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Consumers' Knowledge, Attitudes, and Behavior Regarding Functional Food Products-A Survey from Selected Areas of Sri Lanka

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ABSTRACT

Purpose: *The purpose of this research is to assess the influence of demographical variables (gender, age, education level, study area, nature of residence, residential milieu, suffering from non-communicable diseases (NCDs), and monthly household income) on the consumption frequency of mostly available processed food products with health benefits (functional food products-FF) in Sri Lankan market. Consumers' knowledge of the health-promoting ability of FF, attitude on FF choices, and behaviors on FF consumption were also analyzed.*

Research Method: *A questionnaire was completed by 303 individuals (60.40% females, 39.60% males, and 83.17% of the total having a diploma/degree) from the Western, Central, Southern, Sabaragamuwa, and Uwa provinces. Cronbach's alpha coefficient assessed the reliability of the questionnaire and Pearson's chi-squared test was used to examine the independence among qualitative variables. The Likert scale numbers were transformed to means and articulated the weights of the study variables. The Correlation analysis was carried out to find the association between Consumers' knowledge and attitudes regarding FF.*

Findings: *The age, education level, and NCDs of the respondents were significantly affected ($p<0.05$) in the FF consumption frequency of the selected sample. The population between the ages of 18-34 who have a diploma/degree and no NCDs was more likely to consume FFs. However, most of them have no clear idea and were not sure of the curing ability of FFs or their bioactive ingredients. They were not always thinking about healthiness while purchasing. Consumers' knowledge and attitudes regarding FF observed a positive correlation ($P<0.01$). The results showed that tea/herbal infusions were the most preferred FF type by the respondents. As per the responses, less awareness was a significant barrier to consuming FFs.*

Research Limitations: *The respondents in this study were biased toward the young age group with a diploma/degree.*

Originality/ Value: *These findings provide valuable information concerning Sri Lankan consumers' behavior and attitudes toward FF consumption. The knowledge can be utilized in future FF development processes.*

Keywords: *Attitudes, Behaviors, Consumption frequency, Functional foods, Knowledge*

INTRODUCTION

Foods' potential to promote health is not a new concept that has been used for centuries. 'Let food be medicine and medicine be food' is a well-known phrase frequently attributed to Hippocrates, the father of western medicine.

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In recent years, there has been a dramatic increase in the prevalence of non-communicable diseases (NCDs) such as cancer, diabetes, and cardiovascular disease. Each year, NCDs are responsible for 71% of all global deaths, including premature deaths at the ages of 30 to 69, particularly in low- and middle-income countries (World Health Organization, 2021). One major reason for NCDs is unhealthy eating habits including fast foods and junk foods. Changing one's eating habits has been identified as an excellent proactive approach to healthy aging (Hyseni *et al.*, 2017). However, due to urbanization, hectic lifestyles, and female employment, it is no longer feasible to maintain old dietary habits as it is. People can no longer hunt or climb trees for food, as their primary needs expand. Functional food (FF); entered the arena in this scenario.

As per the definition of Granato *et al.* (2017), 'functional foods are industrially processed or natural foods that when regularly consumed within a diverse diet at efficacious levels has potentially positive effects on health beyond basic nutrition'. In 1991, the Japanese introduced FOSHU (Food for Health Benefits) concept, giving such foods a marketable value (Bailey, 2005). These FF products are produced by either isolating the active components in natural plants (e.g. antioxidants, polyunsaturated fatty acids, probiotics) and embedding them into processed foods, or else unhealthy counterparts (e.g. sugar, saturated fat, refining starch) of the processed foods are removed or replaced with healthy food components. Some examples of processed functional foods include probiotic yogurt, cooking oil enriched with antioxidants/vitamins, sugar-free biscuits, fat-free milk powders, whole grain instead of refining starch for bakery items, replacing saturated fat with unsaturated fat, and incorporating phytochemicals into beverages.

The global functional food market was valued at USD 258.80 billion in 2020 and is expected to grow at a Compound Annual Growth Rate (CAGR) of 9.5 percent to USD 529.66 billion by 2028 (Fortune Business Insight, 2021). In 2019, Asia Pacific was the largest market, accounting for more than 40% of the total value share (Precedence Research, 2020).

Functional foods are also getting popular in Sri Lanka. With the COVID-19 pandemic, there is a further increment in demand for health-promoting foods. Universities and manufacturing industries are researching to develop such foods. 'Healthy, sugar-free, fat-free, fiber-rich' have become marketing catchphrases. Local Ayurveda knowledge is also being scientifically proven and used in the development of functional foods and nutraceuticals (Rasanjalee and Samarasinghe, 2018).

However, the influence of demographic variables on functional food consumption patterns, consumer knowledge (awareness) , attitudes (beliefs, thoughts, and feelings), and behaviors (choice, motives, and feeding practices) regarding functional foods have not been extensively researched in Sri Lanka (Alvarenga *et al.*, 2012). Similar consumer surveys were conducted in other parts of the world, particularly in developed countries with a large consumer base (Ozen *et al.*, 2014). These kinds of research are vital to understanding the market trends and to choosing marketing strategies to promote FF. This study was conducted to fulfill that research gap and functional food product developers can use this manuscript as reference material to identify the target niche market's behavioral pattern.

MATERIALS AND METHODS

Sample Selection and Data Collection

A probability sampling technique (simple random sampling method) was used for data collection. A self-administrative questionnaire was distributed among respondents from Western, Southern, Central, Sabaragamuwa, and Uwa Provinces.

The questionnaire in both English and Sinhala languages was distributed either physically or online methods among participants. Some questions in the questionnaire were adopted from

the study of Herath *et al.* (2008). From the total number of questionnaires distributed, 303 were used for data analysis. Data were collected for a year from May 2020 to May 2021.

A simplified definition of processed functional food was elaborated in the introductory part of the questionnaire as some respondents are not familiar with the term. The definition was as below.

'Market available processed food products that make health claims to reduce disease risk or improve/maintain a person's health' (Granato *et al.*, 2017; Williams and Ghosh, 2008).

Measures

Reliability of the questionnaire:

Questionnaire reliability was assessed by Cronbach's alpha coefficient, with a cut-off of 0.7 (Tavakol and Dennick, 2011).

Association/independence between demographical data and frequency of consuming functional foods:

Before the research, seven commonly available functional foods in the local market were screened using a pilot survey. The foods were herbal tea/ infusion, low-fat yoghurt, instant porridge/soup mixture, cereal mix, kurakkan bread, sugar-free biscuit/crackers, and probiotic added foods. Then, the consumption frequency of each food item was assessed using a Likert scale (1=daily, 2=weekly, 3=monthly, 4=rarely, 5=never). For the data analysis purpose, consumers were divided into two groups based on the functional foods' consumption frequency.

Group 1 = consumers who consume at least one commonly available functional food per week (frequent users).

Group 2= consumers who do not consume any commonly available functional food per week (seldom users).

The aim is to check the relationship between selected demographical data and the frequency of functional food consumption. Pearson's chi-squared test assayed association/independence among qualitative variables.

Respondents' Knowledge of functional food and health:

The objective of this part was to check whether consumers aware that their food choices can positively impact on promoting good health. Four statements were given (Table 04), and the respondents could mark their answers using a five-point Likert scale (5=strongly agree;1=strongly disagree). Mean limits in Table 01 and Table 02 were used in descriptive analyses of the Likert scale data (Pimentel, 2019).

Table 01: Mean limits for five-point Likert scale.

Value	Limits	Interpretation
5	4.20-5.00	Strongly agree
4	3.40-4.19	Agree
3	2.60-3.39	Neutral
2	1.80-2.59	Disagree
1	1.00-1.79	Strongly disagree

Source: Pimentel, 2019

Table 02: Mean limits for three-point Likert scale.

Value	Limits	Interpretation
3	2.34-3.00	Yes, always
2	1.67-2.33	Yes, sometimes
1	1.00-1.66	Never

Source: Pimentel, 2019

Respondents' Attitude Related to Functional Food Choice:

This part aims to identify the motivation factors of respondents to consume functional foods. Ten questions were asked (Table 05), and the respondents marked their answers using three-point Likert scale.

Data acquired from the Likert scale were analyzed using descriptive statistics. The numbers obtained for each Likert item which were transformed to their mean values to articulate the weights of the study variables. The weighted mean for each number in Likert scale was calculated then the attitude for each item was also explained. The relationship between respondents' 'Knowledge of functional food and health' and 'motivation to consume functional foods' were determined using Pearson correlation analysis.

All the statistical analyses were performed using IBM SPSS statistics 25 software.

Consumers' behavior, knowledge, and suggestions on functional foods:

This part aimed to assess how consumers are aware of certain functional foods and took their opinion on functional foods related to their consumption experience. The results obtained were interpreted using pictorial depicts.

RESULTS AND DISCUSSION

Sociodemographic Information

Respondents were from selected provinces of the country. Most of them belong to the Western province (37.62%), followed by the Central province (21.15%), Southern province (14.85%), Sabaragamuwa province (13.86%), and Uwa province (12.52%). More than half of the respondents were from semi-urban areas (50.16%), followed by rural (27.39%) and urban (22.44%) areas. Most of the respondents were in boarding places (49.83%), while only 27.39% were in their own houses. Other 27.77% are staying in rented houses or with parents.

The respondents were mainly women (60.40%). Most of the respondents were between the age of 18-34 (80.20%). Most respondents have a basic degree/diploma (66.67%) or postgraduate degree (16.50%). More than half of respondents (63.10%) mentioned science/science-related subjects (e.g., medicine, nursing, food science, sports science, agriculture) as their specific study area.

The total monthly income of most of them was below LKR 100,000.00 (75.24%). Among all participants, only 15.18% were suffering from non-communicable disease/s. None of the respondents specified the type of NCD. A detailed description of the sample and sociodemographic profile was demonstrated in Table 03.

Table 03: Purchasing behavior of respondents, according to their demographic characteristics.

Demographic characteristic		N (% from total*)	Participants who consume at least one common FF** per week N (% from total)	P value (P≤0.05)
Gender	Female	183 (60.40%)	122 (67.00%)	0.51
	Male	120 (39.60%)	76 (63.60%)	
Age	18-34	234 (80.20%)	159 (80.30%)	0.05
	35-54	44 (14.52%)	30 (15.20%)	
	>55	25 (8.25%)	9 (4.50%)	
Education level	O/L or below	14 (4.62%)	5 (35.71%)	0.01
	A/L	37 (12.21%)	16 (43.20%)	
	Diploma/Degree	202 (66.67%)	141(70.10%)	
	Post Graduate Degree	50 (16.50%)	36 (72.00%)	
Study area (N=255)	Perceived science related subjects	161(63.10%)	119 (73.90%)	0.06
	Perceived non science related subjects	94 (36.90%)	59 (62.80%)	
Total monthly income (LKR)	<50,000	122 (40.26%)	75 (62.00%)	0.38
	50,000 to 100,000	106 (34.98%)	68 (64.20%)	
	100,000 to 500,000	75 (24.75%)	55 (73.33%)	
Residential milieu	Rural	83 (27.39%)	50 (60.20%)	0.15
	Semi urban	152 (50.16%)	97 (64.20%)	
	Urban	68 (22.44%)	51 (75%)	
Nature of residence	Own house	83 (27.39%)	50 (25.30%)	0.15
	Boarding place	151 (49.83%)	97 (64.20%)	
	Other	69 (27.77%)	51 (75.00%)	
Non-Communicable diseases	Yes	46 (15.18%)	23 (50.00%)	0.02
	No	256 (84.82%)	176 (68.21%)	

**Valid total N=303, ** Herbal tea/infusion, low fat yoghurt, instant porridge/soup mixture, cereal mix, kurakkan bread, sugar free biscuit or crackers, and probiotic added foods*

Validity and Reliability of Data Set

Cronbach's alpha (or coefficient alpha) used to measure the reliability or internal consistency of set of questions. The Cronbach's alpha coefficient value for the questions related to the knowledge of FF was 0.894 and for the questions related to respondent's behavior on FF was 0.832. These values suggested that the items have relatively acceptable internal consistency (Habidin *et al.*, 2015).

Relationship Between Demographic Data and Frequency of Consuming Functional Foods

According to the results demonstrated in Table

03, only three demographic characteristics (age, education level, and suffering from non-communicable diseases) were significantly (p-value ≤0.05) influenced the frequency of functional food consumption.

Past studies also indicated that age is significantly associated with the acceptance of functional foods (Herath *et al.*, 2008; Ong *et al.*, 2014). In this study, the young respondents aged 18-34 had the highest consumption frequency (frequent users) of functional foods over the respondents aged 35 or above (Table 03). Young respondents may have limited time to prepare food due to busy work schedules, limited food processing facilities in boarding places, and comparatively higher accessibility to information on FF via the internet and social media may be reasons for this observation. The young generation getting addicted to fast foods is identified as a major public health problem (Das, 2015) and this preference of the selected samples to consume functional foods is a good alternative to minimize/avoid fast foods. Functional food manufacturers can attract this target population by using creative marketing strategies.

Contrary to the present finding, most previous studies showed older people are more interested in functional food products than younger consumers (Topolska *et al.*, 2021). It is beneficial to have functional foods for older adults due to their age-related health concerns. However, a previous study conducted among the Canadian population showed that food neophobia reduced the functional food consumption of older adults (Stratton *et al.*, 2015). Similarly, Sri Lankan adults may also prefer to have indigenous, traditional, and natural food systems which exert therapeutic benefits over processed functional foods.

Functional food consumption frequency had a positive relationship with the education level. The highest FF consumption frequency was observed from the consumers having a post-graduate degree, followed by a basic degree/diploma. Ong *et al*. (2014) and Herath *et al.* (2008) observed similar findings in their studies. With higher education, people have more tendency to access the knowledge on FF and easily change their attitude positively may be the reason for the observation. A large percentage of respondents who perceived science subjects (e.g., medicine, nursing, food science, sports science, agriculture) had more tendency to consume functional food frequently, yet the relationship was not significant (Table 03).

Interventions aimed at improving dietary behaviors among people at higher risk of NCDs identified as a best practice (Browne *et al.*, 2019). Surprisingly, in this study, respondents not having NCDs more frequently consumed functional foods than those with NCDs. This result may be due to comparatively high consumption of processed food by the young population who have a comparatively lower risk of NCDs.

In this study, gender does not significantly influence functional food consumption frequency. In contrast, some research showed women are more likely to buy FF than men (Beardsworth *et al.*, 2002; Siro *et al.*, 2008). The association between monthly income and functional food consumption frequency was not significant (Table 03). The percentage of the urban population who consumed functional food frequently was higher than the rural populations, but the influence was insignificant. The percentage of respondents in boarding places/rent houses were higher in consuming functional foods frequently than consumers in their own house/with parents (Table 03).

Most of the participants in the survey were educated young population. According to the results, they were the ones who frequently consume functional foods. Therefore, manufacturers can identify them as a target group while introducing functional foods to the marketplace. The elders usually practice having homemade functional foods (e.g., porridge, infusions) and complementary medicine rather than purchasing them as ready-to-eat or instant products.

Respondents' Knowledge on Functional Food and Health

Respondents' knowledge of the health-promoting ability of functional foods directly influences consumers' purchasing behaviours and attitudes. A study by Annunziata and Vecchio (2011) showed less knowledge and awareness of Italian consumers on functional foods reduces the consumption frequency. In this study, average Likert scale scores for the knowledge related statements are in Table 04. Accordingly, consumers agreed on the statement that functional foods promoted good health. Yet, they have no clear idea/not sure about functional foods' ability to reduce western drug usage or the effectiveness of functional foods compared to western drugs. Healthy eating is an excellent proactive approach to preventing the risk of NCDs. Therefore, it is good that young, without NCDs population having awareness and motivation to choose their food wisely.

Respondents' Attitude Related to Functional Food Choice

Respondents' attitudes are the primary concern in accepting functional foods (Singh, 2019). The average Likert scale scores and the standard errors for the attitudes related to FF choice are given in Table 05. Accordingly, the respondents' attitude towards functional food choices was neutral (not strongly agreed or strongly disagreed to the given Likert items). Most of them were not always concerned about the healthiness of food products during their buying behaviour. In this study, both physiological (e.g. general wellbeing, weight control, disease prevention, fitness) and psychological (mental performance/ stress release) benefits influenced respondents FF choices (Figure 01). In contrast, previous studies showed consumers much concern about physiological benefits/reduction of disease risk of FF rather than psychological benefits (Vella *et al.*, 2014).

In this study, A significant ($P<0.01$) positive correlation was observed between respondents' knowledge of FF and health and their attitude/ motivation to consume FF. This demonstrated respondents can be motivated to consume FF by enhancing their awareness.

According to Figure 01, only 24.42% of respondents always check the nutrition label, calorie value, or health claims in food labels before buying. Among the respondents, 31.64% chose food/beverage to enhance general well-being/stay healthy. More than half (82.40%) of respondents were always/may be willing to pay an additional cost for the health benefits of food (Figure 01).

Table 04: Descriptive statistical analysis of participants' knowledge on functional food and health.

Statement	Mean Likert score* (statistic ± standard error)	Item description **
Some foods contain active components that reduce the risk of diseases and improve long term health.	3.64±0.069	Agree
Some foods contain active components that can help with current health, such as improving digestion.	3.68±0.066	Agree
Foods can be used to reduce the use of medications or other medical treatments.	3.39±0.073	Neutral
Foods enriched with active components that reduce the risk of diseases and improve long term health are just as effective as pills and supplements containing the same compound.	3.08±0.070	Neutral

**N=303, **minimum Statistic=1, Maximum statistic=5*

Table 05: Descriptive statistical analysis of participants' attitudes on functional food choice.

	Attitude construct	Mean Likert score* (statistic± standard error)	Interpretation**
Q1	Check the nutrition label, calorie value, or health claims in food labels before buying.	1.97±0.038	Yes, sometimes
Q2	Choose food/beverage because they contain desirable nutritional qualities (fiber, antioxidants, essential fatty acids).	2.07±0.039	Yes, sometimes
Q3	Choose food/beverage to enhance general wellbeing/ stay healthy.	1.86±0.052	Yes, sometimes
Q4	Choose food/beverage because they contribute to weight control.	2.19±0.040	Yes, sometimes
Q5	Choose food/beverage to enhance resistance to illness.	2.04±0.040	Yes, sometimes
Q6	Choose food/beverage to improve athletic performance/fitness.	2.27±0.039	Yes, sometimes
Q7	Choose food/beverage to improve mental performance/stress release.	2.24±0.045	Yes, sometimes
Q8	Choose food/beverage for specific medical purposes or health concerns (such as diabetes, cardiovascular disease, high blood pressure, allergens).	2.01±0.056	Yes, sometimes
Q9	Choose food/beverage because they are fortified with extra vitamins and/or minerals.	2.11±0.038	Yes, sometimes
Q10	Willing to pay an additional cost for the health benefits of a food.	1.83±0.040	Yes, sometimes

**N=303, **minimum Statistic=1, Maximum statistic=3*

Consumers' Behavior, Knowledge, and Suggestions on Functional Foods

Figure 02 shows the factors considered by consumers while purchasing functional foods. Accordingly, nutrition composition, taste, and price are the major influential factors considered by the respondents before purchasing a FF. As per Figure 03, social media has been identified as the major news source for knowing functional foods, followed by TV advertisements. A previous study done with consumers in Canada identified health professionals such as physicians and dieticians, family members, and friends as credible sources of information on FF (Vella *et al.*, 2014).

According to Figure 04, most consumers have tea/infusions daily rather than other functional foods. Cereal mix, probiotic added foods, and low-fat yoghurts are the leading functional foods consumed on weekly basis. However, most respondents consumed all these functional foods rarely and some respondents never consumed them.

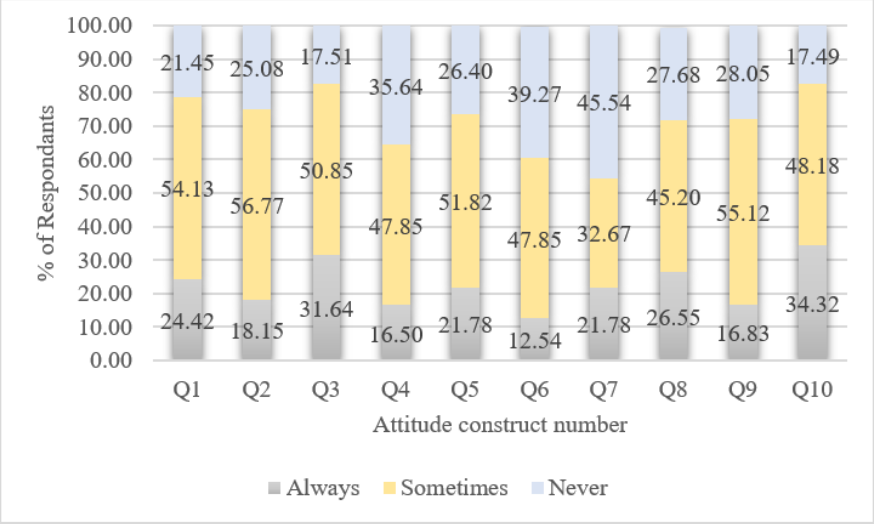

Figure 01: Responses on attitude related to functional food choices (Q1-Q10 are in Table 05)

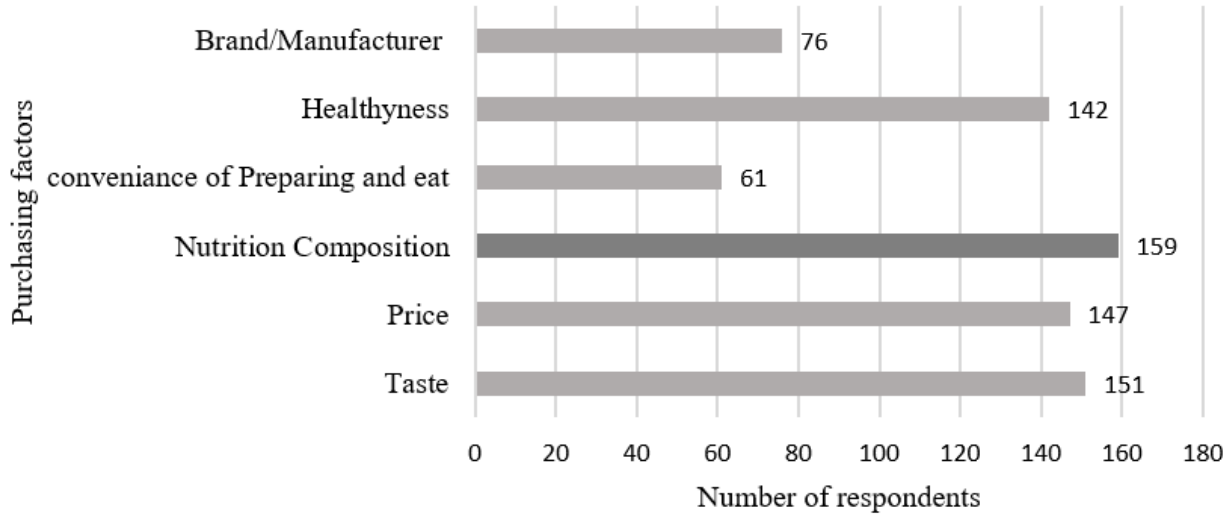

Figure 02: Factors that consumers consider while purchasing a functional food

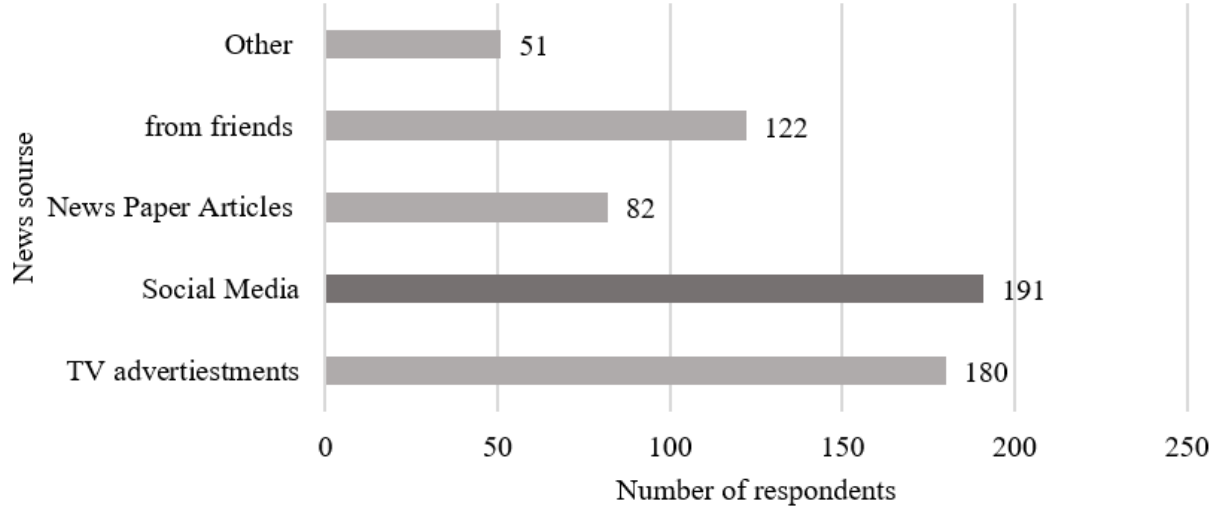

Figure 03: Key sources use to know about functional foods

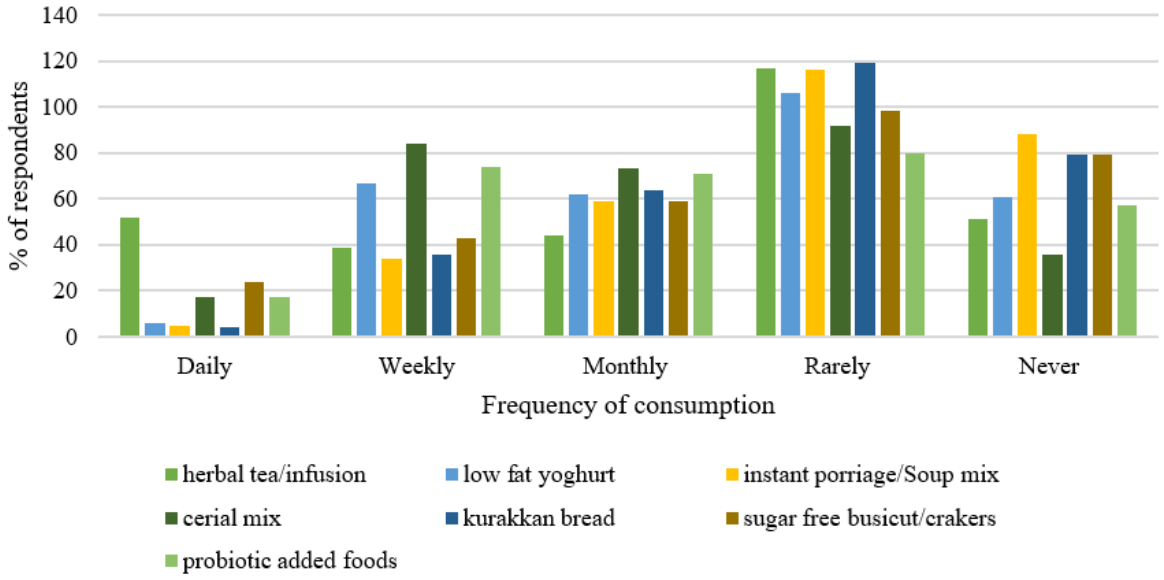

Figure 04: Frequency of consuming selected functional foods

By responding to the question asked about consumer suggestions on the most suitable functional food type to consume daily for particular health conditions (e.g., diabetes), nearly half of the participants suggested herbal tea. Then, they suggested biscuits, soup mixes, snacks, bread, and yoghurts, respectively. (Figure 05). Few participants suggested spices, desserts, and beverages under other categories.

Less awareness was identified as the significant barrier for the selected sample to consume functional foods, followed by not tasty, price not affordable, and fear of artificial additives (Figure 06). Citizens of northern Greece submitted the same reasons for a similar survey (Karelakis *et al.*, 2020). Manufacturers should mitigate these barriers to popularize their products among the general population. For instance, polyphenolics, glycosylates, and flavonoids are good antioxidants yet have an aversive bitter taste after fortifying them to food vehicles. Food processors can think of using suitable bitter-inhibiting compounds or bitter blockers at the manufacturing stage (Gaudette and Pickering, 2013). Good quality raw materials for functional foods can be purchased from small-scale farmers, which is the best option to reduce the product's price while giving a hand to small entrepreneurs. Otherwise, most functional foods only target the export market, and the local consumers do not have the opportunity to gain their beneficial effects. It is vital to test the functional foods in vivo and in vitro before launching those into the market. Otherwise, FF breaks consumers' trust by failing to give the functional benefits they claimed.

There are a few limitations in the present study. The respondents in this study were biased towards the young age groups and may not represent the Sri Lankan population at large. A more representative sample should be drawn for future research.

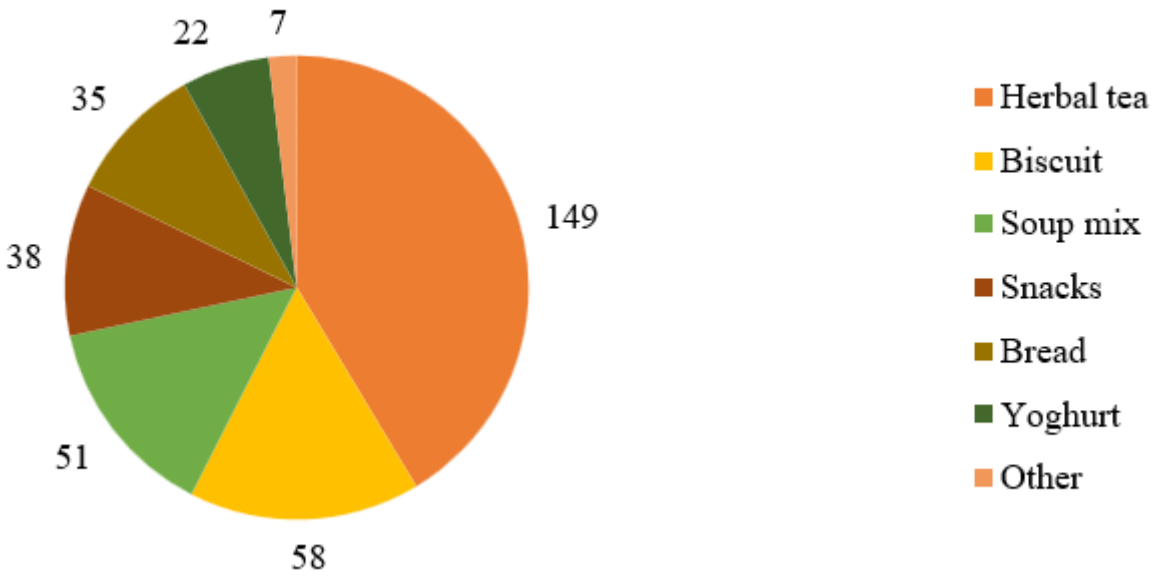

Figure 05: **Consumer suggestion on most suitable functional food to convey the health benefits to general population**

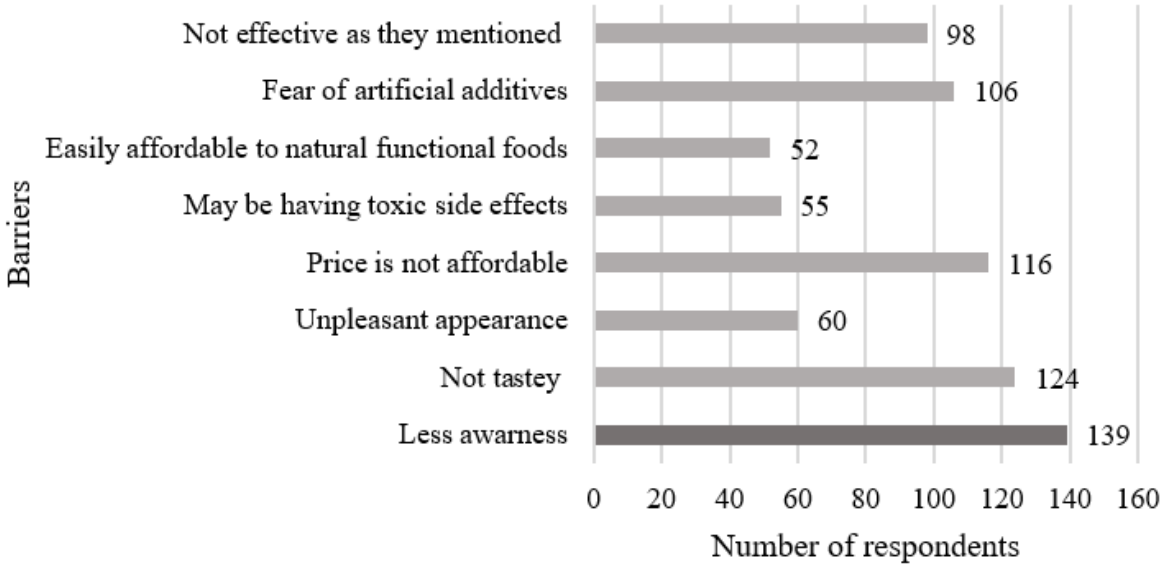

Figure 06: **Barriers to consume functional foods**

CONCLUSION

The study revealed that age, education level, and NCDs have a significant association with functional food consumption frequency. Accordingly, the young population aged 18-34 who have a diploma/degree and do not have NCDs were more likely to consume FF rather than other respondents. Respondents agreed on the health-promoting ability of FF but had a neutral idea of its effectiveness with compare to allopathic medicine. Respondents' attitude toward functional food choices was neutral and both physiological and psychological factors influenced their FF choices. The study demonstrated a significant positive correlation between respondents' knowledge of FF and their motivation to consume FF. More than half of respondents were always/may be willing to pay an additional cost for the health benefits of food. Nutrition composition was the major influential factor considered by the respondents

before purchasing FF and social media has been identified as the major news source for knowing FF. Tea/infusions were the most frequently consumed FF by the respondents. Less awareness was identified as the significant barrier for the selected sample to consume functional foods. This study revealed an excellent opportunity to develop functional foods targeting the young consumers of Sri Lanka. Food manufacturers can utilize the trends discussed in this manuscript for their future functional food development.

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