



THE UNIVERSITY OF THE WEST INDIES
AT ST. AUGUSTINE, TRINIDAD AND TOBAGO

A Research Paper
Submitted in partial requirements
for HUEC 3012
of
The University of the West Indies

Title: A Survey of Domestic Food Handling Practices

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A SURVEY OF DOMESTIC FOOD HANDLING PRACTICES

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2010

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Table of Contents

List of Tables and Figures	pg. 3
Abstract	pg. 4
Introduction	pg. 5
Literature Review	pg. 8
Methodology	pg. 12
Results	pg. 14
Discussion	pg. 24
Conclusion	pg. 28
References	pg. 30
Appendix	pg. 33

List of Tables and Figures

Table 1	Demographic Characteristics of the Study Population	pg. 14
Table 2	Responses to Cleaning and Sanitation Questions	pg.16
Figure 1	Percentage of persons who test meat by tasting	pg.17
Figure 2	Percentage of persons who test meat by colour	pg.18
Figure 3	Percentage of persons who test meat by thermometer	pg.18
Figure 4	Percentage of persons who test meat by smell	pg.19
Figure 5	Percentage of persons in sample or in their household who previously had food poisoning.	pg.21
Figure 6	Percentage of persons seeking treatment for food poisoning	pg.22
Figure 7	Distribution of places where treatment was sought for food poisoning.	pg.23

Abstract

Objective: To assess the level of consumer knowledge regarding safe food handling practices, and the incidence of food poisoning within the chosen sample population.

Methodology: A sample of 138 adult persons (age 18 or older) was chosen by using systematic sampling within households of the Realspring Gardens community during the month of March 2010. A 25 item questionnaire was administered to the participants, which included sections on Cleaning and Sanitation, Food Practices, Food Poisoning and Demographics. The data obtained was analysed using SPSS version 16 software.

Results: While indicators such as hand washing, use of soap and washing of produce had very high rates of good practice, other areas such as thawing of foods, use of cutting boards, storage of meat showed that proper food safety practices were not observed by several members of the sample. Almost half the sample had an episode of food poisoning, but did not believe this was the result of consuming food prepared at home, and thought that street vendors were the most likely source of acquiring a food borne illness.

Conclusion: Consumers in this sample were generally unaccepting of the view that food poisoning may result from home cooked food. Some unsafe food handling practices were standard in this population, and may indicate a knowledge deficit in this area.

Introduction

Background

Food poisoning (also known as food borne illness or food borne disease) is any illness that results from eating contaminated food. The most common bacterial agents of these illnesses are *E. coli*, *Campylobacter*, *Salmonella*, *Shigella* and *Listeria*. Other causes include viruses, parasites, toxins and contaminants (CDC, 2005). Contamination of food occurs primarily because of improper handling, cooking and storage. While food poisoning is believed to occur quite frequently, actual numbers are difficult to obtain, since many cases are not reported, and many people may choose to treat themselves. (Wilcock et.al. 2004) It is believed however, that improper food handling practices at the domestic level may be responsible for many episodes of food poisoning each year (de Jong et. al.2008).

According to the Caribbean Epidemiology Centre (CAREC), Trinidad and Tobago has experienced a general increase in the incidence of food borne illnesses between the years 1981 to 2005, with a peak in 1990 (CAREC, 2008) Whether this increase is due to more occurrences of food poisoning, or improved reporting is not immediately clear. Similar results were observed in other Caribbean countries (CAREC, 2008). This trend demonstrates that there is a need for investigation about the causes of this problem, and what measures can be undertaken to ameliorate the situation, since most episodes of these illnesses can be prevented by merely observing certain precautions and standards of hygiene.

Food borne illness is a major public health issue with far reaching implications for our nations, such as loss of productivity and burdens upon the health care system, as well as for the afflicted individual and their family (Flint et. al. 2005). All efforts must be made to emphasize the importance of safe food handling, and to reduce the known causes of food borne illness.

Rationale

The gradual increase in the detection of food borne illness in Trinidad and Tobago as proven by data collected by the Caribbean Epidemiology Centre, indicates that a problem exists with regard to the safe production and handling of foods for consumption (CAREC 2008). This paper will focus on domestic food preparation, and areas within the home where contamination may most likely occur.

Problem Statement:

The purpose of this study is to assess the level of consumer knowledge regarding safe food handling practices, and the impact of this knowledge level on the incidence of food borne illnesses originating in the home. This study will employ the survey method within the residential community of Realspring Gardens, Southern Main Road, Valsayn, during the month of March 2010.

General Objective:

- To investigate domestic food handling practices amongst households in the south Valsayn, St Augustine area.

Specific Objectives:

The specific objectives were to:

- ascertain whether or not consumers acknowledge that food poisoning can occur at home
- determine the level of consumers knowledge regarding proper food handling techniques at home

- identify areas of knowledge deficit, and groups within the population that may need to be addressed.
- make recommendations as deemed necessary

Literature Review

Proper handling, storage and preparation of food are absolutely necessary to produce meals which are safe for consumption. These issues become almost critical when dealing with individuals who are immune-compromised or ill, the elderly, and children under five years of age (Redmond and Griffith 2009).

Hospitalization and even death can result from ingesting contaminated water and food which then produce food borne illness. In a matched cohort study in Denmark of 48857 persons with gastrointestinal disease and 487138 controls from the general population, it was shown that persons with Salmonella and Campylobacter infections have 3.1 times higher risk of long term mortality than the average population (Helms et. al. 2003). In the infant population, neonates, preterm babies and those of low birth weight are at highest risk. For young formula fed children, caregivers must ensure that feeding equipment and utensils are sterilized and scrupulously clean, and that water used for reconstituting formula is boiled before use (Redmond and Griffith 2009).

Locally, there is a paucity of information regarding the incidence and frequency of food borne illnesses. One local study which was conducted in 2002 using 84 randomly chosen consumers showed that roughly half of the respondents had experienced symptoms of food borne illness, however only 23.8 % of these persons sought medical treatment, and even fewer reported to a health authority (Surujlal and Badrie 2002). This highlights the problem of under-reporting, and the consequent under-estimation of the occurrence of disease.

Studies conducted internationally seem to have identified similar problems. Wilcock et. al. identified additional obstacles to the process of accurate recording of episodes of illness, such as lack of diagnostic testing, test results not being forwarded for tabulation and vehicles of transmission such as water. It was also hypothesized that there are cases of gastrointestinal illness which may be caused by unknown or yet to be identified agents, hence illness was not attributed to food(Wilcock et. al. 2004). Also, it is thought

that because most mild cases of gastroenteritis are self limiting, that persons may fail to seek treatment (Sair 2002). Under-reporting of food borne illness therefore appears to be a serious issue. This leads to the extent and severity of the problem being underestimated. Other papers have arrived at similar conclusions (Dreyfuss 2009, Helms et. al 2003).

Studies have uncovered some demographic factors that correlate with food handling practices. One Irish study with a sample size of 1025 persons created a number of “high risk” subgroups within their sample, and attempted to find out whether the practices of these persons were more deviant from standard procedure than others. Data was collected by using focus groups. Men appeared to practice riskier behaviours than women, and the age factor was also found to be significant (Brennan et. al. 2007). A review of studies on consumer attitude and behavior by Wilcock et al quoted similar findings found in other studies. However, in a cross sectional survey done in Turkey of 458 persons, the men received higher scores with regard to food safety knowledge (Unusan 2007). Socioeconomic factors and the concept of optimistic bias were also suggested by Wilcock et. al. as possible risk factors. In another study, those persons with higher education level demonstrated greater awareness of food poisoning and preventative measures (Angelillo et. al. 2001).

Generally it has been found that although consumers may be aware of safety measures that should be implemented, some fail to put these into practice (de Jong et. al. 2008). Habit and past experience were suggested as reasons for this. On the other hand, some areas of knowledge deficit have been identified. These include the many ways in which cross contamination may occur, such as bacterial transfer from hands to kitchen equipment, caused by poor hygiene practices like inefficient hand washing (de Jong et. al. 2008). A study conducted in the United Kingdom used a combination of questionnaires, direct observation, microbiological tests and focus groups to draw inferences regarding home hygiene. However their sample consisted of only 10 households and was not randomly selected (Curtis et. al 2003).

It has been repeatedly demonstrated that cleaning cloths and sponges can spread contaminants around the kitchen area because they are moist most of the time and so favour the multiplication of bacteria from organic food material (Redmond and Griffith 2009). It is recommended that paper towels be used for cleanup and then disposed. Work surfaces, chopping boards, dishcloths, mops and waste bins have also been shown to harbor potentially dangerous organisms, particularly *E. coli* (Redmond and Griffith 2009).

Pathogenic organisms have been shown to be introduced in the home by people, food, water, pets and insects. Human beings carry microbes on their hands, hair, clothes, and in stools (Swartz 2002). Foods may also carry naturally occurring microorganisms. Using tracer organisms (*Campylobacter jejuni*, *L. casei* and *E.coli*), one study from the Netherlands showed that cross contamination was reduced when both soap and water was used to wash hands, and that in general, hands and cutting boards were the main means by which cross contamination occurred in the kitchen (de Jong 2008). This indicates that the consumer should wash produce and meats before using, and always wash hands using both soap and water before handling any food. In a study which videotaped 99 members of a convenience sample preparing a meal at home, the majority of persons did not use soap to wash their hands, did not clean food contact surfaces and undercooked food (Anderson et.al. 2004). However, in a systematic review of 14 studies which investigated diarrhoeal disease, no association was found between poor hygiene and disease outcome (Stenberg, Macdonald and Hunter 2008).

Theoretical Framework

This study is founded on the concern that poor food handling practices at home may contribute to incidences of food borne illness. While researchers have postulated that domestic cases comprise the majority of episodes of food borne illness, no data exists in Trinidad and Tobago to support this.

Although the Caribbean Epidemiology Centre is mandated to document such cases, their records contain data mainly on outbreaks, and individual cases are harder to quantify for several reasons as noted earlier.

This study will determine for a given population:

- An assessment of their domestic food handling practices
- Incidence of food poisoning cases and what action was taken by the afflicted person

Whether any relationship exists between these two factors will also be examined.

Methodology

Description of subjects and context

The study population was comprised of 138 adult persons (18 years and older), from households within the Realspring Gardens (Phases 1 and 2) housing development.

This area is a middle class residential community, located south of the Churchill Roosevelt Highway.

All persons chosen were preparers of food for themselves and their family members.

Sampling Procedure

Maps of the selected areas were obtained from the Central Statistical Office, Independence Square, P.O.S.

These were used to formulate a grid showing all the available dwelling houses in the area. Various households were then selected from within the grid using systematic sampling.

Data Collection and Procedure

Data was collected via the use questionnaires administered face to face, during the month of March, 2010.

Participants were allowed to fill out the form themselves and make suggestions as they saw fit.

Data Collection Instrument

The survey questionnaire was subdivided into 4 sections:

1. Cleaning and Sanitation
2. Food Practices
3. Food Poisoning
4. Demographics.

The section titled Cleaning and Sanitation contained 6 questions, Food Practices had 8 items and Food Poisoning contained 5 questions. The Demographics section comprised 6 basic questions. All were of the closed ended type.

Data Analysis

The data obtained was analysed using SPSS (Statistical package for Social Sciences) version 16 software. The following methods were employed: Frequencies, Crosstabs, Chi square test.

Results

1. Description of the Sample

The sample consisted of 138 persons, the majority of whom were female, of African descent and engaged in full time employment. The demographic characteristics of the sample are presented in Table 1.

Table 1
Demographics of the Study Population

Variables^a	n	%
Sex (134):		
Male	36	26.9
Female	98	73.1
Age in years (133):		
18-24	26	19.5
25-34	47	35.3
35-44	29	21.8
45-54	28	21.1
55+	3	2.3
Ethnicity (136):		
African	72	52.9
East Indian	14	10.3
Mixed	45	33.1
Caucasian	1	0.7
Other	4	2.9

Religion (133):		
Hindu	6	4.5
Muslim	3	2.3
Roman Catholic	55	41.4
Anglican	12	9.0
Presbyterian	2	1.5
Baptist	7	5.3
Seventh Day Adventist	1	0.8
Jehovah's Witness	4	3.0
Other	43	32.3
Employment (134):		
Homemaker	5	3.7
Full time	113	84.3
Part time	6	4.5
Student	8	6.0
Unemployed	2	1.5
Education (132):		
Primary	2	1.5
Secondary	62	47
Trade	6	4.5
Tertiary	62	47

^a Number of participants who responded to the question is indicated in parentheses.

2. Cleaning and Sanitation

Participants were asked various questions related to cleaning and sanitation. The results are shown in Table 2 below.

Table 2
Responses to Cleaning and Sanitation Questions

Question	Options	Responses (valid %)
Do you wash your hands before preparing food?	Always	87
	Only if dirty	2.2
	Sometimes	10.9
	No	
Do you use soap every time you wash your hands?	Yes	66.7
	Sometimes	29.7
	No	3.6
Do you clean countertops before preparing food?	Yes	63.2
	Only if dirty	19.1
	At least once per day	5.9
	No fixed time for cleaning	11.8
How often do you change/replace your cleaning cloth/sponge?	Every day	1.5
	Once per week	17.5
	Every month	18.2
	Less often than that	4.4
	Use paper towels	8.0
	No fixed period	50.4

The majority of persons thought that it was necessary to wash their hands after using the toilet (99.3%), changing a baby's diaper (91.3), handling raw meat (92%) and playing with pets (90.6%).

3. Food Handling Practices

An overwhelming 92.6% of respondents always washed their produce before using.

Participants were asked "How do you test whether meat has finished cooking?" Results are below.

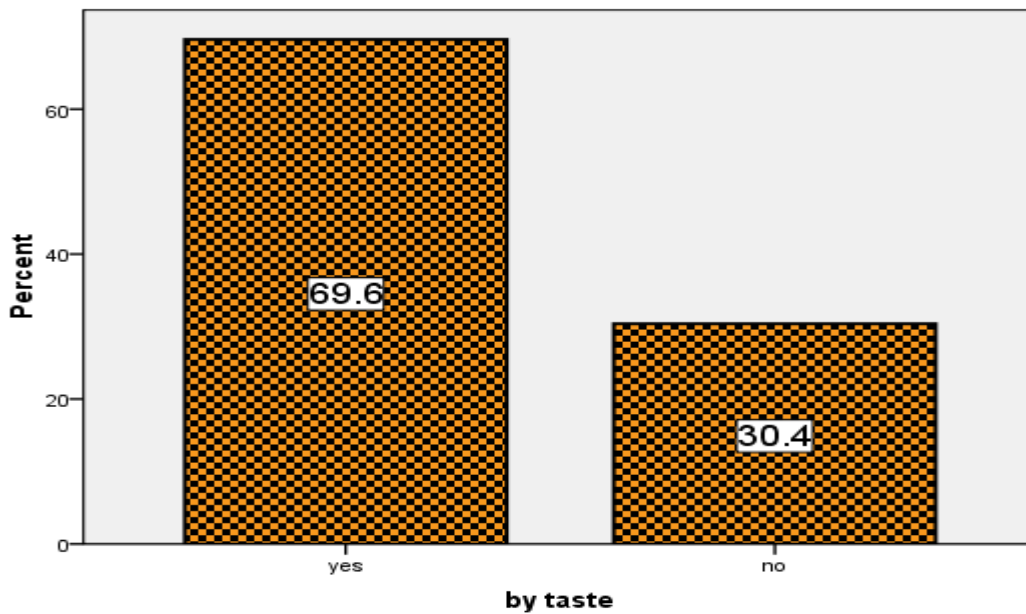


Figure1. Percentage of persons who test meat by tasting

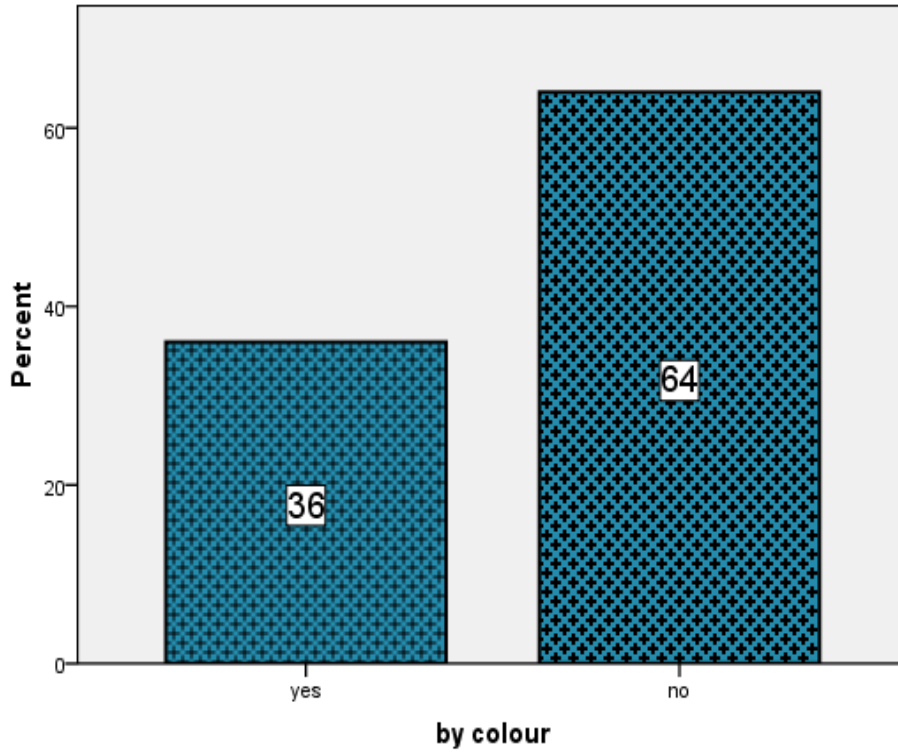


Figure 2. Percentage of persons who test meat by observing colour

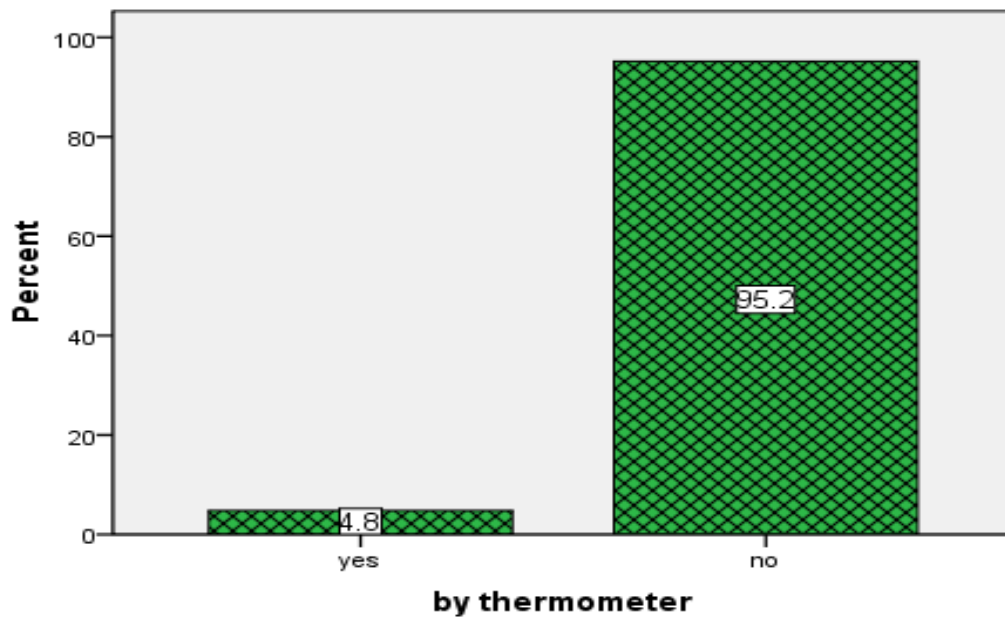


Figure 3. Percentage of persons who test meat by using a thermometer

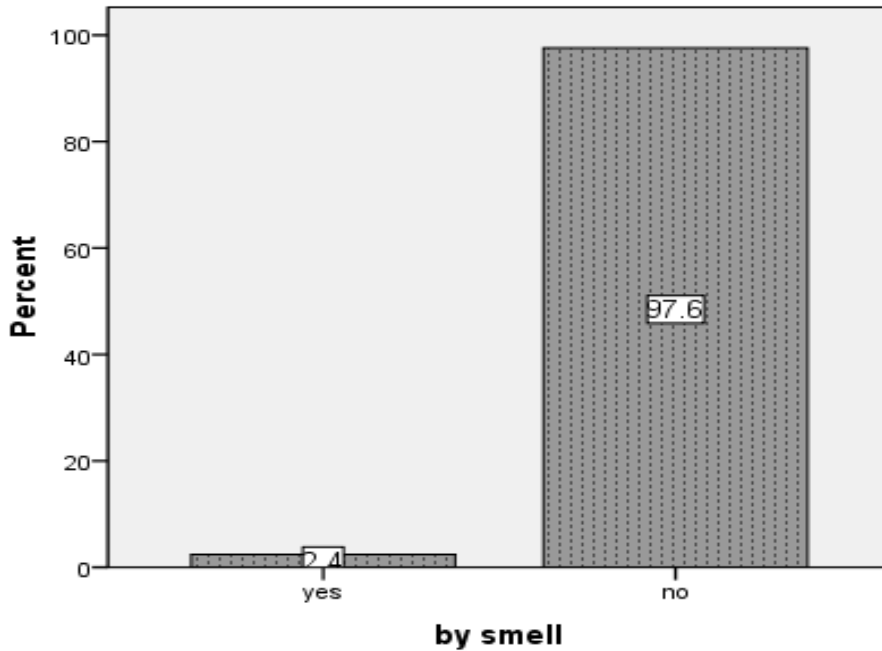


Figure 4. Percentage of persons who test meat by the smell

Several persons (42.3%) used the same cutting board for both meats and vegetables.

136 persons answered the question “How do you thaw frozen food?” They were permitted to indicate more than one option if necessary. The number of persons with affirmative responses is shown below:

Leave out at room temperature	63
Defrost in microwave	30
Thaw in refrigerator	38
Under running water	50

2 persons wrote on their forms that they placed the item in a bowl of water to defrost.

More than half of the persons in the sample (51.9%) indicated that they would refreeze foods that had already been thawed.

Only 11.6% of the sample stored meat on the bottom shelf of the refrigerator, while 15.9% would place the meat “wherever there is space”.

When asked whether or not they consumed items after the expiry date, 67.4% said “never”, while 25.9% said they would if the item had recently expired, and 6.7% if it “looked and smelled okay”.

Some persons in the study (10.4%) allowed their pets into their kitchens.

4. Food Poisoning

Several persons (46.6%) indicated that they or a member of their household had previously had food poisoning. However, when asked where they thought the illness had been acquired, only 3% of these persons felt that they became ill from consuming food prepared at home, while 12.1% were unsure of the source of their illness.

have you or anyone in household ever had food poisoning

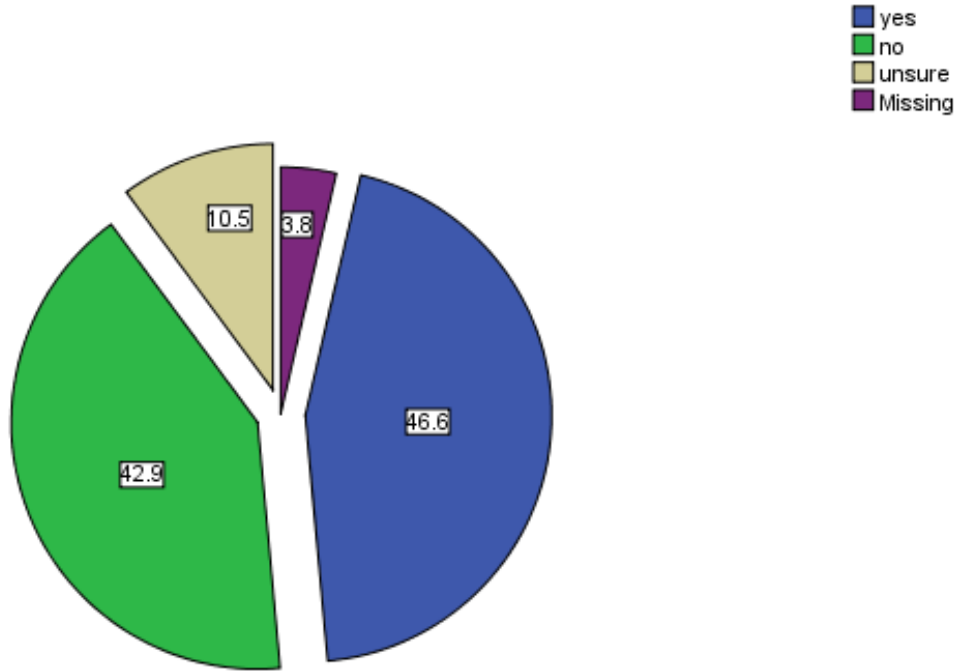


Figure 5. Percentage of persons in sample or in their household who previously had food poisoning.

78.7% of those who already had a food borne illness chose to seek treatment.

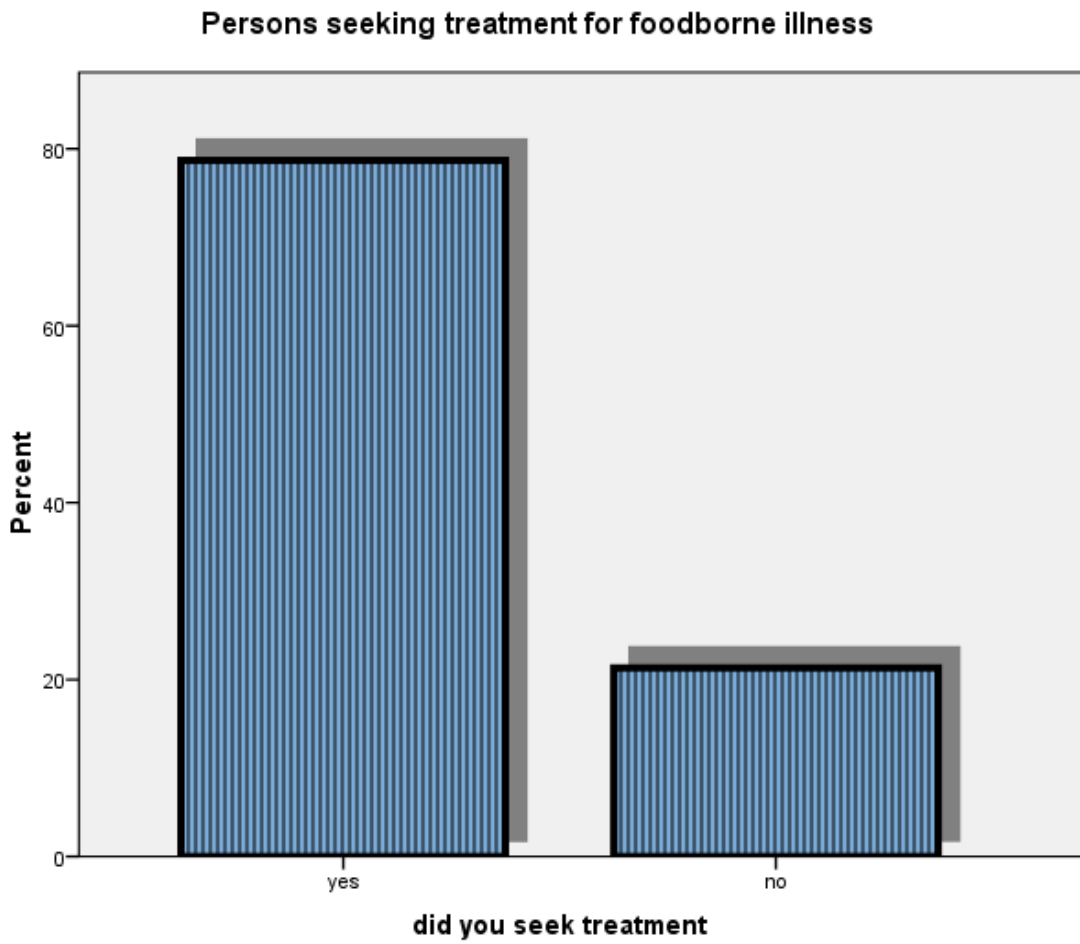


Figure 6. Percentage of persons seeking treatment for food poisoning.

The pie chart below shows where persons sought treatment for their illness.

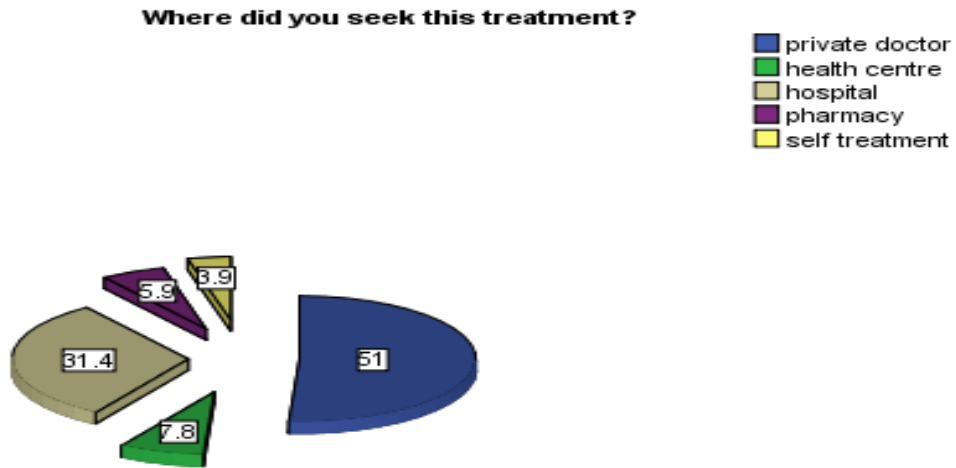


Figure 7. Distribution of places where treatment was sought for food poisoning.

Most people were of the opinion that food poisoning is most likely acquired from eating food prepared by street vendors (76.6%). Other possible sources indicated in decreasing order were restaurant/fast foods (43.8%), commercially prepared foods (11.7%), and foods prepared at home (3.6%).

No statistically significant differences were found between demographic characteristics and food handling practices.

Discussion

The survey was designed to investigate the food safety behaviour of consumers in the domestic setting. In general, the results revealed that there were some widespread practices which could be considered as potentially hazardous and contributing to disease. These included:

- ❖ Thawing food at room temperature
- ❖ Storing meat on a shelf other than the bottom shelf
- ❖ Refreezing already thawed foods
- ❖ Using one cutting board for multiple tasks
- ❖ Failing to use a thermometer to check doneness of meat
- ❖ Consuming expired food
- ❖ Allowing pets into the domestic kitchen

All the above mentioned practices are in direct contradiction to safe food handling recommendations as set forth by international bodies such as the Food Safety and Inspection Service (FSIS).

Thawing should ideally be performed in a refrigerator at 40° F or less, under running potable water at 70° F, by microwave if cooked immediately thereafter, or as part of the cooking process. Similar results as shown in our study related to the thawing of frozen foods were obtained in an earlier local study (Surujlal and Badrie 2002). Thawing meat at room temperature on a countertop is an extremely risky practice and is not recommended. Meat should be stored on the bottom shelf to prevent its juices from dripping onto foods below and presenting a cross contamination risk. Most persons in the study stated that they would store meat on the top shelf, which is incorrect practice. A Turkish study of five hundred women saw results comparable to ours (Ozcelik 2007).

Separate cutting boards should be used for different types of foods, as this minimizes the chance of cross contamination. A significant number of persons in the sample utilized one cutting board for both meat and vegetables. Although international recommendations state that the internal temperature of meat and poultry should be checked by using a metal stemmed thermometer, only 3 persons did so in our sample.

A “use by” date on a food product is the last day recommended for use of that product as recommended by the manufacturer (FSIS, 2007). Food must not be eaten after this date and should be discarded.

Additionally, there may be a loss of nutritional value of the product. A number of persons in this study were willing to consume expired food items. Finally, there is no place for domesticated animals in the kitchen as these may harbour a number of pathogens (Swartz 2002, Wolfe et. al. 2007).

Consumers must also understand the importance of cleaning and sanitizing food contact surfaces and cloths. An alarming 19.1% would only clean their kitchen counters if visibly dirty. These surfaces have been shown to support the growth of several microorganisms (Cosby et. al. 2008). Kitchen cloths and sponges because they are continuously moist and supplied with organic matter, are particularly able to promote the proliferation of bacteria. It is therefore recommended that disposable paper towels be utilized in the kitchen (Redmond and Griffith 2009). Only 8% of persons surveyed used paper towels for cleaning.

The majority of respondents tasted meat to assess whether or not it had finished cooking, and several persons would judge by colour. However, it has been shown that colour is a poor indicator when used in this regard (FSIS 2003).

While several international researchers have stated that the majority of food poisoning cases originate in the home, with Redmond and Griffith estimating the number to be as high as 87% of actual food poisoning cases, this was not reflected in this study. Although nearly half the sample had experienced this type of illness before, very few of them attributed the cause to home cooked meals. Also, most of the persons in this study who had already had food poisoning chose to seek treatment, primarily at private

doctor's offices. Many studies have hypothesized that very few individuals would seek treatment for an illness of this nature. A study by Unicomb et. al however, found that a third of those who had a food borne illness saw a private doctor.

The majority of respondents were of the opinion that they were more likely to fall ill from eating food prepared by roadside vendors than food prepared at home. In a local study done by Badrie et al, only 5.5% of the sample shared this sentiment, while 20% felt they could acquire food poisoning at home.

Because individuals may carry pathogenic organisms on their person, hygiene becomes an issue of utmost importance. These organisms can be easily transferred around the kitchen and into food. Proper hand washing technique, and overall personal hygiene is therefore necessary.

While this study demonstrated inadequate food handling practices by members of the sample, which mirrored some of the international studies reviewed, no association could be found between demographics and this behavior, or increased risk of food poisoning.

Limitations

The study was test piloted by administering the questionnaire to a sample of 15 randomly chosen persons, following which some adjustments were made to the survey instrument to improve its relevance and validity. Even with this measure, some respondents were able to indicate viable options which were not included on the questionnaire. The most noteworthy of these were in response to Question #11 which asked "How do you determine whether meat has finished cooking?" Optional answers given included "from experience" and "by time".

Since the survey was self reported, there may be potential bias introduced by the respondent. This may be so particularly for questions concerning hygiene practices, where the respondent may have supplied an answer they knew to be the correct practice rather than what they would actually do in a given situation.

A number of issues pertaining to food safety were not asked in an effort to make the questionnaire as concise as possible.

The sample size of 138 persons was obtained within one limited geographic area. This small number was used mainly due to restrictions in time and resources. The limited size and scope of the sample may also prevent extrapolation of the findings to the greater population.

Conclusion

The minimization of incidences of food poisoning can only be achieved through safe handling of food, effective cleaning and sanitation, good personal hygiene and adequate cooking of food. This study has shown that while practices such as hand washing, and washing of fruits and vegetables appears to be the norm, there are a number of areas related to safe food handling and preparation that need to be addressed. This may be attributed to negligence or preparation errors. Many consumers are simply not aware of what is correct procedure, and this indicates that some type of training and education is needed. This may be performed in schools, at community meetings, health centres, media infomercials etc.

Recommendations

Future studies of this kind should have a larger sample size, and survey persons from different geographical parts of the country to obtain a sample which is better representative of the entire population of Trinidad and Tobago. A survey instrument which includes all aspects of food safety should be developed. Observational studies may also be considered.

With regard to educational efforts, the following measures may be employed:

- Hygiene Promotion via media, fliers
- Education campaigns in schools
- Public awareness of food borne illness- media
- Health centres – community approach, demonstrations
- Possible local adaptation of internationally acclaimed Fight Bac® program

- Introduce household HACCP measures

The Caribbean Food Safety Centre, a sub-agency of The Caribbean Industrial Research Institute (CARIRI), introduced several educational tools including a quarterly magazine to assist in promoting good food practices. Some of these activities are non-operational at this time. A revision of the program and increased visibility to the general public will improve the chances of success of the Food Safety Centre.

The Caribbean Food and Nutrition Institute in collaboration with the Chemistry Department of the University of the West Indies implemented a three year Consumer Food Safety Program in 2002. Trinidad and Tobago was not one of the participating countries. The program was reported to have attained a measure of success, with members of the public becoming sensitized to risks to food safety. Initiatives such as these should be continued on an ongoing basis, and implemented across the entire Caribbean.

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Appendix

FOOD HANDLING SURVEY

Cleaning and Sanitation

1. Are you responsible for preparing food at home?

All the time

Sometimes

Rarely

2. Do you wash your hands before preparing food?

Always

Only if dirty

Sometimes

No

3. When do you think it is necessary to wash your hands? (check all that apply)

After using toilet

Changing baby's diaper

Handling raw meat

Playing with pet

4. Do you use soap every time you wash your hands?

- Yes
- Sometimes
- No

5. Do you clean/sanitize countertops before preparing food?

- Yes, always
- Only if dirty
- At least once per day
- No fixed time for cleaning

6. How often do you change/replace the sponge/cloth you use to clean the kitchen?

- Every Day
- Once per week
- Every month
- Less often than that
- Use paper towels
- No fixed period

Food practices

7. Do you wash fruits and vegetables before using?

- Yes, always
- Yes, if it looks dirty

No

8. How do you test whether meat has finished cooking?

By observing the colour

By tasting

By smelling

Using a thermometer

9. Do you use different cutting boards for meat and vegetables?

Yes No

10. How do you thaw frozen food?

Leave out at room temperature

Defrost in microwave

Thaw in refrigerator

Under running water

11. Do you ever re-freeze foods after they have been thawed?

Yes No

12. On what shelf in the refrigerator do you store meat?

Top

Middle

Bottom

Wherever I find space

13. Do you use/consume items after the expiry date?

Yes, if recently expired

Yes, if it looks and smells ok

Never

14. Do you allow pets into your kitchen?

Yes

Never

Don't own a pet

Food Poisoning

15. Have you or anyone else in your household ever had food poisoning?

Yes No Unsure

16. If yes, do you think you got it from food prepared at home?

Yes No Unsure

17. Did you or your family member seek treatment for this illness?

Yes No

18. If yes, where did you seek this treatment?

Private doctor

Health centre

- Hospital
- Pharmacy
- Advice of family/friends
- Self treatment

19. At which of the following do you think a person is most likely to get food contamination?

- Home
- Restaurant/Fast food
- Commercially prepared foods
- Street food vendors
- Other

Demographics

1. Age:

- 18-24
- 25-34
- 35-44
- 45-54
- 55+

2. Sex: Male Female

3. Ethnicity:

- African
- East Indian
- Mixed
- Chinese
- Caucasian
- Other

4. Religion:

- Hindu
- Muslim
- Catholic
- Anglican
- Presbyterian
- Baptist
- Adventist
- Jehovah's Witness
- Other _____

5. Employment:

- Homemaker
- Full time
- Part time
- Student
- Retired

Unemployed

6. Education level:

Primary

Secondary

Trade

Tertiary