The Journal of Agricultural Sciences - Sri Lanka
Vol. 18, No 3, September 2023. Pp 388-406
http://doi.org/10.4038/jas.v18i3.9850

Awareness on and Compliance with the Food Act in Sri Lanka: An Analysis of the Present Status

A.T. Kolamunna[1] and C.A.K. Dissanayake[1*]

Received:12th July 2022 / Accepted: 04th July 2023

ABSTRACT

Purpose: *In Sri Lanka, legislative regulation of food safety and hygiene issues is mainly done under the Food Act No. 26 of 1980. Proper awareness and compliance to the Food Act are necessary for food safety. This cross-sectional analysis was done to assess the present status of awareness and compliance with the prohibitions and regulations of the Food Act by stakeholders.*

Research Method: *Litigations done by Public Health Inspectors (PHIs) from 7 districts and data from a field survey of 30 PHIs (from same districts), 50 traders and 70 consumers (from 5 districts) were collected.*

Findings: *According to the litigations analyzed, "Food (labeling and advertising) regulation" was the highest violated regulation in Sri Lanka ($p<0.05$). However, "Food (Packaging materials and articles) regulation" had significantly higher ranking ($p<0.05$) according to the PHIs' survey. According to the traders' ranking, their highest and least compliance ($p<0.05$) were on "Packaging materials and articles" and "Bread standards" regulations respectively. Consumers' highest and least awareness were on "Coloring agents" and "Flavoring agents" respectively and their highest and least compliances ($p<0.05$) were on "Adoption for standards" regulation and "Labeling and advertising" regulation respectively.*

Originality/ Value: *This study gives an overall idea about the current awareness and compliance of the stakeholders on Food Act. It is vital for future policy development.*

Keywords: *Consumers, Food Act, Food regulations, Public Health Inspectors, Traders*

INTRODUCTION

Food is an essential requirement for every living being. It is indirectly identified as a human right by the Universal Declaration of Human Rights (Hettiarachchi *et al.*, 2021a). According to the definition in Food Act of Sri Lanka imposed in 1991, "food can be any article that is manufactured, sold or represented for human consumption". Similarly, it includes "any article that is used in composition or preparation of food". It is a responsibility of the entire community to dedicate to ensure the food safety. In the world, different food laws have been implemented in order to regulate the food safety and hygiene conditions. For instance, neighboring India has Food Safety and Standards Act, the United Kingdom has Food Standards Act 1999 and the United States has Food Drug and Cosmetics Act 1938 (Shukla *et al.*, 2014).

When the situation in Sri Lanka is considered, during the past few decades, the food industry has expanded due to reasons such as urbanization, increased trade in fresh and processed food, more consumption of foods of animal origin, growing mobility of people, and increasing population (Munasinghe *et al.*, 2015). Thus, the concerns

[1*]*Department of Animal and Food Sciences, Faculty of Agriculture, Rajarata University of Sri Lanka.*
chamdissanayake@yahoo.com
https://orcid.org/0000-0003-2607-6479

on food safety and hygiene issues have also been increased. In order to regulate these issues and ultimately to protect the consumer, several legislations have been stated. Among them Food Act No. 26 of 1980 is the main legislation being practiced in Sri Lanka (Parliament of the Democratic Socialist Republic of Sri Lanka, 1980). This was later amended by Food (Amendment) Act No.20 of 1991 (Parliament of the Democratic Socialist Republic of Sri Lanka, 1991) and Food (Amendment) Act No.29 of 2011 (Parliament of the Democratic Socialist Republic of Sri Lanka, 2011; Hettiarachchi, 2020).

All the acts and regulations are available online with open access, therefore anyone can refer and become aware. But the availability of food laws itself does not ensure consumers' safety unless it is properly enforced and monitored. However, uncertainty prevails on the level of awareness of people regarding the Food Act as well as their responsibilities to ensure food safety. Furthermore, foodborne illnesses have increased but many of them remain unreported. The main reason is that the consumers are either unaware or do not consider their responsibilities in achieving food safety (Munasinghe *et al.*, 2015). Furthermore, based on preliminary discussions had with traders, it is understood that most of them are unwilling to accept responsibility for the products they sell or display in their stores, particularly when they purchased them from other manufacturers.

In Sri Lanka, Public Health Inspectors (PHIs) have the legal authority to inspect and to take corrective actions against the food safety and hygienic issues. They are the key field workers who are involved in many preventive health programs in the community (Kumarasinghe and Samaranayake, 2020). They deal with different types of health legislations. Among which Food Act is the one that they do major legislative activities. It is identified that PHIs are more self-competent on Food Act than other legislations (Wijedasa, 2003). Therefore, PHIs act as a good tool to understand the level of food safety and hygienic issues in the country.

Majority of the past research studies have considered consumer awareness and Food (labeling and advertising) regulations. For instance, Talagala and Arambepola (2016) have identified unsatisfactory use of food labels, while Arnold *et al.*, (2020) also had discussed about contravention of labelling regulations in beverages. They have further highlighted the importance of implementing Food (labelling) regulation properly. Researchers have also concerned Food (color coding for sugar level) regulations, Food (sweeteners) regulation and Food (flavoring substances and flavor enhances) regulations. For example, Rajapaksha *et al.*, (2017) have concluded that incidence of the use of non-permitted color in foods and beverages is at unsatisfactory level in Colombo district. Dilrukshi *et al.*, (2019) have found that 100% beverages and 85% confectioneries in Jaffna contained permitted synthetic food colors. Out of the remaining confectionaries, 7% had not contained any synthetic food colors and 8% had contained non-permitted colors. At the same time, Sewwandi *et al.*, (2020) have revealed that the majority of consumers had a good impression about traffic light system (color coding system) used in fruit-based beverages where 68% of target population of the consumer survey had a good understanding on the color-coding system.

However, much attention has not been paid as an overall perspective of the situation involving all stakeholders. Therefore, this study was aimed at analyzing the present status regarding the awareness and compliance to the Food Act by multiple stakeholders who are involved with food safety issues in Sri Lanka.

MATERIALS AND METHODS

In order to achieve the set objectives, a cross-sectional analysis was conducted (Figure 01). The key figures involved in food safety issues, namely, PHIs, traders and consumers were taken for the study.

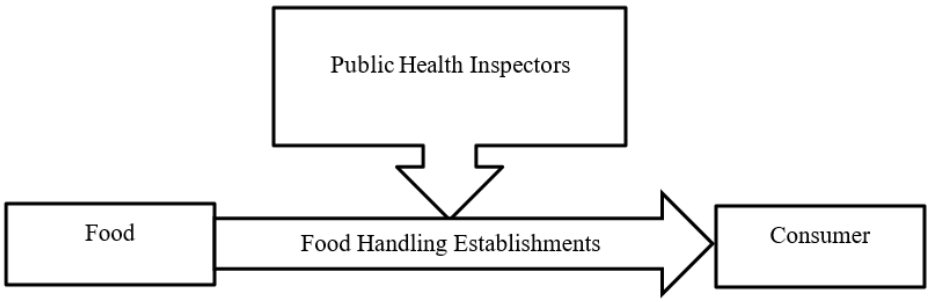


Figure 01: Conceptual framework representing the stakeholders of food safety under Food Act

In order to obtain primary data, a survey was conducted with a semi-structured pretested questionnaire. The litigations done by the PHIs were collected for the study. These litigations were done according to the prohibitions stipulated in the Food Act of Sri Lanka and the regulations come under it. The litigations which were conducted for five years from 2015 to 2020 were selected. Seven districts in Sri Lanka, namely; Colombo, Gampaha, Kandy, Nuwaraeliya, Anuradhapura, Polonnaruwa and Matara, were selected to represent different population density categories (Table 01) described by the Department of Census and Statistics (2020). Accordingly, Colombo and Gampaha represented the category of "High population density" (>1,000 persons/ km2), while Kandy and Matara belonged to "Medium" (500-1,000 persons/km2) and, Nuwaraeliya, Anuradhapura and Polonnaruwa belonged to "Low" (>500 persons/km2) population densities. Traders and consumers were selected from Colombo, Gampaha, Kandy, Kalutara and Kurunegala districts which are the main consumer basin areas having the highest population in Sri Lanka (Department of Census and Statistics, Sri Lanka, 2020).

Out of the litigations done by PHIs under the Food act No.26 of 1980 in each district within the specified period of time, 50% were selected randomly for the study. The litigations were traced using the charge sheets produced by the PHIs. Accordingly, 37 charge sheets from Colombo, 25 charge sheets from Gampaha, 65 charge sheets from Kandy, 45 charge sheets from Nuwaraeliya, 54 charge sheets from Anuradhapura, 108 charge sheets from Matara and 27 charge sheets from Polonnaruwa were selected. Thus, a total number of 361 charge sheets were taken for the study.

Additionally, a representative sample of 30 PHIs was selected randomly from the respective districts for the survey. They were inquired about their experiences and observations within one year during the prescribed period of time (2019 – 2020).

Table 01: Population density categories in selected districts.

District	Population density (No. of persons/km^2)	Population density category
Colombo	3,512	High (> 1,000).
Gampaha	1747	
Kandy	764.4	Medium (500 -1,000)
Matara	675	
Nuwaraeliya	444	
Anuradhapura	131	Low (< 500)
Polonnaruwa	134	

Source: Adapted and modified from Department of Census and Statistics (2020)

The information was collected based on a pre-tested, semi-structured questionnaire via conducting personal interviews. They were asked to rank their experiences and views within one year of the prescribed period of time as "0" - Never = 0 per year, "1" - Seldom = 1-10 per year, "2" - Neither seldom nor often = 11 – 20 per year, "3" - Frequently = 21 – 30 per year, "4" - Very frequently = more than 30 per year. Other than that, the satisfaction levels of PHIs on awareness of traders about rules and regulations regarding the food safety and hygiene, responsiveness of food handlers such as traders to PHI's advice and responsiveness of consumers regarding food safety issues were analyzed by using descriptive analysis. They were supposed to rank their satisfaction as; "0" – Mostly dissatisfied, "1" – Dissatisfied, "2" – Neither satisfied nor dissatisfied, "3" – Satisfied, "4" – Highly satisfied.

There are 7 categories of food handling establishments stated in the Manual for the Sri Lanka Public Health Inspectors as, food factory, hotel, bakery, tea and snack bar, grocery, supermarket and others (Ministry of Health, 2010). Thus 50 traders were selected from main consumer basin areas including Colombo, Gampaha, Kandy, Kurunegala and Kalutara districts. They were selected randomly in a way that they represented the categories of hotels, bakeries, groceries, supermarkets, vegetable stalls and dairy stalls. Their awareness on prohibitions and regulations under the Food Act were evaluated using a pre-tested semi-structured questionnaire via personal interviews. In order to identify the compliance of traders to the Food Act, participants were asked to rank how often they take necessary actions to be compliance with the rules and regulations using a five-point hedonic scale.

In selecting the 70 consumers, a different strategy was taken. It was expected to identify whether the level of education of the consumers affects their decision to file a complaint against food safety and quality problems. Thus, two types of families were selected; families with at least one parent is holding a university degree and families where none of the parents were holding a university degree. Accordingly, 70 undergraduates residing in the same 5 districts who represented 10 highest ranked Sri Lankan universities were selected using snowball sampling technique. A collective view of both parents was taken as one response.

The data collected were analyzed using R studio (Version - R x 64 4.0.1). Litigations were analyzed using descriptive statistics. Non-parametric tests such as Freidman test and Post Hoc Analysis - Least Significant method (LSD) were used to identify the significance within test parameters of ranked data. Chi square test was also used to analyze the relationship between the education level of the family and their responses towards food safety issues that they experience. The significance level for all data analysis was taken as 0.05.

RESULTS AND DISCUSSION

The results are discussed under different subsections as below.

Evaluation of Litigations

The study mainly aimed towards analyzing the litigations collected. The analysis of the litigations collected revealed a variation in the regulations, which were prominently violated in different districts. Accordingly, "Food (labeling and advertising) regulation" was the mostly violated regulation in Kandy (27.7%), Gampaha (36%), Nuwaraeliya (24.4%) and Anuradhapura (25.9%) districts. However, the highest violated prohibition (40.7%) in Polonnaruwa district was "No person shall manufacture, import, display, sell or distribute any food that is unfit for human consumption". The same prohibition as in Polonnaruwa was observed to be the highest in Colombo too (29.7%). In Matara, the maximum percentage (20.4%) of violations was on "Food (flavoring substances and flavor enhances) regulation".

When all the litigations in all districts were considered as a whole, the least violated regulations were "Food (antioxidants) regulation, Food (sweeteners) regulation and Food (bread standards) regulation (0.3%), while the highest violated regulation was "Food (labeling and advertising) regulation" (19.7%) (Table 02). A previous study done by Arnold *et al*. (2020) in 18 supermarkets in the Kandy Municipal Council area also revealed that a majority of health and nutritional claims had violated the existing legislative provisions on food labeling.

Table 02: Percentage of violation of prohibitions and regulations of the Food Act, Sri Lanka.

Prohibition/ Regulation	Total no. of violations (%)
Injurious to human health	34
Unfit for human consumption	110
Unclean, putrid, repugnant, decayed, decomposed, infected with diseased animal substance or decayed vegetable substance or insect infested	82
Adulterated	24
Has added substances in contravention of the provisions	0
Unfit for sanitation	30
Improperly packed and labeled	2
Stored unfit for sanitation	6
Packaged in a way to mislead the consumer	6
Food (color coding for sugar level) regulation	2
Food (flavoring substances and flavor enhances) regulation	34
Food (sweeteners) regulation	2
Food (adoption of standards) regulation	13
Food (hygiene) regulation	59
Food (shelf life of imported items) regulation	0
Food (melamine in the milk and milk products) regulation	0
Food (Formaldehyde in fish) regulation	0
Food (packaging materials and articles) regulation	23
Food (antioxidants) regulation	2
Food (coloring substances) regulation	8
Food (vinegar standards) regulation	0
Food (control of import labeling and sale of genetically modified foods) regulation	0
Food (labeling and advertising) regulation	139
Food (iodization of salt) regulation	63
Food (irradiation) regulation	0
Food (bottled or packed water) regulation	4
Food (prohibition of potassium bromate in flour) regulation	0
Food (bread standards) regulation	2
Food (miscellaneous) regulations	0
Food (Preservatives) Regulations	5
Baking powder	0
Sugar confectioneries	0
Fats and oils	19
Cereals, pulses, flours and cereal foods	16
Spices, condiments and seasonings	18

This variation of the legislative actions between districts may have number of reasons. According to the population density and degree of urbanization, the types and number of available food handling establishments might differ. Characteristics, attitudes, and interests of PHIs and the environmental factors, such as political situation, influence or support by higher authorities affect in identifying food safety issues (Herath, 2004). A previous study conducted by Herath (2004), also convinced that there is a wide variation in the performance of PHIs on food safety activities at PHI divisional level. The level of activities related to food legislations differs from individual basis, depending on the personal characteristics such as attitudes and interests of the PHI and PHI range to be covered. This also might vary depending on the level of knowledge of PHIs regarding the Food Act because, a study conducted by Arnold (2005) based on Gampaha and Kurunegala districts, had mentioned that, none of the PHIs had a sufficient level of knowledge on food legislation activities. Arnold (2005) had categorized that only 6.6% had "good knowledge" and 48.8% had "poor knowledge", while the rest had "very poor knowledge". This could be a reason for the variation of legislations

Further, according to Table 02, violation or contravention of 8 prohibitions or regulations was not reported in any of the selected districts. They include "no person shall manufacture, import, display, sell or distribute any food that has added substances in contraventions of provisions", Food (shelf life of imported items) regulation, Food (melamine in the milk and milk products) regulation, Food (Formaldehyde in fish) regulation, Food (vinegar standards) regulation, Food (control of import labelling and sale of genetically modified foods) regulation, Food (irradiation) regulation and Food (prohibition of potassium bromate in flour) regulation. There could be several reasons for the above non-reporting. One such reason might be that most of these regulations are imposed on imported food items. The strict regulations in import control procedure (Ministry of Health, Food Control Administration Unit (2021)) might have an effect on this reduction. And secondly all might be abiding the regulations. Furthermore, it might also be due to differences in the attention paid by authorized officers on different products, which might have caused less attention towards these.

Views and Experiences of PHIs

The participated PHIs represented Colombo (13.3%), Gampaha (10%), Kandy (30%), Nuwaraeliya (16.9%), Matara (10%), Anuradhapura (10%) and Polonnaruwa (10%). According to their ranking based on their experiences, Food (packaging materials and articles) regulation was the highest observed violated regulation (Sum of ranks = 868.5) while "No person shall manufacture, import, display, sell or distribute any food that is infected with diseased animal substance or decayed vegetable substance or insect infested" was the least violated (Sum of ranks = 241) regulation. This result was contradictory to the result obtained by analyzing litigations. However, according to the PHIs, there were many violations other than litigations, which were not sued at court and were advised to comply. Therefore, PHIs' observations reflected a collective result of both litigations and advocacies done. Other responses given by PHIs were analyzed using descriptive analysis and the results are in Table 03. It was observed that PHIs had given number of advises for traders on corrective actions to be taken in their premises regarding food safety without going for litigations. According to their ranking, they had advised traders more than 30 times per year (ranking = 4) and they had sued 21 – 30 times per year (ranking = 3). It was reported that they had to destroy or eliminate commodities in the range of 11 – 30 times per year, within their area. However, food handlers' behavior exhibited against PHIs' advice had happened seldom (ranking = 1). The PHIs had seldom (ranking = 1) received complaints from consumers regarding food safety issues during a prescribed period of one year. This implies, as authorized officers, PHIs "very frequently" (more than 30 incidences per year) had taken different measures to make traders compliant with food safety rules and

regulations to ensure the food safety. According to the responses from the PHIs, this had been done with the support of traders. However, less support was given by the consumers. According to PHIs' point of view, consumers' attention on their responsibility to dedicate for food safety was "dissatisfactory". The main reasons given by the PHIs were ignorance, less awareness, less attention paid on food safety and reluctance to complain.

The satisfaction levels of PHIs on awareness of traders on rules and regulations regarding food safety and hygiene, responsiveness of food handlers to PHI's advice and responsiveness of consumers regarding food safety issues were analyzed. Based on the results, it can be stated that PHIs were neither satisfied nor dissatisfied (Median = 2) on the awareness of traders about rules and regulations regarding the food safety and hygiene, and also on responsiveness of food handlers to PHI's advices and responsiveness of consumers regarding food safety issues (Table 04). Among the PHIs interviewed, 100% of them stated that "Food hygiene" was the section that they had to advise traders on for corrective actions. Food (Hygiene) regulation and Food (Labeling and advertising) regulation were the regulations that are contravened mostly so they had to go for litigations. But, according to Hettiarachchi et al. (2021b), PHIs give minimum priority to labelling regulations due to inadequate levels of knowledge, competence and legal support.

Awareness and Compliance of Traders

Out of the total 50 traders who responded to the survey, 84% of the food handling establishments were owned by males while the rest were owned by females. The study revealed that all these traders were literate. Of the participants, 10% had university degrees, 64% had passed only GCE (A/L) and 26% had passed only GCE (O/L). To be aware on details of food safety regulations, literacy is important. According to the study findings, the traders who responded to the study had used several sources to obtain information regarding food safety and hygiene (Figure 02). Highest number (84%) of traders had obtained awareness from PHIs. Other than that, training programs, officials other than PHIs, other traders, newspapers, TV programs, internet and social media have been used as sources of awareness.

These awareness status of traders regarding the Food Act was further analyzed. They were asked whether they are aware of each prohibition and regulation or not. According to the results, 96% of the traders were aware of the prohibitions stated in the Food Act. Least awareness (34% of the traders were unaware) was on the prohibition, "No person shall manufacture, import, display, sell or distribute any food that is adulterated and adding substances in contravention of the provisions". Highest awareness (96% of the traders were aware) was on prohibition "No person shall manufacture, import, display, sell or distribute any food that is unclean, putrid, repugnant, decayed, decomposed, infected with diseased animal substance or decayed vegetable substance or insect infested". Summary of all the responses is displayed in Figure 03. Maximum awareness (84% of the traders were aware) was on Food (Labeling and advertising) regulation and the minimum awareness (78% of the traders were unaware) was on Food (Formaldehyde in fish) regulations.

A summary of the responses of the awareness on food regulations is displayed in the Figure 04. It is difficult to measure the compliance of the community towards those legislations because a suitable indicator for the compliance is not available (Yapp and Fairman, 2006). Even though, in the present study an effort was taken to evaluate the compliance, by using several strategies such as ranking. According to the ranking done by participated traders about how often they take necessary actions to be in compliance with the rules and regulations, (Table 05), the highest ranking (Sum of ranks = 1439.5) was given to the Food (packaging materials and articles) regulation. Least ranking (sum of ranks = 463.5, 421.5, 404.0 and 382.0 respectively) was offered to the Food (flavoring agents and flavor enhances) regulation, Food (control of

import labeling and sale of genetically modified foods) regulation, Food (antioxidants) regulation and Food (bread standards) regulation. This implies that the traders were more considerate on packaging material, but were least concerned on the food flavors and enhancers; genetically modified food, antioxidants and bread standards. However, Hettiarachchi *et al*. (2021b) mentioned that the manufacturers /distributors preferred labelling regulations because it is useful in attracting consumers.

Table 03: Ranks given by the Public Health Inspectors (PHIs) on the frequency of actions taken for ensuring food safety and hygiene.

Action	Mean rank given	Median of ranks given
Advising traders to do corrections in their premises without going for litigations	3.3	4.0
File litigations regarding food safety	2.7	3.0
Destroy or eliminate the commodities with the agreement of the person who owns the possession	2.6	2.5
Noticed that food handlers have behaved against the advises given by PHIs	1.2	1.0
Receive complaints from consumers regarding food safety issues	1.4	1.0

Table 04: Satisfactory level of Public Health Inspectors' (PHIs) on awareness on and compliance with the Food Act, Sri Lanka.

Question	Mean rank given	Median rank given
Awareness of traders about rules and regulations regarding the food safety and hygiene	2.3	2.0
Responsiveness of food handlers to PHI's advices	2.4	2.0
Responsiveness of consumers regarding food safety issues	1.7	2.0

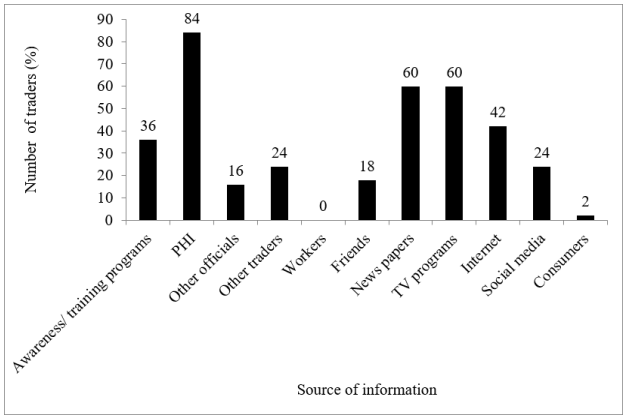
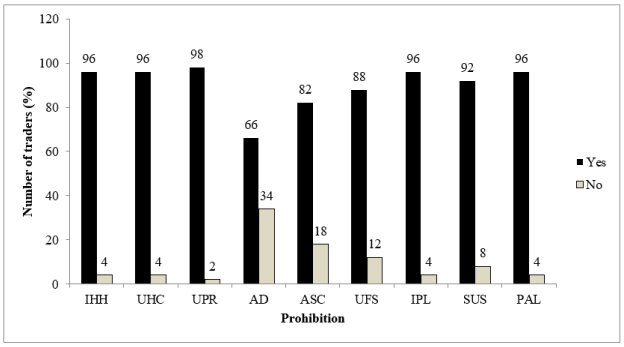
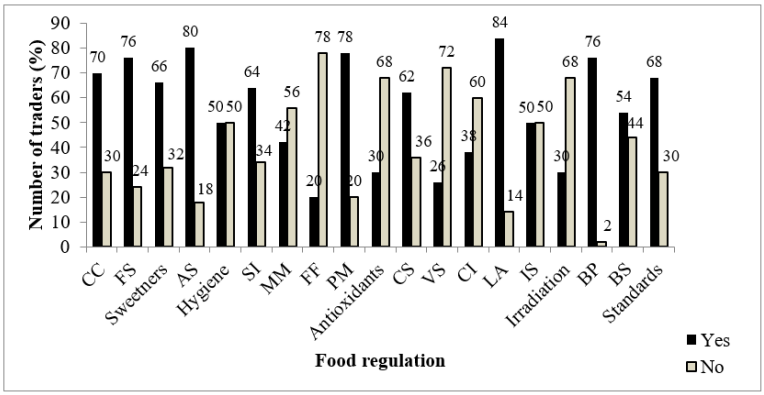


Figure 02: Sources used by traders to obtain information regarding food safety and hygiene.



**IHH: Injurious to human health; UHC: Unfit for human consumption; UPR: Unclean, putrid, repugnant, decayed, decomposed or diseased animal substance or decayed vegetable substance or insect infested; AD: Adulterated; ASC: Has added substances in contravention of the provisions; UFS: Unfit for sanitation; IPL: Improperly packed and labeled; SUS: Stored unfit for sanitation; PAL: Packaged and labeled in a way to mislead the consumer*

Figure 03: Awareness level of traders on prohibitions in the Food Act, Sri Lanka.



**CC: Color coding for sugar level; FS: Flavoring substances and flavor enhancers; AS: Adoption of standards; SI: Shelf life of imported items; MM: Melamine in the milk and milk products; FF: Formaldehyde in fish; PM: Packaging materials and articles; CS: Coloring substances; VS: Vinegar standards; CI: Control of import labeling and sale of genetically modified foods; LA: Labeling and advertising; IS: Iodization of salt; BP: Bottled or packed water; BS: Bread Standards*

Figure 04: Awareness of traders on food regulations of the Food Act, Sri Lanka.

Table 05 Sums of ranks given by the traders on compliance with the prohibition/regulation in the Food Act, Sri Lanka.

Prohibition/ regulation	Sums of ranks and Group
Whether the packaging materials are damaged, cracked, unclean etc. or not	1439.5a
Whether the label contains Additives in INS numbering	1405.0ab
In the food for infants and children, whether the included additives are suitable/ allowed or not	1364.5abc
Has added substances in contravention of the provisions	1322.5abcd
In vinegar, whether it has mentioned the source of vinegar or not	1321.0abcd
In food that are irradiated, whether it is done without creating undue risk to health, safety and environment	1262.0bcd
Adulterated	1254.5cde
In milk and dairy products, whether melamine is available in unacceptable amount (> 1 ppm) or not (by observing the ingredients in package)	1242.0cde
Whether the bottled or packed mineral/ drinking water has obtained a certification of registration in that behalf from the Chief Food Authority	1239.0cde
Unfit for sanitation	1185.0def
If the product is an imported one, whether the packed date, expiration date, use by date etc are mentioned properly or not	1181.5def
Whether the label contains Intended use	1112.5efg
[In carbonated drinks/ ready to serve instant drinks (except dairy products), Fruit nectar and fruit juice whether the color coding for sugar level is available or not	1076.0fgh
Whether the label contains Date of expiry	1053.0fghi
Whether the label contains Instructions for storage	1020.0ghi

Prohibition/ regulation	Sums of ranks and Group
Improperly packed and labeled	1013.0ghij
Whether the product is expired or not	943.5hijk
Unfit for human consumption	927.0ijk
Whether the available coloring substances are permitted or not	917.5ijk
Whether the label contains Name and address of the manufacturer/ packer/ distributor in Sri Lanka	915.0ijk
Whether the salt contains 15 – 30 mg/kg iodine or not	867.5jkl
Whether the label contains Batch number	834.5kl
Whether the label contains Complete ingredient list	817.0kl
Unclean, putrid, repugnant, decayed, decomposed or diseased animal substance or decayed vegetable substance or insect infested	809.0klm
Stored unfit for sanitation	753.5lmn
Manufacturer, import, display, sell or distribute any food that is, injurious to human health	734.5lmn
Packaged and labeled in a way to mislead the consumer	733.0lmn
Whether the packaging materials are permitted or not	666.0mn
Whether the product is SLS certified or not	629.5no
Whether the fish contain more than 5 ppm formaldehyde or not	610.0no
Whether baking powder, sugar confectioneries, fats and oils, cereals, pulses, flours and cereal foods, spices, condiments and seasonings have required standards or not	493.0op
Whether the included sweeteners are permitted or not	487.5op
Whether the included flavoring substances and flavor enhances are permitted or not	463.5p
Whether the product includes genetically modified organisms/ their components or not	421.5p
Whether the available antioxidants are permitted or not	404.0p
Whether the bread includes only the permitted ingredients, permitted optional ingredients, permitted colors and a permitted moisture content and acid insoluble ash content	382.0p

**The value denoted by same letter is not significantly different ($p<0.05$).*

Out of the total traders who participated in the study, 98% had claimed that their trading premises had already been inspected by PHIs at least once during the period under study. And, out of them 66% of the traders had been advised to take corrective actions within their premises, which were basically about the proper storage and display of food items, proper waste disposal and arrangement of disposal bins, and hygiene of the premises and workers. These all are inclusive in the Food (hygiene) regulation. In such advised cases, 93.8% of traders had mentioned that they

had taken the actions as per the PHIs' advices. The rest did not comment on taking any action regarding the PHIs' advices.

Out of the total number of participated traders, 14% had been charged for accusation under three regulations of the Food Act. Those accusations included, 1. displaying expired food products which is included in Food (labeling and advertising) regulation, 2. insect infected rice which is included in the prohibition; "No person shall manufacturer, import, display, sell or distribute any food that is unclean, putrid, repugnant, decayed, decomposed or diseased animal substance or decayed vegetable substance or insect infested", and 3. unsanitary storage which is included in Food (hygiene) regulation. Of the participants to the study, the traders who had been charged had taken corrective actions to rectify the misconduct. In addition, 8% of the participants had become guilty under the Food Act at the court for the reasons such as expiration [Food (labeling and advertising) regulation], uncleanliness [Food (hygiene) regulation] and insect infestation (Prohibition; "no person shall manufacturer, import, display, sell or distribute any food that is unclean, putrid, repugnant, decayed, decomposed or diseased animal substance or decayed vegetable substance or insect infested"). This confirmed the highest number of litigations on Food (labelling) regulation revealed in the analysis of litigations. This was also in line with the findings based on the comments of PHIs, which revealed that the highest number of incidences were reported on Food (labelling) regulation and Food (hygiene) regulation. A study conducted by Weerasinghe *et al*. (2017) also stated that the school canteens in Sri Lanka are not up to the satisfaction level in terms of food safety and quality. According to that study, availability of adequate and quality physical and human resources were identified as crucial to ensure quality service of a food establishment. This reason may be applicable for other types of food handling establishments which were included in the present study. However, an observational study done in 40 school canteens in Kilinochchi district mentioned that the overall food hygiene was satisfactory in 62.5 % of canteens (Subaskaran, 2019), which were contradictory to the present study findings.

Awareness and Compliance of Consumers

Other than traders, consumer awareness on the legislation present in the country to govern the food safety is also important. Out of the total number of responded consumers, 78.4% were aware about the Food Act while the rest 21.6% were not. The consumers who were aware about the Food Act had used several sources to obtain awareness regarding food safety legislations under the Food Act (Table 06). Highest number of participants (70%) had used internet, while a lower number of participants (18.6%) had obtained knowledge by officials other than PHIs.

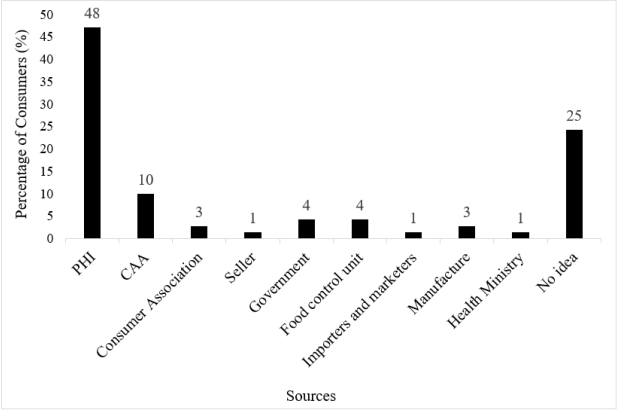
Table 06: Sources of awareness for consumers on Food Act, Sri Lanka

Source	Number of consumers (%)
Awareness/ training programs	28.6
Public Health Inspectors	34.3
Other officials (Specify)	18.6
Friends	30.0
News papers	47.1
Television programs	51.4
Internet	70.0
Social media	67.1
Other	8.6

On the other hand, 48% of the respondents had correctly identified as that they should complain to PHIs in case of facing a food safety problem. However, 28% of respondents mentioned incorrect officials or authorities for reporting, while 25% did not know to whom they should report food safety concerns (Figure 05).

The study further revealed that 24.1% of the consumers who participated in the study had stated that they believed that consumers also can become guilty under the Food Act, which was incorrect. However, only 26.2% complained about the issues that they had experienced to authorized officers. The rest (73.8%) although had faced food safety issues, had never complained. They had stated several reasons for not complaining (Figure 06). The main reason of the majority (60%) was that they did not consider much about complaining.

When considering the educational level on the complaining behavior, the results revealed that there was no significant ($p<0.05$) relationship between the education level of the family (holding a degree) and their complaining behavior towards experiencing a food safety issue A study done in Malaysia has concluded that the knowledge had a significant (P=0.009) association with the level of practice toward compliance with abattoir laws among the workers (Abdullahi *et al*., 2016), but it did not mention about the education level.



PHI: Public Health Inspector; CAA: Consumer Affairs Authority

Figure 05: Beliefs of consumers regarding the person to complain to for a food safety issue.

Another study conducted by Kariyawasam *et al.* (2006) regarding consumer attitudes and perceptions towards food quality has shown that the age, gender, level of education and income have a significant impact on purchasing behavior, but it does not discuss about the reaction of consumers regarding illegal cases. Therefore, more studies need to be done to validate these results.

When awareness on each regulation was investigated, as per the results displayed in Table 07, it was revealed that the Food (Coloring agents) regulation was the one that consumers were mostly aware about. And they were least aware about the Food (Flavoring agents and flavor enhances) regulation. This might be due to the frequent awareness on these artificial food coloring agents among the consumers. But the exact reason for this has to be further explored.

When considering the compliance of the consumers with common food safety and hygienic prohibitions and regulations mentioned in Table 08, the highest rank was given to the Food (adoption of standards) regulation. The lowest rank was given to the Food (labeling and advertising) regulation. This lowest rank is further explained in a previous study, where complicated life styles, brand loyalty of the consumers and complicated nature of food labels had been identified as the major reasons for not examining food labels (Bandara, 2016).

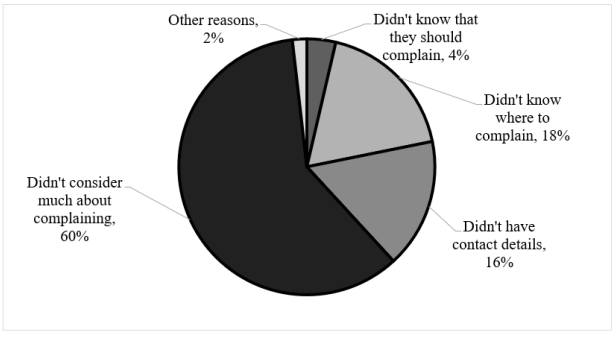


Figure 06: Reasons for not complaining about food safety issues

Table 07: Sums of ranks given by consumers on their awareness level on different food regulations of the Food Act, Sri Lanka.

Regulation	Sums of ranks
Coloring agents	762.5a
Formaldehyde in fish	717.0ab
Iodization	682.5ab
Irradiation	679.5b
Shelf life of imported food	668.5b
Bottled or packed water	655.5bc
Antioxidants	586.0cd
Potassium bromate in wheat flour	582.0cd
Labeling and advertising	581.5cd
Bread standards	570.0d
Sweeteners	560.0d
Standards	555.5de
Vinegar standards	540.5de
Packaging materials and articles	535.0de
Melamine in milk and milk products	477.0e
Flavoring agents and flavor enhancers	367.0f

**The value denoted by same letter is not significantly different ($p<0.05$).*

Table 08: Sums of ranks given by consumers on their compliance level with the common food safety and hygienic prohibitions and regulations of the Food Act, Sri Lanka.

Criteria	Sums of ranks
Whether the product is SLS certified or not	1481.5a
Whether the label contains Instructions for storage	1470.5ab
Whether the food is Repugnant	1393.5abc
Whether the food is unsanitary	1355.0abc
Whether the added flavoring substances and flavor enhances are permitted or not	1329.0abcd
In purchasing food for infants and children, whether the added additives are suitable/ allowed or not	1328.5abcd
In carbonated drinks/ ready to serve instant drinks (except dairy products), Fruit nectar and fruit juice whether the color coding for sugar level is available or not	1325.0abcd
Whether the added sweeteners are permitted or not	1322.5abcd
In milk and dairy products, whether melamine is available in unacceptable amount (> 1 ppm) or not (by observing the ingredients in package)	1315.0abcde
Whether the added coloring substances are permitted or not	1305.0bcde
If the product is an imported one, whether the packed date, expiration date, use by date etc are mentioned properly or not	1296.5cde

Criteria	Sums of ranks
Whether the food is Adulterated	1289.5cde
In vinegar, whether it has mentioned the source of vinegar or not	1274.0cde
Whether the added antioxidants are permitted or not	1272.0cde
Whether the product includes genetically modified organisms/ their components or not	1185.0def
Whether the packaging materials are damaged, cracked, unclean etc. or not	1148.5efg
Whether the food is mixed with undesirable components	1097.5fgh
Whether the label contains Intended use	1068.5fghi
Whether the food is Decayed	1010.0ghij
Whether the packaging materials are permitted or not	983.5ghijk
Whether the food is Improperly packed and labeled	952.0hijkl
Whether the label contains Date of expiry	930.0hijkl
Whether the food is Packaged and labeled in a way to mislead the consumer	927.0ijkl
Whether the food is unclean/ unsuitable for consumption	916.0ijkl
Whether the label contains Name and address of the manufacturer/ packer/ distributor in Sri Lanka	882.0jkl
Whether the label contains Batch number	863.5jklm
Whether the food is Infected with diseased animal substance or decayed vegetable substance or insect infested	853.0jklm
Whether the label contains Additives in INS numbering	827.5klm
Whether the label contains Complete ingredient list	812.0lm
Whether the food is Stored under unsanitary conditions	801.0lm
Whether the product is expired or not	705.5m

**The value denoted by same letter is not significantly different ($p<0.05$).*

When considering about the nutritional panel, many consumers either do not analyze nutrition labels or they are not in a position to interpret the information on the labels accurately (Kasapila and Shaarani, 2016). Hettiarachchi et al. (2021b) also found that consumers believe that the labels do not always provide correct information and they were not satisfied with the implementation of labelling regulations, location of the label and the expiry date. But, according to the same study, the color code for sugar level and the expiry date were the main interests of consumers which is totally contradictory with the present results where the color code and expiry date were given significantly lower rankings (Table 08). On the other hand, another study revealed

that a considerable proportion of Sri Lankan customers (87%) is known to read the labels regularly (Hettiarachchi *et al*., 2018). A study conducted in Kandy revealed that consumers use nutritional labeling when making a purchasing decision especially because of health consciousness. Majority of these respondents have paid attention for any additional nutritional information provided on food items (Prathiraja and Ariyawardana, 2003).

The present study, consumers ranked the food safety and hygienic issues that had been experienced by them as in Table 09. Here, the highest ranking was given for the prohibition "No person shall manufacture, import, display, sell or distribute any food that is repugnant', while the lowest ranking was given for the issue "Label does not contain Additives in International Numbering System for Food Additives (INS) numbering", which is included in Food (labeling and advertising) regulation. This might be due to the fact that general consumers might not be aware of the International Numbering System (INS) used in identifying the ingredients. However, the consumers who participated in the study were neither dissatisfied nor satisfied about the food safety, hygiene, rules and regulations in Sri Lanka.

Table 09: Sums of ranks given for the food safety and hygienic issues experienced by the consumers.

Food safety issue	Sums of ranks
Conditions that food are Repugnant	1386.5a
Conditions that food are unclean/ unsuitable for consumption	1367.5ab
Conditions that foods are Adulterated	1359.0abc
Conditions that food are mixed with illegal substances that are harmful to health	1335.0abcd
Added coloring substances are not permitted	1319.0abcd
Conditions that foods are Improperly packed and labelled	1231.5abcde
In vinegar, it has not mentioned the source of vinegar	1230.5abcdef
Added flavoring substances and flavor enhancers are not permitted	1222.0abcdefg
Label does not contain Intended use	1218.5bcdefgh
Label does not contain Instructions for storage	1214.0bcdefgh
Available antioxidants are not permitted	1198.5cdefgh
Conditions that food are Infected with diseased animal substance or decayed vegetable substance or insect infested	1183.0defghi
In carbonated drinks/ ready to serve instant drinks (except dairy products), Fruit nectar and fruit juice; the color coding for sugar level is not available	1175.5defghi
Conditions that food are Decomposed	1172.5defghi
Packaging materials are damaged, cracked, unclean etc.	1142.5efghij
If the product is an imported one; the pack date, expiration date, use by date etc are not mentioned properly	1138.5efghij
Conditions that foods are Packaged and labeled in a way to mislead the consumer	1128.0efghijk
Added sweeteners are not permitted	1098.0efghijkl
Packaging materials are not permitted	1080.0efghijkl
Conditions that foods are unsanitary	1066.5fghijklm
Label does not contain Name and address of the manufacturer/ packer/ distributor in Sri Lanka	1059.0ghijklm
Label does not contain Batch number	1056.0hijklm

Food safety issue	Sums of ranks
Conditions that foods are Stored under unsanitary conditions	1019.5ijklmn
Product includes genetically modified organisms/ their components, even it is not allowed to include GMO	986.5jklmn
In the food for infants and children; the added additives are not suitable/ allowed	967.0klmno
Product had expired	962.5lmno
Label does not contain Date of expiry	914.0mno
Product is not SLS certified even they need to be SLS certified	908.0mno
In milk and dairy products, melamine is available in unacceptable amount (> 1 ppm) (by observing the ingredients in package)	887.0no
Label does not contain Complete ingredient list	873.5no
Label does not contain Additives in INS numbering	820.5o

**The value denoted by same letter is not significantly different ($p<0.05$).*

Comparison of Observations on Litigations and the Responses of PHIs, Traders and Consumers

According to the litigation analysis, the highest violated regulation was labelling and advertising. Public Health Inspectors also stated that it was the section that they had to conduct litigations mostly. But similarly, they had to do both advice and form litigations on Food (hygiene) regulation. However, according to their ranking on observing the violation of prohibitions/ regulations, Food (packaging materials and articles) regulation was the highest violated one. It was the one that traders had ranked as the regulation that their highest compliance was on. This might be due to the fact that both traders and PHIs had paid greater attention on this aspect. Therefore, the PHIs find violations mostly on this regulation. Similarly, more advices are given to comply. This might lead traders to take corrective action very frequently to be compliant with it. But, in consumers' perspective, their least experienced issue was in labelling. This might be due to the fact that consumers trust the trader where they purchase their food commodities. These contradictory results may also be due to differences in awareness, interest, attitudes of PHIs, traders and consumers on prohibitions and regulations stated under the Food Act and on overall food safety status of the country.

As revealed by the study, the stakeholders were neither satisfied nor dissatisfied regarding the present status of awareness and compliance on the Food Act in Sri Lanka. According to Herath, (2004), the food safety situation in Sri Lanka is not different, especially, from other developing countries. According to the literature, majority of the authorized officers are not satisfied with the level of enforcement of food safety rules and regulations (Herath, 2004). The same study has revealed that the inadequacy of the number of authorized officers engaged in food safety activities at divisional level as a major issue. Opinions of different authorized officers on specific food safety activities revealed the inadequacy of coverage and intensity, not giving priority on a scientific basis, and the need for better feedback and follow up actions as the most important aspects that need improvements (Herath, 2004).

According to the views of PHIs, consumers will follow some incorrect procedures to address food safety issues, such as taking bribes by traders, make the involvement of unofficial parties like politicians. Therefore, at the time when authorized officers get to know about the issue, much time has passed so that they cannot take any action. Some PHIs had commented that present status of food safety and hygiene has improved compared to the past years and can be improved further. This was suggested to be improved by increasing the existing fines imposed and proper

implementation of such fines, because Food Act is a strong legislation that can cover wide range of aspects.

CONCLUSIONS

Based on the research findings, labelling and advertising are the most prominent prevailing violation related to food safety in Sri Lanka. According to the views of PHIs, regulation on 'packaging materials and articles' has the least compliance from traders while most traders are taking corrective actions to be compliant with the same regulation. PHIs are more often required to implement laws related to hygiene and labeling. The traders are in highest compliance with Food (Packaging materials and articles) regulation while least compliance with Food (Bread standards) regulation. Consumers' highest and least awareness are on coloring agents and flavoring agents respectively. The highest compliance of consumers is on Food (adoption for standards) regulation while the least compliance is with Food (labeling and advertising) regulation. There is no relationship between the educational level (having a degree or not) of the consumers and their complaining behavior on food safety issues that they experience.

It is further suggested that awareness on the Food Act among all the stakeholders needs to be improved. A thorough knowledge about the responsibilities of each person should also be given to ensure the food safety in the country.

REFERENCES

Abdullahi, A., Hassan, A., Kadarman, N., Saleh, A., Baraya, Y.U.S.A. and Lua, P.L. (2016). Food safety knowledge, attitude, and practice toward compliance with abattoir laws among the abattoir workers in Malaysia. *International Journal of General Medicine*, 9, 79. DOI: https://doi.org/10.2147/IJGM.

Arnold, S.M. (2005). An intervention study to improve the implementation of specific legislation related to food safety by Public Health Inspectors (Doctoral dissertation). http:// librepository. pgim.cmb.ac.lk/bitstream/handle/1/966/D-1419-AB.pdf?sequence=2. 01.02.2021.

Arnold, M., Wickramatilake, S., Fernando, D., Sampath, R., Karunapema, P., Mahesh, B., Fernando and Y., Denawaka, C. (2020). Health and nutrition related claims of non-alcoholic beverage labels in supermarkets: their compliance with Sri Lanka Food Labelling and Advertising Regulations. *Journal of the College of Community Physicians of Sri Lanka* 26(1), 29–34. DOI: https://doi.org/10.4038/jccpsl.v26i1.8222

Bandara, B. E. S. (2016). Impact of food labeling information on consumer purchasing decision : with special reference to faculty of Agricultural Sciences, *Italian Oral Surgery*. Elsevier Srl, 6 (Icsusl 2015), 309–313. DOI: http://doi.org/10.1016/j.profoo.2016.02.061.

Department of Census and Statistics. 2020. *Estimated mid year population by district 2015-2019.* Colombo, Sri Lanka.

Dilrukshi, P. G. T., Munasinghe, H., Silva, A. B. G. and De Silva, P. G. S. M. (2019). Identification of Synthetic Food Colours in Selected Confectioneries and Beverages in Jaffna District, Sri Lanka', 2019. *Journal of Food Quality.* DOI: https://doi.org/10.1155/2019/7453169.

Herath, H.D.B. (2004). Study on food safety activities at divisional level in selected provinces in Sri Lanka (Doctoral dissertation). http://librepository. pgim.cmb.ac.lk/bitstream/handle/1/985/D-1418-AB.pdf?sequence=2. 11.12.2020.

Hettiarachchi, C. A. (2020). Food Act of Sri Lanka : A Systematic Review on Awareness and Practice. *World Nutrition* 11(4), 56–65. DOI: https://doi.org/10.26596/wn.202011456-65

Hettiarachchi, C.A., Arnold, S.M. and Nandasena, S. (2018). Strengths and deficiencies of beverage labelling regulations of Sri Lanka. *Journal of the College of Community Physicians of Sri Lanka*, *24*(2). DOI: https://doi.org/10.4038/jccpsl.v24i2.8148

Hettiarachchi, C.A., Reeve, B. and Wijesinghe, S.S., (2021a). A comparative doctrinal analysis of food advertisement laws in Sri Lanka with selected jurisdictions. *Journal of the Postgraduate Institute of Medicine*, 8(1): E126 1-12. DOI: http://doi.org/10.4038/jpgim.8290.

Hettiarachchi, C.A, Nandasena, S. and Arnold, M. 2021b. Attitudes of manufacturers, law enforcing officers and consumers on the Sri Lankan labelling regulations: a qualitative study. *Journal of the College of Community Physicians of Sri Lanka*. DOI: https://doi.org/10.4038/jccpsl.v27i1.8378.

Kariyawasam, S., Jayasinghe-Mudalige, U.K. and Weerahewa, J. (2006). Assessing consumer attitudes and perceptions towards food quality: The case of consumption of tetra-packed fresh milk in Sri Lanka. *Research in Agricultural and Applied economics,* (No. 523-2016-37726). https://www.tandfonline.com/ doi/abs/10.1080/10408398.2012.710277.

Kasapila, W. and Shaarani, S.M. (2016). Legislation—Impact and trends in nutrition labeling: A global overview. *Critical reviews in food science and nutrition*, *56*(1), 56-64. https://www.tandfonline.com/doi/abs/10.1080/10408398.2012.710277. 08.03.2021.

Kumarasinghe M. and Samaranayake, D. (2020). Job satisfaction and associated factors among Public Health Inspectors in Job satisfaction and associated factors among Public Health Inspectors in Sabaragamuwa Province, Sri Lanka: pre-COVID-19 era. *Sri Lanka Journal of Social Sciences,* 43(2) 99-108. DOI: https://dx.doi.org/10.4038/sljss.v43i2.7770.

Ministry of Health (2010). Manual for the Sri Lanka Public Health Inspector, Ministry of Health, Sri Lanka.

Ministry of Health, Food Control Administration Unit (2021). Import Control Procedure. http://eohfs.health.gov.lk/food/index.php?option=com_content&view=article&id=2&Itemid=136&lang=en.

Munasinghe, J., De Silva, A., Weerasinghe, G., Gunaratne, A. and Corke, H. (2015). Food safety in Sri Lanka: problems and solutions. *Quality Assurance and Safety of Crops & Foods*, 37-44. DOI: 10.3920/QAS2014.x007

Parliament of the Democratic Socialist Republic of Sri Lanka (1980). Food Act, No. 26 of 1980, Government publications bureau, Colombo 01.

Parliament of the Democratic Socialist Republic of Sri Lanka (1991). Food (Amendment) act, No 20 of 1991, Government publications bureau, Colombo 05.

Parliament of the Democratic Socialist Republic of Sri Lanka (2011). Food (Amendment) act, No.29 of 2011, Government publications bureau, Colombo 05.

Prathiraja, P.H.K. and Ariyawardana, A. (2003). Impact of nutritional labeling on consumer buying behavior. *Sri Lankan Journal of Agricultural Economics*, *5* (1381-2016-115752), 35-46. DOI: http://dx.doi.org/10.4038/sjae.v5i0.3475

Rajapaksha, G. K. M., Wansapala, M. A. J. and Silva, A. B. G. (2017). Detection of Synthetic Colours in Selected Foods & Beverages Available in Colombo District, Sri Lanka. *International Journal of Science and Research* 6(5), 801–808. DOI: 10.21275/ART20173280.

Sewwandi, S.D.C., Arampath, P.C., Silva, A.B.G. and Jayatissa, R., (2020). Determination and comparative study of sugars and synthetic colorants in commercial branded fruit juice products. *Journal of Food Quality* 2020. DOI: https://doi.org/10.1155/2020/7406506

Shukla, S., Shankar, R. and Singh, S.P. (2014). Food safety regulatory model in India. *Food Control* 37,.401-413. DOI: https://doi.org/10.1016/j.foodcont.2013.08.015

Subaskaran, S., Hanadapangoda, H.D.P. and Devapriya, K.V.N. (2019). Food safety in school canteens in Kilinochchi district. *International Journal of Multidisciplinary Research* 04(07). https://www.sciencedirect.com/science/article/pii/S0956713513004076.

Talagala, I. A. and Arambepola, C. (2016). Use of food labels by adolescents to make healthier choices on snacks : a cross- sectional study from Sri Lanka. *BMC Public Health* 1–11. DOI: https://doi.org/10.1186/s12889-016-3422-1.

Weerasinghe, M.C., Bandara, S. and Sanoon, M. (2017). Service quality of school canteens: a case study from the Western Province, Sri Lanka. *Ceylon Journal of Medical Science*, 54(2), 11-16. DOI: http://doi.org/10.4038/cjms.v54i2.4817

Wijedasa, K.B.B.M. (2003). Factors associated with the use of selected health legislation by public health inspectors in the western province of Sri Lanka (Doctoral dissertation). http://librepository.pgim.cmb.ac.lk/bitstream/handle/1/1435/D-1081-AB.pdf?sequence=2.

Yapp, C. and Fairman, R. (2006). Factors affecting food safety compliance within small and medium-sized enterprises: implications for regulatory and enforcement strategies. *Food Control*, 17(1), 42-51. DOI: https://doi.org/10.1016/j.foodcont.2004.08.007