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THE EVALUATION OF FOOD HYGIENE KNOWLEDGE, ATTITUDES AND PRACTICES (KAP) OF FOOD HANDLERS IN FOOD SERVICE ESTABLISHMENTS (FSE) IN A PERI URBAN MANUNCIPALITY OF ZAMBIA

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ABSTRACT

Food borne diseases mostly caused by food borne microbial pathogens are increasing in both developed and developing countries and are leading causes of illness and deaths in the developing countries.Most of the food borne disease outbreaks reported are associated with poor hygiene practices in food service establishments. Therefore, this study aimed to explore food hygiene knowledge, attitudes and practices of food handlers in Food Service Establishments (FSE) in a peri-urban municipality in Zambia. The study was a cross sectional which was conducted in randomly selected FSE in a peri urban municipality.The sample size was 62 food handlers drawn from 31 FSE. A simple random probability sampling technique was applied to select study respondents and data was collected using pre-tested structured questionnaire and face to face interviews with food handlers in the sampled FSE. This study showed food handlers in FSE have adequate knowledge in personal hygiene practices (96.8%). However, there is limited knowledge on the importance of maintaining a cold chain in a FSE. Respondents exhibited a positive attitude in the safe handling of food (100%) but showed a negative attitude in maintaining a cold chain and handling of leftover food (62.9%). In personal hygiene practices, respondents exhibited good practices in personal hygiene practices related to hand washing and cleaning (82.3%), however, bad practices (88.7%) were exhibited in the appropriate use of the ideal clothing in FSE – masks, hair nets and aprons. This study concludes that there is need to comprehensively change the behaviour of food handlers in a FSE in a peri-urban municipality in their knowledge, attitudes and practices towards personal hygiene and food safety to reduce the risk of food poisoning outbreaks.

Key words: Hygiene, Practices, Food Service Establishments, Food handlers, KAP

1.0 Introduction

Food borne diseases are increasing in both developed and developing countries. Diarrhoeal diseases, mostly caused by food borne microbial pathogens, are leading causes of illness and deaths in the developing countries, killing an estimated 1.9 million people annually at the global level (Schlundt J, 2004). The high incidence of food borne illnesses has led to an increase in global concern about food safety. Several food-borne disease outbreaks have been reported to be associated with poor personal hygiene of people handling foodstuffs (Van Tonder, 2007).

An estimated 76 million food borne illnesses occur annually in the United States. This foodborne illness result in an estimated 325,000 hospitalizations and 5000 deaths every year in the United States. The cost of the most common food borne illnesses in the United States is estimated at $6.5–$34.9 billion annually (Mead PS, 1999). In the past few decades, the epidemiology of food borne diseases has changed with several emerging and re-emerging pathogens. Some of them may pose a low risk to most individuals, but may be life-threatening to others (Maizun Mohd Zain, 2002).

Between 1998 and 2002, an average of 1329 food borne disease outbreaks were reported to the Centre for Disease Control and Prevention (CDC) each year. Approximately 52% of these were attributed to food service establishments (Jones TF, 2006; Lynch M, 2006). During the same period, the Oregon Public Health Division reported 62 food borne outbreaks or approximately 5% of the national total (Emilio E. DeBess, 2009). Another study conducted in Malaysia also showed that approximately 10-20% of food-borne disease outbreaks are due to contamination by the food handlers (Zain MM, 2002).

Public Health Epidemiologists along with Environmental Health Specialists are the first to respond to a food borne outbreaks, and to investigate, analyse, and report any food borne disease outbreaks, including restaurant-associated illnesses. Routine surveillance underestimates the incidence of food borne gastrointestinal illness related to food consumption in food service establishments by approximately 20–38 times (Evan MR, 2006; Jones TF, 2006).

Food contamination may occur at any point during its journey through production, processing, distribution, and preparation (Green L, 2005; Hennessy TW, 2004). The risk of food getting contaminated depends largely on the health status of the food handlers, their personal hygiene, knowledge and practice of food hygiene (Mead PS, 1999). Infections can also be acquired through contaminated unwashed hands, insects, and circulation of bank notes and by wind during dry conditions (Isara AR, 2009). Contamination of food with eggs and cysts especially those sold

by hawkers may also serve as a source of infection to consumers of such items (Umeche N, 1991).

Therefore, food handlers i.e. any person who handles food, regardless whether he actually prepares or serves it, play an important role in the transmission and, ultimately, prevention of food borne disease (Isara AR, 2009). Information regarding food handlers' practices is key to addressing the trend of increasing food borne illnesses. In recent years, due to changing lifestyle, breakdown of joint family system and increase in number of working women has led to consumption of ready to eat foods. The individuals may be able to satisfy their taste and nutrition needs, but pays little attention to hygiene and food safety (Santosh MJ, 2008).

This study will be undertaken with the aim of evaluating food hygiene knowledge, attitude and practices of food handlers in food service Establishments in Chinsali in Zambia.

2.0 Method/Study design

This study was cross sectional which was conducted in randomly selected Food Service Establishments in Chinsali with a view of evaluatingfood hygiene knowledge, attitude and practices among food handlers of Chinsali Township Food Service Establishments. The required sample size was 50 % of the total workers in each Food Service Establishments. This is because of differences in number of workers (food handlers) in different Food Service Establishments. A non-probability sampling technique was applied to select participants. Those who were not willing to participate were excluded from the study (Md Mizanur R. et al, 2012). The consent was obtained after explaining the purpose of the study and data was collected on pre-designed proforma by face to face interview with the manager and the food handlers. The questionnaire was made of four parts; (1) Social-demographic information, (2) Information on Food Hygiene knowledge (3) Information on food handlers attitude on food hygiene (3) Information on food handlers practices in Food Service Establishments.

2.1Dependent variables

Attitude and Practices of food handlers in Food Service Establishments were the dependent variables for this study

2.2Independent variables

Hygiene knowledge of food handlers in Food Service Establishments was the Independent variable for this study

2.3 Samplingtechnique

The population of subjects for the study were food handlers. 95% Confidence Level, an error margin of 0.05% was used to compute the sample size. Due to varying numbers of food handlers in Food Service Establishments, fifty percent (50`%) of the total number of food handlers to be observed in each Food Service Establishment wasselected using a simple random probability sampling technique. The Questionnaire was used to collect information on demographics, hygiene knowledge, attitudes and practices, and other relevant information needed for the success of this study (George A & Ekau A. 2011).

2.4Study population

The study population were food handlers from Food Service Establishments. This included both males and females.

2.5Inclusion criteria

Only food handlers who were willing to take part in the study and those who had direct contact with food, involved in food preparation, serving food and food surfaceswere included in the study.

2.6 Datacollection methods

Data on food hygiene knowledge, attitude and practices in food handlers was collected using administered structured questionnaire in English and Bemba. The questionnaire was also administered in Bemba for respondents who can't read and write English.The questionnaire was administered through face to face interviews with the researcher recording responses

2.7Processing and Analysis of Data

The data obtained from the questionnaires were tabulated, coded on Microsoft excel and analysed statistically using Statistical Package for Social Sciences (SPSS) software for windows, version 16.0. Cross tabulations, two tests of association, Pearson's Chi-square (x^2) and Fisher's tests were used to determine the influence of different factors. Results with p-value <0.05 level of significant, were considered statistically significant. For analysis of association between variables, the level of knowledge, attitude and practices were categorised as "knowledgeable (≥80% correct) or Not knowledgeable (<80%). The two models were developed to identify the variables that impacted the results of interest. These included model 1, knowledgeable and model 2, not knowledgeable.

3.0 Results and Findings

3.1 Food Service Establishment types

Figure 1 shows the typesof Food Service Establishments from which data were collected. Results shows that 26%(8) were bakeries/butcheries/restaurants, 13%(4) were guest houses and lodges while 61%(19) were restaurants

3.2 Number of respondents from different Food Service Establishments

Different numbers of respondents from different premises are presented in **figure 2**. 36(58%) were from restaurants, 19(31%) from bakeries/butcheries/restaurants and 7(11%) from guest houses/lodges respectively.

3.3. Sample distribution of respondents

Food Service Establishments employees are mainly composed of food handlers above 21 years 88.7% (55) and only 11.3% (7) respondents were below 21 years of age. There were more single/widowed respondents 54.8% (34) than married food handlers 45.2% (28) in the sample. The majority of food handlers (74.2%) reached secondary and tertiary level of their education. The social economic status was expressed as place of residence (Rural, Semi-rural and Urban), rural as high density, semi-rural as medium density and urban as low density areas. Food handlers coming from semi-rural areas were 41.9% (26), 38.7% (24) food handlers were coming from rural areas and 19.4% (12) respondents were coming from urban areas respectively.

3.4. Knowledge distribution of food handlers

Table 2 shows knowledge distribution of food handlers on food hygiene. Respondents showed high levels of knowledge in food hygiene and safety in most of the questions despite having little knowledge on thermostat ofthe fridge.

3.5 Social demographic factors associated with knowledge

Social demographic factors were associated with knowledge. These are age, marital status, education background, place of residence and sex. After computation of p-values using Chi-square test and Fisher's exact tests, statistics showed no association between knowledge and all demographic factors with P-values 0.703, 0.799, 0.667, 0.956 and 0.533 respectively

3.6 Distribution of hygiene practices of food handlers

Table 4 shows hygiene practices of food handlers among them showed positive hygiene practices. Of all the responses, 82.3% (51) confirmed that they wash their hands before handling food and 64.5% (40) also pointed out that they wash hands after preparing food. Out of the total number 100% (62) of respondents, 62.9% (39) food handlers use protective clothing every time they are preparing food and only 1.6% (1) wears mask when preparing food while 62.9% (39) wear caps when preparing food.

3.7 Distribution of positive attitudes

Table 5 shows the distribution of positive attitudes of food handlers on food hygiene and safety in all the questions. The most common negative attitude expressed by respondents was on

defrosted foods to be refrozen only once (37.1%). Generally, respondents had positive attitudes on what should amount to good hygiene in Food Service Establishment (above 80%)

3.8 Association between attitudes and practices

Table 6 below shows the association between attitudes and practices. Statistics showed no association between the attitudes and practices of food handlers in Food Service Establishments. P-value >0.05 indicates no association statistically. Pearson chi-square tests, linear by linear association, fisher's exact tests were used in the analysis.

3.9 Association between knowledge and practice

The association between knowledge and practices of food handlers is shown in table below (Table7). Statistics showed no association between knowledge and practices among food handlers (p-value >0.05). To determine this, cross tabulations, chi-square tests and fisher's exact tests were employed for analysis

3.10 Association between knowledge and attitude

Table 8 shows association between knowledge and attitude. Statistics showed association between knowledge and other variables; using of caps, masks, protective gloves as they reduce risks of food contamination. There was association also between knowledge and knowing of fridge temperature as it reduces foodborne illnesses (p-values <0.05). However, there was no association between knowledge and other variables (p-value >0.05).

4.0 Discussion of results

Demographic characteristics of the selected sample are presented in Table 2. The sample comprised of both males and females of which 7(11.3%) were males and 55(88.7%) were females. There were more female than male food handlers in the sampled Food Service Establishments. This could be due to food service establishment type of jobs that are culturally considered to be jobs for females as it patterns to food preparations. This study is similar to the study done by Chipabika (2014) which revealed that the majority (80%) of food handlers were above 21 years. Among the food handlers interviewed 184 (73%) were female and males were 67 representing 27%. This is also similar to the study done by Getachew (2010) on the assessment of hygienic practices in selected hospitals in Ethiopia where 100% were female and another study done by Zain and Isara (2009) on knowledge and practices of food hygiene and safety among food handlers in fast foods in Benin found that the majority were females (69.5%). From these studies it is clear that the majority of food handlers in food establishments are female and this could be attributed to the number of factors which include the nature of the job and mostly female employees are known to maintain proper personal and food hygiene. These two studies were different from the study done by Kasturwar and Mohd on knowledge and practices

among food handlers found that the majority of food handlers 52(62.7%) were males and 31 (37.3%) were females.

The activities performed in Food Service Establishments require certain level of education as some aspects of activities are technical and scientific. In this study it was observed that 74.2% (46) have attained secondary and tertiary level of education, which shows that most food handlers can read and write in English and general appreciation of the technical details that pattern to activities in Food Service Establishments (Tan S.L, et al 2013).

In Chinsali district places of residence can be described as rural (high density), semi-rural (medium density) and urban (low density areas). In this study most of the food handlers came from high density 38.7% (24) and medium density 41.9% (26) areas respectively. This is due to the fact that Chinsali district is an emerging district with increased economic activity and Food Service Establishments acts as sources of employment for most people. The food handlers that came fromLow density areas included Food Service Establishment owners who participate in food preparation and serving of food and are better placed to be decision makers on attitudes and practices in Food Service Establishments.

It is importance to wash our hands every time before eating and after eating food. This is because food handlers or generally humans carry bacteria in their hands like *E. coli, S. marcescens, S. Aureus* and *P. Aeruginosa* among other (Sally. F et al 2007). This can act as source of food contamination in food service establishments. A good and proper hand washing reduces the likelihood of food contamination by bacteria. This study has shown that food handlers in Food Service Establishments in Chinsali are knowledgeable on hand washing 100%(62) and do practice correct hand washing 82.3% (51). Food can be contaminated through saliva and air especially if the mouth is not covered. *Salmonella* and *T. bacterium* have been known to have contaminatedfood when mouths were uncovered (Allison E, 2007), therefore food handlers covering their mouths with a mask in Food Service Establishments is critical in preventing food contamination (Sally et al, 2007). In this study food handlers in food service establishments in Chinsali do not practice use of masks during food preparation and food serving. This practice not being practiced therefore has potential to lead to food contamination. This is related to the study done on 124 food handlers in 32 school canteens in Portugal, found that the food handlers displayed reasonable level of knowledge in personal hygiene and cross contamination, but fared worse in other areas.

About89% of foods borne diseases have been associated with poor personal hygiene by food handlers which is an issue of attitudes towards hygiene. This entails that, food handlers in food service establishments should practice good hand washing practices and good personal hygiene in order to prevent food contamination. This study shows that food handlers in food service

establishments in Chinsali have good attitudes on safe food handling as an important part of their job 100% (62) and that improper storage of food may be hazardous to health 100% (62). To the contrary, food handlers did not have good attitude despite their high levels of knowledge on defrosted foods that may be refrozen only once 37.1% (23). This has been shown by the study done by Mohammad (2013) which showed that food handlers had high levels of knowledge; In general, the food handlers' knowledge was high with a mean percentage score of 84.83% ± 11.71%. They demonstrated excellent knowledge in the categories of high risk foods, foodborne diseases, food storage temperatures, and sources of food contamination. But, they had a lack of knowledge about the proper method of thawing frozen food, where 90% thought that the correct method for thawing frozen meat and broiler is to keep them over night at room temperature. The study also showed that the participants had good knowledge on personal hygiene and definition of foodborne diseases with mean score of 93.85% and 73.85%, respectively. On the contrary, their knowledge on food storage and preparation temperatures was poor with only 28%.

After computation of p-values statistics, no association between knowledge and demographic factors of food handlers in Food Service Establishments as $p>0.05$ was observed. This study shows that there was no association between knowledge and practices and furthermore, there was no association between attitude and practices. Knowledge and attitude on the use of caps, masks in reducing food contamination are closely associated ($p<0.050$). Food handlers in food service establishments in Chinsali knowledge on the use of caps and masks are not enough to prevent or reduce food contamination but the attitude also. The study shows that good hygiene knowledge and positive attitudes will not lead to good practice measures. This is similar to the study done by Amany, (2013) which revealed a discrepancy between stated knowledge and practices for routine protective measures, suggesting that knowledge alone is probably insufficient to promote positive attitudes and safe behaviours. Routine use of gloves was related to attending educational courses and the number of hospital beds. Better practices in smaller hospitals may suggest that a smaller workload is associated with greater care in applying food hygiene practices, since those working in hospitals with less than 300 beds tended to be more careful in applying food hygiene practices.

5.0 Conclusion and Recommendations

5.1 Conclusion

5.1.1 Knowledge

The study revealed that food handlers in Food Service Establishments in Chinsali are knowledgeable on hand washing, correct application of cleaning procedures of food services establishments decrease the risk of infection to customers 100% (62) and demonstrated high levels of knowledge on periodic health examination twice a year 100 (62). To the contrary, food

handlers do not have knowledge on the thermostat setting of the refrigerator and freezers should be controlled periodically once every month 37.1% (23).

5.1.2 Attitudes

Food handlers in food service establishments in Chinsali showed high levels of positive attitudes on safe food handling as part of their job 100% (62), however only 37.1% (23) agreed that defrosted foods may be refrozen only once. Despite their good knowledge, food handlers had a discrepancy on defrosted foods to be refrozen only once.

5.1.3 Practice

Food handlers have good hand washing practices before handling food as this may prevent or reduce food contamination by food handlers in food service establishments in Chinsali 82.3% (51). In this study food handlers in food service establishments in Chinsali do not practice use of masks during food preparation and food serving 88.7% (55). This practice not being practiced therefore has potential to lead to food contamination as observed in the study.

6.0Recommendations

In order to improve the hygiene standards and practices among the food handlers in food service establishments in Chinsali district, the following were the recommendations following the findings of the study

- There is need for authorities in Chinsali district to conduct periodic sensitizations and come up with comprehensive trainings on food hygiene for food handlers. Despite having knowledge in some areas, food handlers have no knowledge in other aspects of foodhygiene like on the thermostat setting of the refrigerator and freezers should be controlled periodically once every month 37.1% (23)
- Local authority, ministry of health and other stakeholders in Chinsali district should take an active role in ensuring that food handlers have positive attitudes in food hygiene and food safety through structured information sharing platforms.
- Food handlers in food service establishments in Chinsali district should be encouraged, sensitized and educated more on the importance of using masks during food preparations as it was revealed that food handlers do not practice use of masks during food preparation and food serving 88.7% (55).

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Tables

Table 1:Sample description of respondents

Characteristic		Gender		
		Male	Female	P-value
	% (n)	% (n)	% (n)	% (n)
Age (years)				
<21	11.3 (7)	9.5 (2)	12.2 (5)	
21+	88.7 (55)	90.5 (19)	87.8 (36)	1
Total	100 (62)	100 (21)	100 (41)	
Marital status				
Single/widow	54.8 (34)	57.1 (12)	53.7 (22)	
Married	45.2 (28)	42.9 (9)	46.3 (19)	0.794
Total	100 (62)	100 (21)	100 (41)	
Education background				
Primary/No education	25.8 (16)	14.3 (3)	31.7 (13)	
Secondary/Tertiary	74.2 (46)	85.7 (18)	68.3 (28)	0.138
Total	100 (62)	100 (21)	100 (41)	
Place of residence				
Rural	38.7 (24)	33.3 (7)	41.5 (17)	
Semi-rural	41.9 (26)	52.4 (11)	36.6 (15)	0.476
Urban	19.4 (12)	14.3 (3)	22.0 (9)	
Total	100 (62)	100 (21)	100 (41)	

Table 2: Knowledge distribution of food handlers

Statements	Responses % (n)		
	Agree	Disagree	Uncertain
Correct application of cleaning procedures of Food Services Establishments decrease the risk of infection to customers	100 (62)	0 (0)	0 (0)
Food service staff with wounds, cuts and abrasions on hands should not touch foods	96.8 (60)	1 (1.6)	1 (1.6)
Preparation of food in advance is likely to contribute to foodborne illnesses	96.8 (60)	1 (1.6)	1 (1.6)
Improper reheating of food is likely to contribute to food contamination	88.7 (55)	4 (6.5)	3 (4.8)
Washing hands before handling food reduce the risk of contamination	98.4(61)	1.6(1)	0.0(0)
The use of caps, masks, protective gloves and adequate closing reduce the risk of food Contamination	96.8 (60)	3.3(2)	0.0(0)
It is important to know the temperature of the refrigerator to reduce the risk of food contamination	91.9 (57)	4.8(3)	3.3(2)
Personal hygiene ensures safe food, and Avoid Cross Contamination	83.9 (52)	7 (11.3)	3 (4.8)
The thermostat settings of the refrigerators and freezers should be controlled periodically once a month	37.1 (23)	30 (48.4)	9 (14.5)
Chilling or freezing eliminates harmful germs in food	80.8 (50)	6 (9.7)	6 (9.7)
It is compulsory to carry out periodic health examinations two times a year	100 (62)	0 (0)	0 (0)

The correct temperature for a refrigerator is 4 degrees Celsius	91.9 (57)	3 (4.8)	2 (3.2)

Table 3: Social demographic factors associated with knowledge

Characteristic	Knowledge 10+ % (n)	Knowledge <10 % (n)	P-value
Age (years)			
Below 21	9.4 (3)	13.3 (4)	
21and above	90.6 (29)	86.7 (26)	0.703
Total	100 (32)	100 (30)	
Marital status			
Single/widow	53.1 (17)	56.7 (17)	
Married	46.9 (15)	43.3 (13)	0.799
Total	100 (32)	100 (30)	
Education background			
Primary/No formal education	28.1 (9)	23.3 (7)	
Secondary/Tertiary	71.9 (23)	76.7 (23)	0.667
Total	100 (32)	100 (30)	
Place of residence			
Rural	37.5 (12)	40.0 (12)	
Semi-rural	43.8 (14)	40.0 (12)	0.956
Urban	18.8 (6)	20.0 (6)	
Total	100 (32)	100 (30)	
Gender			
Male	37.5 (12)	30.0 (9)	
Female	62.5 (20)	70.0 (21)	0.533
Total	100 (32)	100 (30)	

Table 4: Distribution of hygiene practices of food handlers

Question	Responses % (n)				
	Always	Often	Sometimes	Rarely	Never
Do you wash your hands before preparing food	82.3 (51)	11.3 (7)	6.5 (4)	0 (0)	0 (0)
Do you wash your hands after preparing food	64.5 (40)	8.1 (5)	11.3 (7)	4.8 (3)	11.3 (7)
Do you use protective clothing when you prepare foods?	62.9 (39)	9.7 (6)	6.5 (4)	1.6 (1)	19.4 (12)
Do you use mask when you prepare foods?	1.6 (1)	1.6 (1)	6.5 (4)	1.6 (1)	88.7 (55)
Do you wear a cap when you prepare foods?	62.9 (39)	8.1 (5)	3.2 (2)	1.6 (1)	24.2 (15)

Table 5: Distribution of positive attitudes

Statements	Responses	
	%	(n)
Safe food handling is an important part of my job responsibilities	100	62
Learning more about food hygiene is important to me	96.8	60
Washing hands before handling food reduces food contamination	96.8	60
Using cap, masks, protective gloves reduces the risk of food contamination	88.7	55
Raw foods should be kept separately from cooked foods	83.9	52
Defrosted foods may be refrozen only once	37.1	23
It's important to know temperature of the fridge to reduce foodborne illness	80.6	50
Improper storage of foods may be hazard to health	100	62
Food service staff with abrasions or cuts on hands should not prepare foods	91.9	57

Table 6: Association between attitudes and practices

Questions	Practice			
	Total % (n)	**Positive % (n)**	**Negative % (n)**	**P-value**
Using cap, masks, protective gloves reduces the risk of food contamination				
Positive	100.0 (39)	87.2 (34)	12.8 (5)	
Negative	100.0 (23)	91.3 (21)	8.7 (2)	1
	100.0 (1)	100.0 (1)	0.00 (0)	
	100.0 (61)	88.5 (54)	11.5 (7)	1
	100.0 (39)	84.6 (33)	15.4 (6)	
	100.0 (23)	95.7 (22)	4.3 (1)	0.243

Table 7: Association between knowledge and practice

Statement	Knowledge % (n)			
	Total	**Positive**	**Negative**	**P-value**
Washing of hands before preparing food				
Positive	100.0 (51)	49.0 (25)	51.0 (26)	
Negative	100.0 (11)	63.6 (7)	36.4 (4)	0.379
Washing of hands after preparing food				
Positive	100.0 (40)	52.5 (21)	47.5 (19)	
Negative	100.0 (22)	50.0 (11)	50.0 (11)	0.851
Use of protective clothing				
Positive	100.0 (39)	51.3 (20)	48.7 (19)	
Negative	100.0 (23)	52.2 (12)	47.8 (11)	0.946
Use of mask when preparing foods				
Positive	100.0 (1)	100.0 (1)	0.0 (0)	
Negative	100.0 (61)	50.8 (31)	49.2 (30)	1
Wear of cap when preparing foods				
Positive	100.0 (39)	51.3 (20)	48.7 (19)	
Negative	100.0 (23)	52.2 (12)	47.8 (11)	0.946

Table 8: Association between knowledge and attitude

	Knowledge % (n)			
	Total	**Positive**	**Negative**	P-value
Learning about food hygiene is important				
Positive	100.0 (60)	51.7 (31)	48.3 (29)	
Negative	100.0 (2)	50.0 (1)	50.0 (1)	1
Washing hands reduces food contamination				
Positive	100.0 (60)	53.3 (32)	46.7 (28)	
Negative	100.0 (2)	0.0 (0)	100.0 (2)	0.23
Using cap, masks, reduces food contamination				
Positive	100.0 (55)	56.4 (31)	43.6 (24)	
Negative	100.0 (70)	14.3 (1)	85.7 (6)	0.05
Raw and cooked foods should be kept separate				
Positive	100.0 (52)	53.8 (28)	46.2 (24)	
Negative	100.0 (10)	40.0 (4)	60.0 (6)	0.502
Defrosted foods may be refrozen only once				
Positive	100.0 (23)	47.8 (11)	52.2 (12)	
Negative	100.0 (39)	53.8 (21)	46.2 (18)	0.647
It’s important to know temperature of the fridge				
Positive	100.0 (50)	62.0 (31)	38.0 (19)	
Negative	100.0 (12)	8.3 (1)	91.7 (11)	0.001
Staff with cuts on hands should not prepare foods				
Positive	100.0 (57)	52.0 (30)	47.4 (27)	
Negative	100.0 (5)	40.0 (2)	60.0 (3)	0.667

Figures

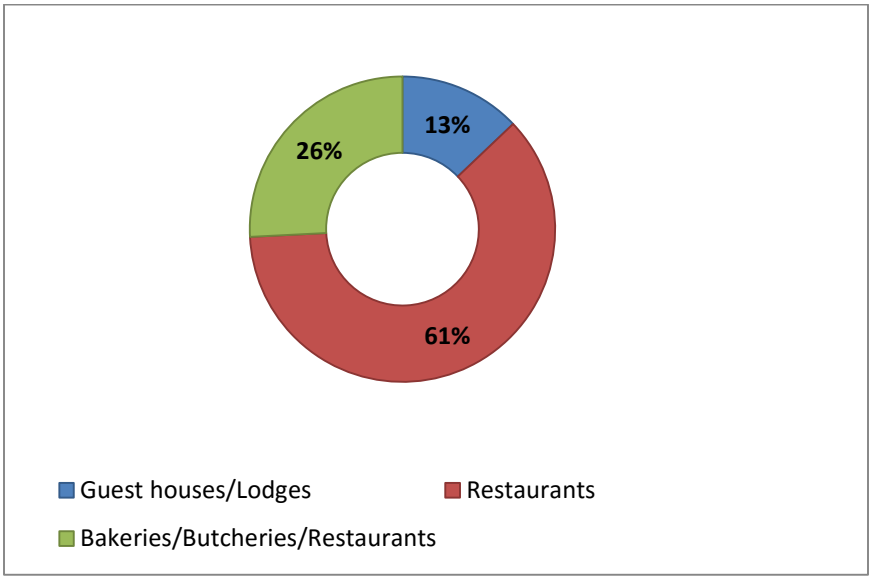

Figure 1: Types of Food Service Establishments were data were collected

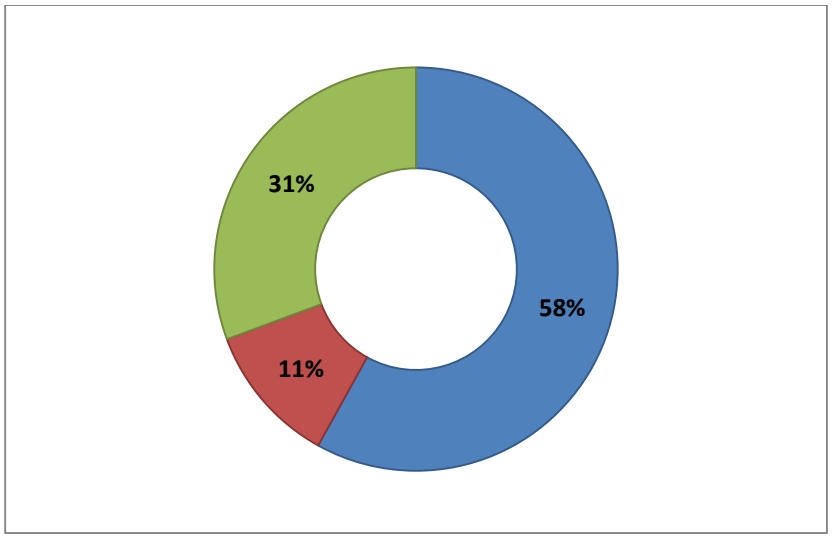

Figure 2: Number of respondents from different Food Service Establishments