Food Safety knowledge and practices of Sri Lankan individual households

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Abstract
Having awareness on better hygiene, health and food safety practice by the individual households is important for the healthy life style as it directly affects the incidence of many diseases prevalent in the community. Thus a cross sectional study was conducted with 121 households and a self-administered questionnaire was used to assess the respondents' knowledge and practices concerning on food safety. Accordingly results showed that responses were in a satisfactory level related to both knowledge (mean of 74.46) and practices (mean of 74.63) but the respondents lacked relevant scientific knowledge regarding food safety. Further low Spearman's Rho values implying that there was no significant relationship between knowledge and practices regarding several factors surveyed such as checking food labels, awareness of hand washing and proper cleaning, understanding about temperature danger zone and the temperature inside the refrigerator.

Keywords: food safety behaviors, food label, danger zone, Sri Lankan households

1. Introduction
Sri Lanka is a developing country in Asia. When compared with other developing countries, Sri Lanka has a high percentage of literacy (91.2%) according to CIA world fact book which may be due to the free education system available in the country. High literacy rate of the country is a positive feature implying the good condition of life of the Sri Lankan citizens. However there is no measure to show whether actually Sri Lankan citizens have the basic knowledge concerning food safety which is essential for a good standard of living. Having a good knowledge and practices over food safety is important for every citizen to live a healthy life free from diseases.

The knowledge and practices of population over hygiene, health and food safety differ in great extent due to many reasons. Many sociological studies have tried to identify the factors affecting the different levels of awareness and practices regarding the above areas. The importance of them is unavoidable as they directly contribute to the economy of the country because high percentage of diseases of the population means high percentage of GDP on medicines, health care facilities as well will contribute to high percentage of absence of employees which reduces the efficiency of any sector. Thus, providing necessary education on these areas is very importance for a developing country. Hence focusing on above and improving them immediately is a national duty.

As the first step of that process, identifying the current status of knowledge, awareness of citizens and the level of practices is required. The studies concerning the knowledge, attitudes and practices of the community (KAP Researches) try to find answers for such problems by considering a sample of suitable size. In the present study, quantified and measured the phenomenon of food safety through the use of a questionnaire and statistical processing of the information collected. It aims to assess whether there is a relationship between knowledge and practices with respect to food safety. These indicators and survey questions are based on the best available knowledge from numerous surveys, including the Demographic and Health Surveys and instruments focusing on water supply, sanitation, and hygiene used by the Environmental Health Project (EHP) and the World Health Organization [1].

2. Materials and methods
2.1 Questionnaire and Measures
The study design used in this survey was analytical cross-sectional. A self-administrated questionnaire with many closed ended questions and a few open ended questions was developed in order to determine the factors related to food safety in Sri Lankan households. The first part of the questionnaire included questions which address the respondents' knowledge on food safety and the second part of the questionnaire included questions addressing the household level practices regarding that. The second part of the questionnaire was divided into the sub parts; food purchasing, food storage, cooking, eating and drinking etc. Then the third part included providing the chance of self-assessment to the respondent. In this part the respondent was asked on the sources of their food safety knowledge, self-assessment on the level of their knowledge and the reasons for the low level of knowledge. The last part of the questionnaire included some questions to socio-demographically segment the respondents and analyze the relationship of the level of knowledge and practices with these variables. Each question was cross checked with the objective of eliminating questions that were not essential and to make sure it was unambiguous, simple and clear.

2.2 Sampling
The Maharagama District Secretariat Division (DSD) is chosen for this survey. It is situated in Colombo district, which contains the highest population density in Sri Lanka; 3438 persons per square kilometer, (Department of Census and Statistics- Sri Lanka, 2013) [2]. A large part of Colombo District is comprised with Colombo city which is the largest and the commercial capital of Sri Lanka where there is a concentration of the government and private establishments. Therefore, Colombo

District was chosen for the survey and the Maharagama Divisional Secretariat Division (DSD) was selected as it comprises of all urban, sub urban and rural residential area types [3]. The age of the study population was 16 and above, one from each selected households who were found to be either the household head or the woman of the house as they are responsible for the quality of food safety practices (of the household). The minimum desired sample size was calculated using the ISO sampling method- Single Sampling Plans for Reduced Inspection. Double stage sampling process was carried out by selecting the Grama Niladari Divisions (GNDs) in the first stage and households from the selected GNDs in the second stage.

First Stage Sampling
As the Maharagama District Secretarial Division includes 41 GNDs, the first stage sampling required random selection of 3 GNDs;
Lot size = 41
General inspection level II code letter = D
Therefore, sample size given by Single Sampling Plans for Reduced Inspection = 3

Second Stage Sampling
The total number of households in the Maharagama DSD was 47,898. Therefore, the final sample size had to be taken as 200 households.
Lot size = 47898
General inspection level II code letter = N
Therefore, sample size given by Single Sampling Plans for Reduced Inspection = 200

2.3 Data Collection
The survey was conducted during the period, September to November 2015. A simple random sampling method was used to choose a representative sample with 200 respondents from the selected population. Sampling was carried out in two stages. In the first stage, 3 Grama Niladari Divisions (GND) were selected randomly (out of the 41 GNDs in the Maharagama district secretariat division) using the list of GNDs as the sampling frame. In the second stage, 67 households were randomly selected from each of the selected GNDs. List of households available with the Grama Niladari was selected as the sampling frame. Questionnaires were distributed to the selected households by personally visiting them using the personal surveying method [4]. In the case where selected householders refused to participate, or unavailable by the time of interviewing, the next household was used instead. Prior to distributing the questionnaire, a description of the survey and its importance was provided and the respondents were assured of the confidentiality of the data gathered. In several cases, verbal assistance was provided on request.

2.4 Data Analysis
The data were analyzed using Minitab 14 statistical software. The frequencies of subjects in categorical variables were analyzed using descriptive statistics, and bar /pie charts were used for graphical representation.

2.4.1 Computing the knowledge and the practice levels on food safety
The study requires assessing the level of knowledge and

practices of the respondents with regard to food safety on the identified five key areas; proper cleaning of food, separating the raw and cooked food, cooking thoroughly, keeping food at safe temperatures and the use of safe water and raw materials [6]. In addition to that, separate questions were asked to cross-check the answers provided for the above stated questions. Here the respondents were supposed to rank the importance of each factor on a scale of three.

3. Results & Discussion
3.1 Size and Composition
Table 1 represents the size and composition of sampled households. A total of 121 households were surveyed covering a population of 66576 individuals. The median household size of the sample was 4 with a range of 2-8 household members. According to the Central Bank Sri Lanka (2014) report, Average household size is calculated as 3.9 persons (2012/13) which are nearly the same in the respondent sample [7].

Table 1: Size and composition of surveyed Population

Survey Population	Value
Number of households	121
Total population of households	473
Median household size	4
% households with children under 10 years of age	64%

3.2 Socio-Economic status of the respondents
Socio- economic status (SES) is a key attribute of the households, influencing their options and decisions. In this survey, self- selected SES categories were recorded using the family income, type of residential area and occupations. Table 2 describe the socio-economic characteristics of the respondents. When the income distribution of the respondent sample is considered, the median value of income of the selected households was in the category of Rs.40,000 - 65,000. Regarding occupations, about 41% of the respondents were unemployed females whereas nearly a quarter of the respondents either worked in the private sector or doing their own business out of which only 16% belonged to the executive level. Concerning the type of residential area, a majority of the respondents (55%) lived in the Sub Urban sector with 43% in the rural sector and 13% in the Urban sector. The Central Bank 2014 report states the Gini Coefficient of household income as 0.48; with a mean household income Rs. 45,878 and the median Rs. 30,814. The median income of the respondent sample is higher than the generic value stated for the country as the respondents belonged to the capital of the country.

Table 2: Income distribution of the respondents

Income category	Percentage
Rs. 10 000- 25 000	19%
Rs. 25 000- 40 000	24%
Rs. 40 000- 65 000	23%
Rs. 65 000- 100 000	24%
Rs. 100 000<	10%

3.3 Socio- Demographic characteristics of the respondents
The socio-demographic characteristics of the respondents such as age, education level and gender are shown in Table 3. According to the descriptive analysis of the sample covered in the survey, majority of the respondents were females (83%) may

be due to the fact that they are more likely to stay at home during the time of questionnaire distribution or gender roles and men opting to let women be interviewed. As data presented in the table 3, majority of the respondents belonged to the age group of 31-45 (64%), secondly the age group of 46-60 (26%). More than half of the respondents (55%) have had their education up to General Certificate of Education Advanced Level and about 21% have had University education.

Table 3: Age distribution and Education Level of respondents

Age categories	Percentage	Education level	Percentage
16-30	7%	Up to O/L	9%
31-45	64%	O/L	15%
46-60	26%	A/L	55%
More than 60	3%	Graduate	16%
		Post Graduate	5%

*O/L – General Certificate of Education Ordinary Level Examination, Sri Lanka
*A/L – General Certificate of Education Advanced Level Examination, Sri Lanka

3.4 Computing the knowledge and the practice levels on food safety

Table 4 indicates that descriptive statistics for the knowledge and the practices level of respondents on food safety.

Table 4: Descriptive statistics for the level of knowledge and practices of respondents on food safety
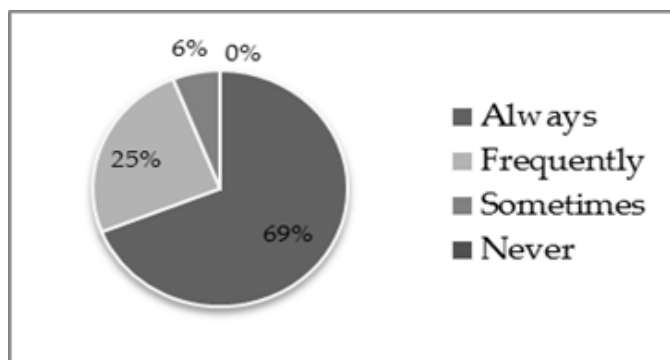
Parameter	Mean	Median
Knowledge level	74.46	75.00
Practice level	74.63	73.33

3.4.1 Knowledge level on food safety

Scientific progress on food safety and establishment of regulations alone cannot assure good condition of life in the household level. Providing basic education to the general public in the household level is essential for that. In the present study, the responses were in a satisfactory level related to the knowledge on food safety with a mean of 74.46 and median value of 75.00. Further, results of identified five key areas are mentioned in Table 5.

Table 5: Importance of various stages of the food life cycle to ensure food safety

Key Areas	Not Important	Important	Very Important
Proper cleaning	3%	5%	92%
Separation of raw and cooked	5%	32%	64%
Proper cooking	6%	20%	74%
Proper chilling and freezing	10%	26%	64%
Hand washing	3%	2%	95%

Outcome of the study shows that the respondents are aware of the importance of hand washing (95%) and proper cleaning (92%) as very important, only 64% believe proper chilling and separation of raw and cooked to be equally important. This is due to the general practices by the Sri Lankan women. They do not consider much on aspects like separation of the raw and cooked food although they ensure that their hands, utensils and food are clean before cooking.

Moreover, results presented about the idea of the respondents on temperature danger zone and the temperature inside the refrigerator expressed that only 20% of the respondents have a clear idea of the temperature danger zone being 50-60 °C. Similarly, Brown, 2011, has mentioned that only 15% have identified the safe refrigerator temperature to be less than 40°C [8]. By their general experiences, they have an idea of the safe temperatures for food and that the room temperature causes food spoilage but when they are asked to say that using a numerical value; they fail. This is due to the lack of scientific knowledge regarding food safety.

3.4.2 Practice level on food safety

Having a good knowledge regarding food safety alone cannot assure a good condition of life as although the knowledge is there, the population might not practically apply their knowledge on their day today life style. According to the results mentioned in Table 4, food safety related practices were in a satisfactory level with the mean value of 74.63 and median of 73.33. Apart from that, some questions regarding checking the food label, household food storage, cooking, eating and drinking were asked from the respondents to assess the respondents' level of practices regarding food safety.

3.4.2.1 Checking the food label

When food safety of the local community is considered, checking the food labels, is important. The results obtained are shown in the Figure 1 below.

Fig 1: Frequency of checking the food label

The food label plays an important role as it provides all the necessary information regarding the food products. When the incidence of checking the food label is considered, a large majority (69%) of the respondents checks the food label always and it is frequently checked by 25%. Another 6% checks it sometimes and it is surprising that there are no respondents who never check the food label. Checking the food label alone is not enough to state that the respondents are aware of the importance of the food labels. To assess the awareness of food label, some questions were asked from the respondents and results are mentioned in the Table 6.

According to Table 6, almost all the respondents (96%) have stated that it is very important to check the expiry date in a food label while 93% of them identified checking the manufactured date as very important also. Nearly 78% of respondents think it is very important to check the ingredient list followed by, nutrient table (70%), quality certificates (60%), government regulations (55%) and energy value (46%). Surprisingly, only 43% of the respondents have stated checking the price as very

important although there is a chance that it is the only thing they normally check in a food label. Furthermore, 33% of the respondents have identified the brand as very important when purchasing a food product. It is interesting to note that, the expiry date and the manufactured date have gained the highest concern of respondents, among the other information on food labels, may be because they are used to determine the safety, freshness, wholesomeness and quality of the food products.

Table 6: Important areas to be checked on the food label

Parameters	Not Important	Important	Very Important
Price	19%	38%	43%
Ingredients	6%	17%	78%
Brand	27%	40%	33%
M.F.D	0%	7%	93%
Expiry date	2%	2%	96%
Quality certificates	3%	36%	60%
Nutrient table	6%	24%	70%
Energy value	9%	45%	46%
Government regulations	14%	31%	55%

As the values presented in Table 6, nearly 78% of the respondents have identified checking the ingredient list prior to purchasing a food item as very important. But it is required to assess whether they are aware of the contents in the ingredient list; specially the E numbers. Results are presented in Table 7.

Table 7: Idea regarding the E numbers on the ingredient list

Statement	Percentage
We should not consume that food if there are E numbers	7%
It is a safe food if there is a large number of E numbers	1%
It is okay to consume that food if the E numbers on the label are healthy and approved by the government	22%
I have no idea of the E numbers on the food label	46%
Have not answered the question	25%

Concerning Table 7 only 22% of the respondents have provided satisfactory answers although they check the food label as a practice. Nearly 46% of the respondents had no idea on the term "E numbers" and another 25% have not answered the question might be indicated that they also had no idea on E numbers. According to the respondents, reasons for this condition include sometimes only the number is included on the ingredients list not the letter "E"; and even though they were printed, they did not take much effort to read them as the font size is very small.

3.4.2.2 Safety of drinking water
In this part, the respondents were asked whether they do any treatment to drinking water or drink it as it is. The summary of the responses is illustrated in the Figure 2. As stated by the respondents, a majority of the respondents, (53%) drink boiled water while another 23% drink filtered water. It is good to state that only 12% of the respondents directly drink water that comes from the municipal tap lines.
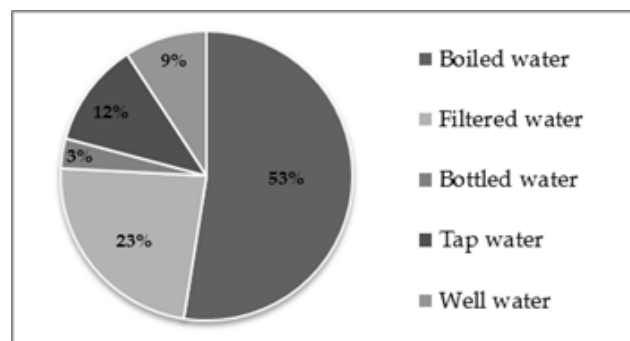
Fig 2: Treatment to drinking water in the household level

Even though drinking water is boiled or filtered, if they are not stored properly, water is not safe to drink. Therefore it is important to store drinking water in clean containers and keep closed with a lid. Thus, the respondents were asked whether they use a container with a lid to store water.
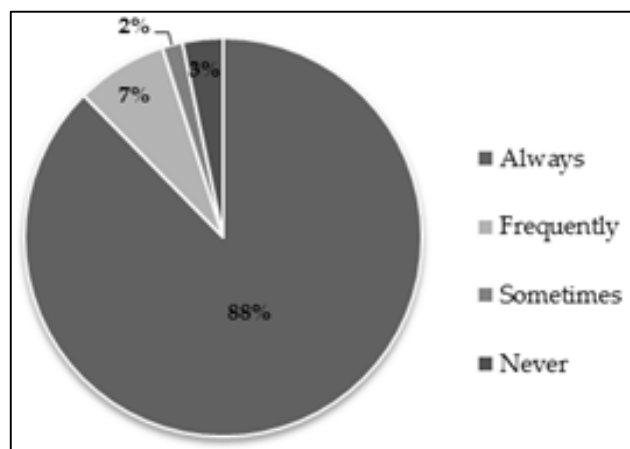
Fig 3: Using a container with a lid to store water

When the water storage practices are considered, 88% of the respondents always use a container with a lid to store their drinking water while only 3% use containers without lids. Therefore, the respondents' practices regarding drinking water are on a good level and up to the standards expected by the Millennium Development Goals [9], 2010. UNICEF (2014) also has reported that 92.3% of the Sri Lankan overall population has safe drinking water sources [10].

4. Conclusions

The aim of this study was to identify the social, demographic, and economic characteristics of households that contribute to the concern of food safety in household level and to determine the extent to which the household members' knowledge have a concern over food safety.

Findings of the study showed that, the basic knowledge and the level of general practices of the respondents regarding food safety lied on a satisfactory level. However, the respondents lacked the scientific knowledge on food safety. Although the respondents possessed basic knowledge about food safety required to live their life with a good condition, they were not familiar with the terms; micro-organisms, temperature danger zone, E numbers etc. When the level of practices applied by the respondents regarding food safety are compared with the world standards, the results obtained showed satisfactory levels with respect to the necessary Millennium Development Goals. Per example the percentage of respondents having access to safe drinking water was higher than the target levels given by the Millennium Development Goals.

The study also required to identify whether the level of practices applied by the respondents on food safety increased with the knowledge in these areas. But the findings of the study revealed that the level of practices do not increase with the level of knowledge as there are a wide range of other factors affecting the level of practices which cannot be measured via this survey. (eg: adaptations, culture)

5. References

1. Pyle D. Strategic Report 8 Assessing Hygiene Improvement Guidelines for Household and Community Levels. Environmental health project. Washington: bureau for global health, 2004.
2. Census of Population and Housing Final Report, Department of Census and Statistics, Sri Lanka, 2012. http://www.statistics.gov.lk
3. Department of Census and Statistics, Sri Lanka, MAHA-RAGAMA (Divisional Secretariat), 2014. http://www.citypopulation.de
4. Sudman S, Blaire E. Marketing Research. Singapore: McGRAW-HILL International Editions, 1998.
5. Macias YF, Glasauer P. Guidelines for assessing nutrition-related Knowledge, Attitudes and Practices, Rome: Food and Agriculture Organization of the United Nations, 2014.
6. World Health Organization. Five Keys to Safer Food Manual. Geneva: WHO Press, 2006.
7. Annual Report. Central Bank of Sri Lanka, 2014. http://www.cbsl.gov.lk.
8. Brown A. Understanding Food: Principles and Preparation. 5th ed. Stamford: Nelson Education, Ltd, 2011.
9. MDG Sri Lanka - Country Report Millennium Development Goals Sri Lanka: Country Report 2008/2009 Colombo: Institute of Policy Studies of Sri Lanka, 2010.
10. WHO, UNICEF. Improved and unimproved water and sanitation facilities, WHO, Geneva and UNICEF, New York, 2012.