal score. There was no significant association between the respondents' attitude score and their age.

Consumption pattern of functional foods and nutraceuticals

Consumption score

Respondents were urged to recall the intake of functional foods available in the market in the 24 hrs dietary recall period and the graphical representation of the same is presented in figure 6. The study investigated the consumption pattern of dietary supplements and nutraceuticals by the respondents within the last 7 days of participating in the study and the data of the same is depicted in figure 7. A total of 30 score points on consumption trend was brought down to 3 and the mean score was calculated. The mean consumption score was 0.94 ± 0.65 . The results obtained give a new insight that though 74% of respondents were aware of functional foods and the attitudinal construct on functional foods fetched a good score of 2.36 ± 0.33 , the consumption trend of commercially available functional foods was not encouraging.

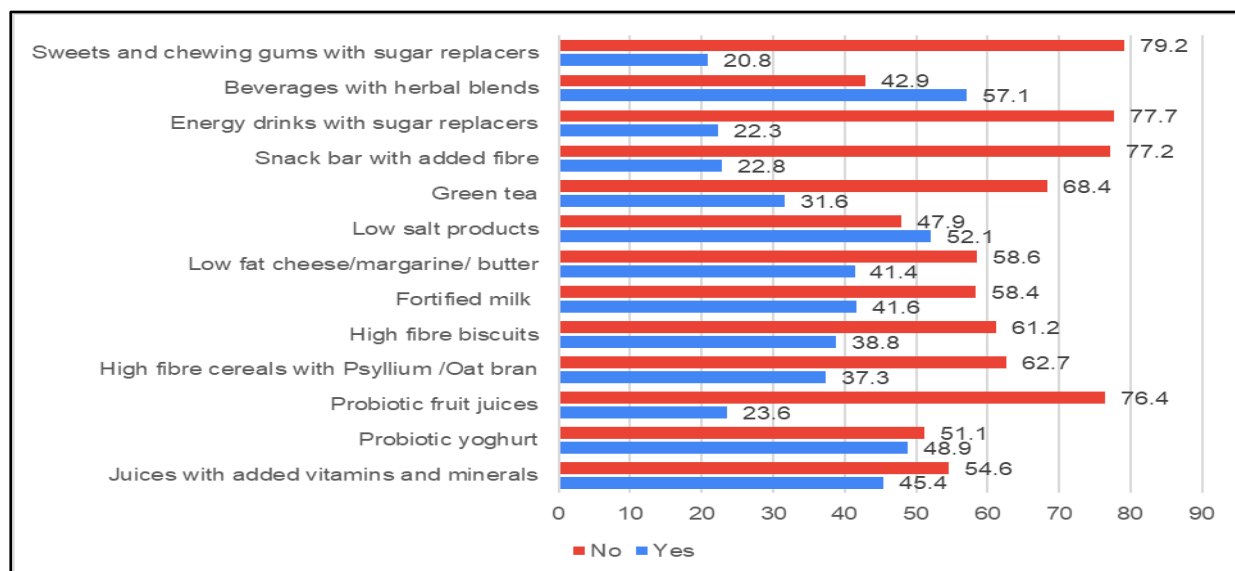
Table 5: Consumption score classified by Education / Age

Education	Consumption score Mean ± SD	p value*	Age	Consumption score Mean ± SD	p value*
Higher secondary (n=63)	1.01±0.65	0.305	18-25 years (n= 287)	1.01± 0.64	0.774
Graduation (n=165)	1.03±0.67		26-40 years (n=76)	0.79± 0.59	

Post- graduation/ Higher (n=170)	0.80±0.57		41-60 years (n=35)	1.01± 0.61	
Mean Consumption Score (n=398): 0.94 ± 0.65					

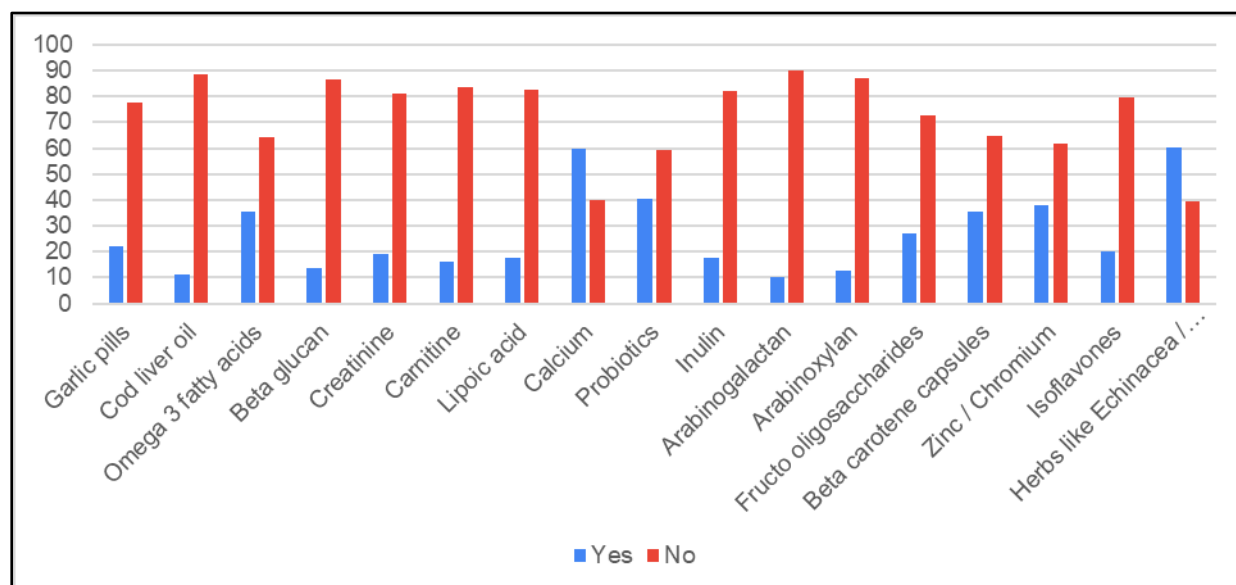
* * Chi-Square analysis $p < 0.05$ statistically significant

Pearson Chi Square test of association showed no significant relationship between the respondents' consumption score and their age or educational qualification.



Data presented as percentage (n=398)

Figure 6: Consumption of functional foods in 24 hrs dietary recall period



Data presented as percentage (n=398)

Figure 7: Consumption of Nutraceuticals within the last 7 days of participating in the study

Coveney (2007) stated that “Trust in food is crucial for consumption of the food”. Frewer *et al* (2003) reported that perceiving benefits of a functional food is crucial for building in trust and increasing consumption. The results on investigating consumption pattern of commercial functional foods and nutraceuticals sends a strong message for the need to build in trust in commercial functional foods and nutraceuticals.

Association between health status and consumption of functional foods and nutraceuticals

Pearson Chi Square test of independence showed that there is no significant association ($p = 1.000 > \alpha 0.05$) between respondents /family members suffering from common health problems (diabetes, hypertension, cardio vascular problem, obesity, kidney disease, hypothyroidism) and their intake of commercial functional foods and nutraceuticals listed in fig 6 and 7.

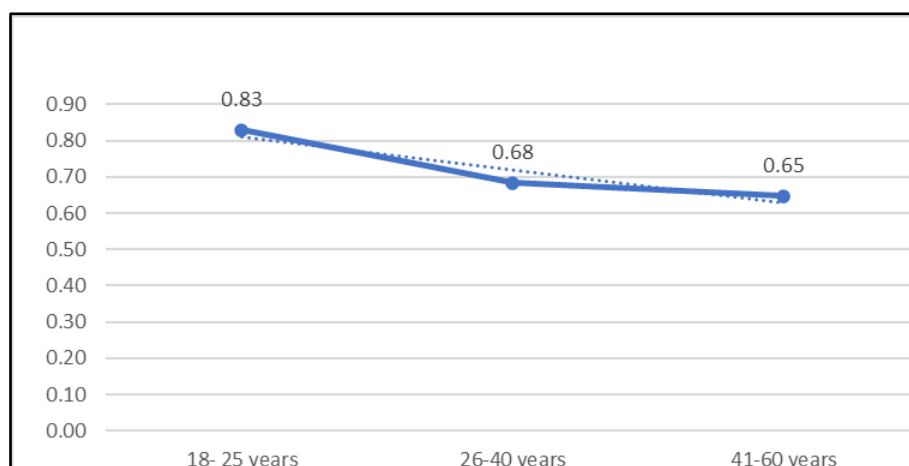
Association between income and consumption of functional foods and nutraceuticals

Chi-square test of independence carried out to study the relationship between income and consumption trend showed no significant association ($p = .35 > \alpha 0.05$).

Reading health claim and Nutrient label

313 respondents (78.6 %) reported that they read health claim and nutrient label of the food products before making a choice to buy and 85 of them (21.3%) responded that they don't read through. Respondents in the age group of 18-25 years had a mean score of 0.83 ± 0.38 for reading nutrition label and a mean score of 0.68 ± 0.47 and 0.65 ± 0.49 was obtained by 26-40 years and 41-60 years respectively.

Saba *et al.* (2010) reported that the presence of health claims had no impact on the prospect of buying the product. In our current research though 78.7 % have reported to read health claims and nutrient label, it did not reflect in their consumption practice of commercially available functional foods and nutraceuticals.



(A score of 1 was allotted to yes for reading nutrition label and 0 for the negative answer)

Figure 8: Association of age group and reading nutritional label score

Consumer preference for functional ingredient

Respondents were directed to choose the functional ingredients, which on being mentioned in a nutrient content claim would increase their purchase intention giving them an option to make multiple-preference. 51 % opted for low calorie and dietary fibre rich foods. 48% chose omega 3 fatty acids, 38% favoured low salt/low sodium foods. 13.3 % did not choose any of the foods.

Association between knowledge, attitude and consumption trend of functional foods and nutraceuticals

Spearman's Rank Correlation R value shows a very weak association between the knowledge, attitude and consumption trend of the respondents (Table 6). Lalor *et al.* (2009) reported that higher nutrition knowledge led to lower trust in health claims. We could consider this explanation for the relatively lower consumption trend of commercially available functional foods and nutraceuticals. This study proves the statement made by Ares *et al.* (2008) "Perceiving a food product as healthier does not necessarily result in the consumer purchasing the product".

Table 6: Association of knowledge, attitude and consumption trend

Spearman's Rank Correlation	p value	r value	Strength of association
Knowledge vs Attitude	0.038	0.104	$r < 0.3$ None or very weak
Attitude vs Consumption	0.128	0.076	$r < 0.3$ None or very weak
Knowledge vs Consumption	0.225	0.061	$r < 0.3$ None or very weak

V. Conclusion

Awareness and positive attitudes are more important factors influencing the consumption of functional foods. The current study throws light that 73.7% respondents were aware of functional foods. The mean attitudinal score 2.36 ± 0.33 shows an encouraging functional food acceptance and a promising market segment for the food industry.

A weak association between the knowledge/ attitude and consumption trend presents a strong message to address the challenge of improving the consumption of functional foods and nutraceutical. Better nutritional knowledge and a positive attitude towards products necessarily did not lead to consumption of commercially available functional foods and nutraceuticals. The cost and lacuna in authentication of functional foods and nutraceuticals might be an important factor to be considered. The results of the current study provide significant information which can be utilized by the food and nutraceutical sector to improve functional food acceptance.

Reference

1. Committee on Opportunities in the Nutrition and Food Sciences, Food and Nutrition Board, Institute of Medicine (1994) Enhancing the food supply. In: Opportunities in the Nutrition and Food Sciences: Research Challenges and the Next Generation of Investigators (Thomas, P. R. & Earl, R., eds.), pp. 98–142. National Academy Press, Washington, DC.
2. Brower, V. (1998). Nutraceuticals: poised for a healthy slice of the healthcare market? *Nat Biotechnol*, 16, 728-731.
3. Heasman, M., & Mellentin, J. (2001). The Functional Foods Revolution: Healthy People, Healthy Profits, Earthscan Publications Ltd, London.
4. Menrad, K. (2003). Market and marketing of functional food in Europe. *Journal of Food Engineering*, 56, 181–188.
5. Urala, N., & Lahteenmaki, L. (2007). Consumers changing attitudes towards functional food. *Fd. Qual. Pref*, 18, 1-12.
6. Macías, YF., & Glasauer, P. (2014). Guidelines for assessing nutrition-related Knowledge, Attitudes and Practices. KAP Manual. FAO.
7. Herath, D., Cranfield, J., & Henson, S. (2008). Who consumes functional foods and nutraceuticals in Canada? Results of a cluster analysis of the 2006 survey of

- Canadians' demand for food products supporting health and wellness. *Appetite*, 51,256–265.
8. Urala, N., Arvola, A., & Lahteenmaki, L. (2003). Strength of health-related claims and their perceived advantage. *Int J Food Sci Tech*, 38, 815–826.
 9. Urala, N., & L  hteenm  ki, L. (2004). Attitudes behind consumers' willingness to use functional foods. *Food Qual Prefer*, 15(7-8), 793-803.
 10. Patch, C.S., Tapsell, L.C., & Williams, P.G. (2005). Attitudes and intentions toward purchasing novel foods enriched with omega-3 fatty acids. *J Nutr Edu Behav*, 37 (5), 235-41.
 11. Labrecque, J., Doyon, M., Bellavance, F., & Kolodinsky, J.(2006). Acceptance of Functional Foods: A Comparison of French, American, and French-Canadian Consumers. *Can J Agr Econ*, 54, 647-661.
 12. Seechurn, D., & Neeliah, H., Neeliah, S. A. (2009). Functional foods in Mauritius: A consumer survey. *Journal of Development and Agricultural Economics*, 1, 204-211.
 13. Menrad, K., Sparke, K. (2006). Consumers' attitudes and expectations concerning functional food. Working paper, University of Applied Sciences of Weihenstephan.
 14. Chambers, S.A., Lobb, A.E., Mortimer, D.T. (2006). Attitudes and Behaviour towards Functional Foods: Focus Groups, Work package No. 2, Report No. 3, University of Reading, UK.
 15. Verbeke, W.(2006). Functional foods. Consumer willingness to compromise on taste for health. *Food Qual Prefer*, 17, 126-131.
 16. Coveney, J. (2007). Food and trust in Australia: building a picture. *Public Health Nutr*, 11(3), 237-245.
 17. Frewer, L.J., Scholderer, J., & Lambert, N.(2003). Consumer acceptance of functional foods: issues for the future. *Brit Food J*, 105, 714-731.
 18. Saba, A., Vassallo, M., Shepherd, R. et al. (2010). Country wise differences in perception of health-related messages in cereal-based food products. *Food Qual Prefer*, 21, 385– 393.
 19. Lalor, F., Kennedy, J., & Wall, P. (2009). The impact, among third-level students, of nutrition knowledge on behaviour towards products with health claims. *Proc Nutr Soc* 68, E131.
 20. Ares, G., Gimenez, A., & Gambaro, A. (2008). Influence of nutritional knowledge on perceived healthiness and willingness to try functional foods. *Appetite*, 51, 663–668.