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***CONSUMERS AWARENESS AND
PERCEPTION OF FOOD SAFETY
FROM SHOPPING TO
CONSUMPTION***

Persis George

A project Report submitted in partial fulfilment of the degree of Professional Masters in Food Safety.

School of Chemical Sciences, University of Auckland.

Date: 04/06/17

DECLARATION

I certify that the work in this Report is that of the author alone and that it has not been submitted previously in whole or in part to qualify for any other academic award, and that any references and previously published materials by a third party have been acknowledged and ethics procedures and guidelines prescribed by the School of Chemical Sciences of the University of Auckland have been followed.

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Persis George

SUMMARY

Consumers attitude has shown to influence behaviour. This study examines consumer's awareness and perception of food safety from shopping to consumption. A total of 73 consumers in the Australasian region were surveyed and the results highlighted some gaps in food safety knowledge and examined some critical violations in handling food at home. The relationship between consumers awareness and perception of food safety is examined in this paper. The data was analysed using SPSS version 24.0 for descriptive, frequency distribution and percentage. Pearson chi square tested the association between food safety awareness in relation to age, gender and educational level. Educated respondents with HACCP knowledge however significantly checked for packaging defects than their counterparts and 70.4 % always washed their hand with warm water and soap or detergents but critical temperature violation were identified with 27.4 % of the respondents thawing meat improperly, 1.4 % left leftovers on the kitchen/bench table 5.5 % did not heat leftovers at all. These findings increase concerns and indicate gap in consumers food safety knowledge and practices.

Overall, there is good general awareness of food safety among Australian consumers indicating that gaps need to be filled in with further education. The internet and social media appear to be the best method to reach audiences for food safety education. Consumers' understanding of their role and importance in the safety of foods prepared at home should, therefore, be reiterated and emphasized in food safety messages. A limitation of the study methodologies is that all studies relied on self-reported behaviours, a method that is known to be subject to reporting bias, therefore implementing observational studies would allow for validation of these results and a more accurate representation of consumer behaviour. Finally, future studies should develop questions and methods based on these surveys in order to benefit from this existing baseline knowledge and to allow comparisons over time to assess the effectiveness of food safety interventions on the reduction of food-borne illness. Perception and beliefs are shaped by knowledge, which in turn is a product of exposure to information sources and personal effort in obtaining information (12,13)

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LIST OF ABBREVIATIONS AND ACRONYMS

Adult: A purchaser in the age group of 18-64

Farm-to-Fork: “a food system including everything from farm to table.

Food Safety: A Suitable product which when consumed orally either by a human or an animal does not cause a health risk to consume. It also refers to safe handling practices that will more likely result in a safe food product like personal hygiene sanitation practices, cross contamination, cooking and cooling, foodborne illness, knowledge and perceived risk.

Misconceptions: “a view or opinion that is correct because it is based on faulty thinking or misunderstanding”

Australasia: a term used to describe a region within Oceania. The nations of Australia and New Zealand.

ORGANIZATION OF THESIS

This thesis is organized as follows.

Chapter one: Introduction, including the following sections – statement of the problem, purpose of the study, importance of the study, context, research questions, assumptions, limitations, and definition of terms.

Chapter two: Journal Manuscript, including methodology, results, and discussion

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1 INTRODUCTION

1.1 Statement of Problem

The incidence of foodborne diseases is rising in developing countries, as well as developed countries (14). Studies shows that consumers learn best form education on specific preclusion to reduce risk towards a targeted population than general education on safe handling or food borne pathogens (23). Likewise, its defined that “the new focus on food safety encompasses the food safety continuum” (9) yet there aren't an admissible food safety educational programs that span the entire food safety gamut.

1.2 Purpose of Study

The study aims to investigate the tangible level of food safety knowledge and pertinent practices in food management that are accountable for the food safety attitude of domestic consumers. As reported by M. Jevsnik (14), there are a number of fallacies for general food preparing and purchasing, like falling to wash cutting boards with detergent and hot water. Research aiming this misconception is limited (14).

1.3 Importance of Study

The changing epidemiology of foodborne illness and the increase in knowledge concerning food borne pathogens requires a re-examination of food safety educational messages to ensure that the guidance given to the consumer is appropriate for controlling pathogens that are prevalent in the food supply chain (11). The findings of this study aim to assist educators and consumers by revealing consumer's current food safety perception, awareness and misunderstanding and behaviours from shopping to consumption and would allow for additional research to be conducted on a similar target population.

1.4 Context of Study

This study drew upon previously conducted research on the subject, yet there is a gap in the lack of understanding about the food chain from farm to fork field (18,19)

1.5 Research Question

To identify a gap in food safety knowledge and to develop food safety education and awareness amongst domestic consumers.

The research questions proposed in this study is

1. What are the current food safety misconceptions?
2. What is the current food safety behaviour?
3. To what extent does a targeted resident understand and have a disquiet for food safety?

1.5.1 Assumption

For the purpose of this study, the following assumptions are made

1. The interview questionnaire developed are appropriate to generate response prevalent to the study.

2. The participant will retort in an open and honest manner to the survey questions.

1.5.2 Limitation

1. Selection based on volunteering to participate
2. Access to diverse demographics (race and socioeconomic status) due to lack of funding

2 JOURNAL MANUSCRIPTS

Abstract

Food Safety requires proper handling from manufacturing through consumption. Food Standard Australia New Zealand (FSANZ) estimate that 11,500 new cases of food poisoning occur daily with 120 Australians dying of food poisoning annually. Despite this, the public underestimates the risk associated with poor food hygiene. Researchers have investigated foodborne diseases and consumer's unsafe behaviour's however, consumers understanding of what behaviour's lead to such risk is little such as eating raw oysters, not cooking hamburgers until it is visibly done, or not routinely washing hands or cutting boards. A consumer might not perceive these as risky behaviours since they might not personally have taken ill after performing such actions. Once these misconceptions are identified, educators can take proper steps to modify behaviours and educate consumers on specific foodborne disease prevention. Whilst it's noted that food industry has a proactive approach in warning the consumers about risky foods, it's not always the case, that it reaches the "vulnerable population" for this reason it is imperative to have a target population education. The Failure to associate at-home food handling practises to foodborne illness is a serious obstacle to convincing people to discontinue potentially hazardous food handling behaviour. The objective of this quantitative survey is to observe Australasian consumer's food safety knowledge and practices during purchase, transportation, storage of food as well as handling practices at home. No significant effect of demographic profile on food handling practices were found. Educated respondents with HACCP knowledge however significantly checked for packaging defects than their counterparts and 70.4 % always washed their hand with warm water and soap or detergents but critical temperature violation were identified with 27.4 % of the respondents thawing meat improperly, 1.4 % left leftovers on the kitchen/bench table and 5.5 % did not heat leftovers at all . These findings increase concerns and indicate gap in consumers food safety knowledge and practices.

Keywords

Food Safety, food regulation, survey, public health

1. Introduction

Food Safety is a major public health issue. Incident of illness arising from food borne pathogens are rising. Bentham and Langford (3) argue that changes in food storage and patterns of consumption are all factors in increasing rates of food poisoning.

Food safety is becoming increasingly important in the Western world, as foodborne illness constitute a significant burden both socially and economically on the society and their health systems. Most cases of food borne illness can be prevented if food safety principles are followed from manufacturing to consumption. Provided that formerly it is impossible for manufactures to warrant a pathogen free food stream, it is imperative that the home food handlers (consumers) act as a critical link in preventing food borne illness.

Many will argue that the food has never been safer than it is today. Billions are invested in food safety, and much attention is given to food contamination, and for commercially produced foods this is most probably true. Still, a single hygienic mistake during food - or feed – production could in the worst-case lead to enormous consequences internationally, if not globally (16, 20). The main hygienic problems in the industrialized world today are most likely caused in the kitchens in food establishments and at home.

The study aims to investigate the tangible level of food safety knowledge and pertinent practices in food management that are accountable for the food safety attitude of domestic consumers

2. Material and Methods.

2.1 Research Design

A cross sectional study of consumer awareness and perceptions of food safety knowledge and practices was conducted from March to April 2017 in a different region of Australia and New Zealand.

2.2 Instrumentation

A 29-item written questionnaire was modified version of M. Jevsnik (14). The questionnaire was pilot tested by 15 participants from July to October 2016, resulting in a minor modification of the content. The revised questionnaires are now divided into three sections.

1. A demographic section (4 questions)
2. Food Safety Knowledge (10 questions)
3. Food Safety Practices (15 questions)

Each question took \approx 15 min to administer. Data was collected through social media, face - to -face interviews and electronic communication using google forms.

2.3 Data Collection

The questionnaire using google forms was electronically communicated with each household selected and were briefly explained about the nature and purpose of the study. To guarantee the anonymity of responses and easy identification of questionnaires, identity numbers were assigned. Items in the questionnaire were explained when necessary and were administered in one sitting as far as possible.

2.4 Assumptions

While conducting this study, the following assumptions were made:

1. The participants responded in an open and honest manner to the survey questions.
2. The interview questions were worded appropriately to generate responses relevant to the research questions.

2.5 Limitations

Demographics might have been skewed due to the location of the respondents as well as a possible selection--bias due to volunteering to participate. Due to restricted location and small sample size, the results of this study are not intended to be generalizable, rather serve as a reference point for future studies

2.6 Data Analysis and reporting

The data was analysed using SPSS 24.0 statistical software. Mean responses and percentage of responses in each category were calculated and presented in tabular form. Cross tabulation was used to analyse information such as frequency distribution, descriptive statistics and percentages. Pearson chi square was used to test the association between food safety knowledge, awareness and perception in relation to the variables of age, gender and education.

3. Results and Discussion

3.1 Profile of Respondents

Age, Sex and educational levels are said to be to influence food safety knowledge and behaviours of the consumer. (26). Food safety knowledge is generally associated with the socio demographic and the academic variable (21), while another believed that no such link existed between knowledge and behaviour (6,7). In this study, however, these variables formed the basis of the research.

A total of 73 questionnaires were obtained during March –April 2017. Demographic data including gender, age, marital status and educational background are given in **Error! Reference source not found.** .52.1 % of the respondents were Male. Most of the respondents were married with the age range of 31-49 and 74.0% had higher education.

Table 1 Demographic Characteristics of respondents

Demographic Characteristic		n ^a	%
Gender (n=73)	Male	38	52.1
	Female	35	47.9
Age Group (n=73)	<30	19	26
	31-49	48	65.8
	>50	6	8.2
Education? (n=73)	Primary	11	15.1
	Secondary	8	11
	Higher Education	54	74
Marital Status? (n=73)	Married	46	63
	Living together	10	13.7
	Single	16	21.9
	Other	1	1.4

a- Number of respondents

3.2 Food Safety knowledge

Many studies have been conducted assessing consumers' knowledge, awareness and attitudes on issues regarding food safety and hygiene. Unlike questions on routine practices on food handling and hygiene, assessing knowledge is relatively uncomplicated (24). Knowledge is generally associated with current practises , which in turn affect the willingness to change current practices if it is leaned that current practices are unsafe (14) . However, actual food practices are known to differ from self-reported practices (15,20,25). The result from a survey on food safety knowledge is likely to precisely represent the respondents' knowledge on the issues in question (24). In general, these studies show that some groups of consumers stand out as having poor knowledge about food safety and hygiene, but they have also revealed that there is a significant gap between knowledge and actual practice among the majority of consumers (4, 6,7)In this study, the place of purchase (shop, market, farm, the home was grown) depended on the food stuff they wished to buy which can be compared to the study of M.Jevsnik (14).Survey results

showed that supermarkets are the consumers first place of choice and are consistent with the findings of others (18) mostly because of consumers high level of confidence in the quality and safety of food sold in the supermarkets coupled with the ambiance and personal inspection choices that it allows (17).

Table 2 Consumers opinion regarding responsibility of food safety

	n ^a	%
Consumer	29	40.3
Farmers	35	48.6
Food Industry	47	65.3
Retail	32	44.4
Catering	27	37.5
Food Safety Inspectors	53	73.6
Ministry of Health	46	63.9

a. Number of respondents

Consumers also believed that they are not responsible for food safety to the similar level as that of food handlers and the government (food industry, catering farmers, retail, food safety inspectors or Ministry of Health)

Demographic characteristics have no association with the attitude towards consumer's responsibility for food safety, many researchers have concluded that females showcased a higher level of food preparation practices than male. However, in terms of food safety knowledge, there wasn't a significant difference. (10,12,14,17,19). It deems true in this research study ($\chi^2=2.08$, $p=0.084$, $n=72$)

When shopping, 46.5 % of the respondents checked the state of packaging. These are comparable to those of M. Jevsnik (14) who estimated that 48.6 % always checked for damaged food packages. The result shows the positive impact of education on purchasing behaviour. Respondents with higher education ($\chi^2=12.233$, $p=0.05$, $n=73$) significantly checked for packaging than respondents who were less educated. Respondents who were familiar with HACCP principles 77.1 % checked the state of packaging more often ($\chi^2=8.088$, $p=0.044$, $n=73$) than other groups. HACCP as a philosophy and technique does have

application to domestic food preparation (11). Education enables access to information and consumers' confidence in safe food and it is linked to the level of knowledge and expertise a consumer has about food safety (16,18)

63.9 % of the respondents were aware of the correct temperature range (1°C-5°C) for retail refrigerator units this is also comparable to the study of M. Jevsnik (14) where 55.1 % were aware of the right temperature range while 47.9 % never checked the temperature in the retail store unit. When the respondents were asked about their awareness of the food hygiene of deli assistants average mean was graded high above 1.71 Table 3

Table 3 Food Safety knowledge of Respondents

Query	Response	n ^a	M ^b	SD
How often do you check	The country of origin	73	1.22	0.87
	If the package is damaged	73	1.89	1.12
	The store refrigerator temperature	73	0.79	0.94
	Presence of additives	73	0.97	0.86
How often do you think	Clean hands	73	1.16	0.907
	Wear Hairnets	73	1.55	0.913
	Wear clean working clothes	73	1.96	0.904

a. Number of respondents

b. Evaluation using a four-point scale (1- never, 2- sometimes, 3- often, 4- always)

3.3 Food Safety and Handling Practices

Most respondents purchased raw meat sometimes during shopping 38.9 % or it depended mainly on when they came across it 31.9 %. Although 26.4 % said that they purchased raw meat at the end when they have already purchased all other items Table 4. Potential temperature abuse could be controlled if this meat was purchased at the end of shopping. 53.4 % of the respondents felt that the duration of transport of raw meat from the time of purchase to home was important but 59.7% never used a cooling bag to carry frozen or refrigerated goods home.

Potential Food safety risk exists when temperature abuse of raw meat above 10°C occurs as it is harbouring ground for the food borne pathogenic microorganism to grow. (James, 1992). Demographic characteristic has no significant association with consumers belief on the importance of the duration of transport of raw meat for food safety from the time of purchase to home and its storage, only 53.4 % respondents in this study believed that it was, however, important and 9.6 % of the respondents were not sure, such behaviour help to determine the food safety attitude and can determine the actual food safety behaviour. (17). It is believed that attitudes directly influence behaviour (17,18).

Table 4 Respondents food Safety practices

Query	Responses	%
During shopping at what stage do you purchase raw meat?	Sometimes during shopping	38.9
	At the end when I have already purchased all other item	26.4
	Depends	31.9
	Not sure	2.8
At what temperature should raw meat in a retail refrigerator unit be stored?	1°C-5°C	63.9
	6-10 °C	4.2
	More than 11°C	2.8
	Less than 0 °C	9.7
	Not Sure	19.4
How important is the duration of transport of raw meat from the time of purchase to home?	Quite Important	37
	Very Important	53.4
	Not Important	0
	Not Sure	9.6
Do you use a cooling or an isolated bag to carry your frozen or refrigerated foodstuffs home?	Yes	26.4
	No	59.7
	Sometimes	8.3
	I did not think of that	5.6

Respondents were asked if they followed a sequence when preparing a meal 50.7% respondents said they did such as washing salad first followed by meat preventing cross contamination. The majority of the respondents 60.3% refrigerated raw meat intended for immediate use and froze the rest. This study showed a critical violation with 27.4% of the respondents thawing meat improperly, i.e., leave it out at room temperature or in hot water 16.4 % this result is comparable to that of 41.6 % in Badrie, (2) , 56% in (Kennedy, 2005)

(16) ,Only 29.6 % respondents did not know the temperature of the refrigerator which is significantly lower than the studies conducted by others.

Treatment of leftovers is unquestionably an interesting and crucial issue for consumer food safety. Consumer handling of leftovers would always constitute a risk for foodborne illness, especially from spore-forming bacteria and toxin-producing bacteria. 73.6 % of the respondents cooled leftovers to room temperature and then put it in the refrigerator which is higher than that recorded by M. Jevsnik (14) .53.5 %, 58% by Badrie(2), but 1.4 % leave leftovers on the kitchen bench/table. 67.5 % of the respondents used a microwave to heat food while 23.3 % used a frying pan/wok this can be compared to the data recorded in an Australian food safety telephone survey where 67.2 % of the respondents used a microwave to heat food. However, a disturbing 5.5 % of the respondents did not re heat leftovers at all Table 5. Only 59.7 % of respondents heated leftovers for as long as it takes for it to become warm or until it boils 13.9 %. This observation is comparable to that of M.Jevsnik. In this study, there was evidence of temperature abuse where food was defrosted at room temperature sitting on the table or in hot water to thaw. Temperature control influences the safety of perishable foods throughout the stages on cold chain this includes the production, transport and storage both in retail and domestic kitchen (15)

Table 5 Food handling practices at home

Query	Response	%
When preparing a meal, do you follow a sequence (i.e. to wash salad in a sink first, followed by meat)?	Yes	50.7
	No	28.8
	Sometimes	20.5
How do you store raw meat at home after purchase?	I refrigerate raw meat intended for immediate use and freeze the rest	60.3
	Fridge	6.8
	Freezer	28.8
	At room temperature	0
	Not Sure	4.1

Do you know the temperature in your refrigerator?	Yes	70.4
	No	29.6
How do you defrost frozen meat?	In the refrigerator	38.4
	In hot water	16.4
	In a microwave	15.1
	Leave out at room temperature	27.4
	I do not defrost, I start to cook meal while it is still frozen	2.7
What do you do with leftovers from your meal?	I cool leftovers to room temperature and then put them in the refrigerator	73.6
	I freeze them	19.4
	I throw them out	4.2
	I use them as animal feed	1.4
	I leave them on the kitchen bench/table	1.4
How do you re-heat leftovers from your meal?	In a frying pan, wok or saucepan	23.3
	In an oven/microwave	67.1
	I do not re-heat them	5.5
	Other Method	4.1
How long are you re-heating a meal?	For as long as it takes to become warm and is ready for consumption	59.7
	Until it boils	13.9
	I will it to boil for a while	8.3
	Just enough so its not cold	11.1
	Other Method	6.9

Do you wash your hands before food preparation?	Depends on what I was previously doing	18.3
	Depends on the food I am going to prepare	11.3
	I always wash my hands	70.4
	I never wash my hands	0
How do you wash your hands after handling raw meat, poultry or fish?	With cold or hot water	18.3
	I do not wash my hands, I dry them with a kitchen cloth or a paper towel	11.3
	With warm water and soap (or detergent)	70.4
	I do not wash my hands during or after food preparation	0
How long do you wash your hands?	11-20 sec	16.7
	More than 20 sec	6.9
	10sec or less	73.6
	I never wash my hands	2.8
	Not Sure	0
How do you dry your hands after washing?	On an apron	31.5
	With a kitchen cloth used for wiping dishes	2.7
	With a kitchen cloth used for wiping the bench	2.7
	With a kitchen cloth intended for drying hands	35.9
	With a bathroom handtowel	19.2
	With a Paper towel	31.5
	On the clothes, I am wearing at the time	2.7

When asked about hand washing techniques 70.4 % of the respondents always washed their hands with warm water and soap (or detergent) but the duration depends on what they were preparing. Most of the respondents used a paper towel to dry their hands. Poor

washing of hands prior to the food preparation may potentially cause cross contamination and thereby cause food poisoning.

Post handling of fish, raw or poultry 70.4 % of the respondents washed their hands with detergent or soap, however, a significant number 18.3 % used only water and 11.3 % did not wash at all but rather used a paper towel to dry wipe their hands. 73.6 % of the respondents washed their hands only for 10 sec or less this is comparable to the study of M.Jevsnik (14) where 52% of the respondents did not use the ascribed time to wash their hands. Hand hygiene is defined as any method that removes or destroys microorganisms on hands. Proper hand hygiene involves the use of soap and warm, running water, rubbing hands vigorously for at least 20 seconds (20). However, a significant number of the respondents 2.7 % either used a towel used for wiping dishes or bench. Clearly, an effective hand washing technique is not practised amongst a significant respondent for this reason awareness needs to be raised about the potential risk associated with such practices. Home food handlers need to take many precautions to minimize pathogen contamination of home-prepared foods since this is last line of defence against food borne illness (24).

4. Conclusion

Consumers self-reported food safety practices, however, do not in most cases relate to their actual behaviour. Previous research study on consumer's awareness and perception of food safety from shopping to eating revealed that each time the conclusions of observational food safety studies were compared to self-reported behaviour, indications suggested that consumers reported that they indeed followed the food safety guild lines even when this was not true. Respondents may, however, claim to follow the perceived "correct" behaviour to project a positive image, but may not be doing so appropriately or correctly. Numerous studies claimed that consumers were indeed aware of the magnitude of hand washing, proper temperature control protocols, cleaning, sanitation and cross contamination (14,15,20,25).

The purpose of this research was to establish what are the food safety misconceptions, concerns and current practices that exist amongst a targeted population of consumers from shopping to consumption. The findings of this study collaborated with those of Badrie (2), M.Jevsnik (14) and others. This study highlighted some gaps in food safety knowledge and practices and infers that the respondents are less aware of their role in the food safety continuum and therefore allow up teen pathways for microbiological contamination such as

Incorrect defrosting practices, poor re heating methods, lack of knowledge refrigeration temperature, cross contamination issues and hand washing techniques. This can be part of the explanation for the lack of knowledge of what happens to the food products after purchase, and consumer food safety has been described as “the Cinderella within the food chain” (20). Expertise and opinions from the perspective of the alternative discipline would be beneficial for both fields of research and if the desired outcome is a behavioural change in consumers, there is a particularly need to include more research disciplines (20). From researchers and risk managers’ point of view, consumers often behave in ways that seem illogical and irrational with respect to food safety and food related risks (26). A common misperception by many food safety scientists, the food industry and the authorities is to extrapolate their own beliefs and thoughts to consumer food handling. Multidisciplinary expertise and collaboration between public health, veterinary and food safety experts (18) – together with expertise on consumer psychology and behaviour – is essential to assure food safety along the whole food chain, from the farm and all the way to the consumer’s fork.

A relatively high number of male respondents in the survey indicated that makes were increasing becoming involved with food preparation and handling in a home-based setting.

The consumer is an integrated link in the food chain. Food industry experts, food authority and retailers need to acknowledge that consumer’s awareness and perception of food safety is vital for the integrity of the entire food safety chain, and the vast knowledge gap that still exists needs to be filled in. Although the current thesis specifically addresses Australasian consumers, the major findings are also internationally valid

5. Discussion

It is clear that consumers attitude towards food safety is not an isolated issue. Rather, it stems from consumers demographic variables, it is evident that a need exists for professional hindrance for consumer regarding food safety subjects.

Recommendations forthcoming from this study are as follows

- a. The need to learn more about consumers attitude and perception to food safety in the Australasian region.
- b. The need to create more awareness of the food handling practises.
- c. The need to promote food safety education

d. The need to create know-how and include it into everyday context

a. The need to learn more about consumers attitude and perception to food safety

Food manufacturing, government agencies are constantly seeking support and information about food safety of novel and market foods. In other words, agencies are seeking to understand consumers attitude and perception before providing information to them.

b. The need to create more awareness of the food handling practises.

Consumers should be invigorated to accept certain behaviour in order to promote positive food safety handling practices. Communication should be as simple as possible to reach the diversified public to facilitate understanding.

c. The need to promote food safety education

Consumers should have easy access and should benefit from information regarding temperature control, right controls for home food preparation practices and cross-contamination. Education message should also include and not limit to information on types of responsible microorganisms, description on food borne illness and preventative strategies. Knowledge on the consequences of certain unsafe behaviour can increase motivation and adherence to food safety guidelines (20). Education should primarily focus on the high-risk group and academic education should include food hazard control into account.

d. The need to create know-how and include it into everyday context

It is assumed that, when novel information becomes accessible, it firsts generates attention then archives conception, and only then it indulgences decision making. Consumers needs to be aware how to translate and relate this message into their everyday setting. Consumers use many sources for food safety information studies have shown that consumers are more likely to believe a message when convened through a variety of sources. (18,19).

3 REFERENCES

1. "Australasia - New World Encyclopedia". Newworldencyclopedia.org.2017.
2. Badrie, Neela et al. "Consumer Awareness and Perception to Food Safety Hazards in Trinidad, West Indies". *Food Control* 17.5 (2006): 370-377.
3. Bentham, Graham, and I. H. Langford. "Environmental Temperatures and The Incidence Of Food Poisoning In England And Wales". *International Journal of Biometeorology* 45.1 (2001): 22-26.
4. Brennan, Mary, Mary McCarthy, and Christopher Ritson. "Why Do Consumers Deviate from Best Microbiological Food Safety Advice? An Examination of 'High-Risk' Consumers on the Island Of Ireland". *Appetite* 49.2 (2007): 405-418.
5. Byrd-Bredbenner, C. et al. "Development of Food Safety Psychosocial Questionnaires for Young Adults". *Journal of Food Science Education* 6.2 (2007): 30-37.
6. BYRD-BREDBENNER, CAROL et al. "Food Safety Self-Reported behaviours' And Cognitions of Young Adults: Results of a National Study". *Journal of Food Protection* 70.8 (2007): 1917-1926.
7. Byrd-Bredbenner, Carol et al. "Risky Eating behaviours' Of Young Adults— Implications for Food Safety Education". *Journal of the American Dietetic Association* 108.3 (2008): 549-552.
8. "CDC - Vessel Sanitation Program - General Information on Hand Hygiene". *Cdc.gov*. N.p., 2017. 26 May 2017.
9. Cortada, James W. "How It Makes Industries So Important". *Entreprises et histoire* 60.3 (2010): 29.
10. Dillman, Don A. et al. "Response Rate and Measurement Differences in Mixed-Mode Surveys Using Mail, Telephone, Interactive Voice Response (IVR) and the Internet". *Social Science Research* 38.1 (2009): 1-18.
11. Griffith, C.J., and D. Workfolk. "Application of HACCP to Food Preparation Practices in Domestic Kitchens". *Food Control* 5.3 (1994): 200-204.
12. HILLERS, VIRGINIA N. et al. "Consumer Food-Handling behaviours' Associated with Prevention of 13 Foodborne Illnesses". *Journal of Food Protection* 66.10 (2003): 1893-1899.

13. James, Stephen J, and Judith Evans. "The Temperature Performance of Domestic Refrigerators". *International Journal of Refrigeration* 15.5 (1992): 313-319.
14. Jevšnik, M., V. Hlebec, and P. Raspor. "Consumers' Awareness of Food Safety from Shopping To Eating". *Food Control* 19.8 (2008): 737-745.
15. James, Stuart. "The Oxford Classical Dictionary (Electronic Edition) RR 2016/278 The Oxford Classical Dictionary (Electronic Edition) Editor In Chief Sander Goldberg Oxford University Press Oxford 2016- URL: [Http://Classics.Oxfordre.Com/](http://classics.oxfordre.com/) Last Visited July 2016 Contact Publisher For Pricing Information". *Reference Reviews* 30.8 (2016): 42-43.
16. KENNEDY, J. et al. "Food Safety Knowledge of Consumers and the Microbiological and Temperature Status of Their Refrigerators". *Journal of Food Protection* 68.7 (2005): 1421-1430.
17. Knight, Peter G. et al. "Household Food Safety Awareness of Selected Urban Consumers in Jamaica". *International Journal of Food Sciences and Nutrition* 54.4 (2003): 309-320.
18. Liu, A., and R. Niyongira. "Chinese Consumers Food Purchasing behaviours' And Awareness of Food Safety". *Food Control* 79 (2017): 185-191.
19. Medeiros, Lydia C. et al. "Design and Development of Food Safety Knowledge and Attitude Scales for Consumer Food Safety Education". *Journal of the American Dietetic Association* 104.11 (2004): 1671-1677.
20. Montville, Rebecca, Yuhuan Chen, and Donald W Schaffner. "Risk Assessment of Hand Washing Efficacy Using Literature and Experimental Data". *International Journal of Food Microbiology* 73.2-3 (2002): 305-313.
21. Norazmir, M.N. et al. "Knowledge and Practices on Food Safety among Secondary School Students in Johor Bahru, Johor, Malaysia". *Pakistan Journal of Nutrition* 11.2 (2012): 110-115.
22. Ovca, Andrej, Mojca Jevšnik, and Peter Raspor. "Food Safety Awareness, Knowledge and Practices among Students in Slovenia". *Food Control* 42 (2014): 144-151.
23. Redmond, Elizabeth C., and Christopher J. Griffith. "Consumer Perceptions of Food Safety Risk, Control and Responsibility". *Appetite* 43.3 (2004): 309-313.
24. REDMOND, ELIZABETH C., and CHRISTOPHER J. GRIFFITH. "Consumer Food Handling In the Home: A Review of Food Safety Studies". *Journal of Food Protection* 66.1 (2003): 130-161.

25. Redmond, Elizabeth C., and Christopher J. Griffith. "A Comparison And Evaluation Of Research Methods Used In Consumer Food Safety Studies". *International Journal of Consumer Studies* 27.1 (2003): 17-33.
26. ROSEMAN, MARY, and JANET KURZYNSKE. "Food Safety Perceptions And Behaviors Of Kentucky Consumers". *Journal of Food Protection* 69.6 (2006): 1412-1421.
27. RØSSVOLL, ELIN HALBACH et al. "Food Safety Practices among Norwegian Consumers". *Journal of Food Protection* 76.11 (2013): 1939-1947.
28. Turnbull-Fortune, Susan, and Neela Badrie. "Practice, Behaviour, Knowledge and Awareness of Food Safety among Secondary & Tertiary Level Students in Trinidad, West Indies". *Food and Nutrition Sciences* 05.15 (2014): 1463-1481.
29. Kurzynske, J.S., and M.G. Roseman. "The Effectiveness of Extension Communication on Improving Kentucky Consumers' Food Safety Attitudes and Behaviours". *Journal of the American Dietetic Association* 106.8 (2006): A73.
30. Sanlier, Nevin, and Ece Konaklioglu. "Food Safety Knowledge, Attitude and Food Handling Practices of Students". *British Food Journal* 114.4 (2012): 469-480.
31. Sanlier, Nevin. "The Knowledge and Practice of Food Safety by Young and Adult Consumers". *Food Control* 20.6 (2009): 538-542.

4 APPENDICES

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APPENDIX 1

I. Demographic characteristics of respondents

1. Gender?

1. Male
2. Female

2. Age Group

1. <30
2. 31-49
3. >50

3. Education?

1. Primary
2. Secondary School
3. Higher Education

4. Marital Status?

1. Married
2. Living together
3. Single
4. Divorced

APPENDIX 2

II. Food safety knowledge

I. Where do you normally purchase food from?

1. Shop
2. Market
3. Farm
4. Home grown

II. According to you who is responsible for food safety

1. Consumer
2. Farmers
3. Food Industry
4. Retail
5. Catering
6. Food Safety Inspectors
7. Ministry of Health

III. Are you aware of the HACCP Principles?

1. Yes
2. No

IV. How often do you check?

A. The country of origin

- Never Sometimes Often Always

B. If the package is damaged

- Never Sometimes Often Always

C. The store refrigerator temperature

Never Sometimes Often Always

D. Presence of addictive's

Never Sometimes Often Always

V. What's your belief on- how often do sales personnel or staff at the eateries do the following?

E. Clean hands

Never Sometimes Often Always

F. Wear Hairnets

Never Sometimes Often Always

G. Wear Clean working clothes

Never Sometimes Often Always

APPENDIX 3

III. Food safety practices

I. During the shopping at what stage do you purchase raw meat?

1. Sometime during the shopping
2. At the end when I have already purchased all other items
3. Depends
4. Not Sure

II. At what temperature should raw meat/tofu in a retail refrigerator unit be stored?

1. 1–5 °C
2. 6–10 °C
3. More than 11 °C
4. Do not know

III. How important is the duration of transport of raw meat/tofu from the time of purchase to the home?

1. Quite important
2. Very important
3. Do not know

IV. Do you use a cooling or an isolated bag to carry your frozen or refrigerated food stuffs home?

1. Yes
2. No
3. Sometimes
4. I did not think of that

V. When preparing a meal do you follow a sequence of preparing meat and salad (i.e. to wash salad in a sink first followed by meat)

1. Yes
2. No
3. Sometimes

- VI. How do you store raw meat at home after purchase?
1. I refrigerate raw meat intended for immediate use and freeze the rest
 2. Fridge
 3. Freezer
 4. At room temperature
- VII. Do you know the temperature in your refrigerator?
1. Yes
 2. No
- VIII. How do you defrost meat?
1. In a refrigerator
 2. In hot water
 3. In a microwave
 4. Leave out at room temperature
 5. I do not defrost, I start to cook meat while its still frozen
- IX. What do you do with leftovers from your meal?
1. I cool leftovers to room temperature and then put them in the refrigerator.
 2. I freeze them
 3. I throw them out
 4. I used them as animal feed
 5. I leave it on the kitchen bench/table
- X. How do you re-heat leftovers from your meal?
1. In a frying pan wok or saucepan
 2. In a microwave/oven
 3. I do not re-heat them
 4. Other method
- XI. How long are you re-heating a meal?
1. For as long as it takes to become warm and ready for consumption
 2. Until it boils
 3. I leave it to boil for a while

4. Just enough so its not cold
5. Other method

XII. Do you wash your hands before food preparation?

1. Depends on what I was previously doing
2. Depends on the food I am going to prepare
3. I always wash my hands
4. I never wash my hands

¶III. How do you wash your hands after handling raw meat, poultry or fish?

1. With cold or hot water
2. I do not wash my hands. I dry them with a kitchen cloth
3. With warm water and soap (or detergent)
4. I do not wash my hands during or after food preparation

¶IV. How long do you wash your hands?

1. 11–20 sec
2. More than 20 sec
3. Depends
4. I never wash my hands
5. Not Sure

XV. How do you dry your hands after washing?

1. With and apron
2. With a kitchen cloth intended for wiping dishes
3. With a kitchen cloth used for wiping the bench
4. With a kitchen cloth intending only for drying hands
5. With a bathroom hand towel
6. With a paper towel
7. On the clothes, I am wearing at the time.