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FOOD SAFETY KNOWLEDGE, ATTITUDE AND ASSOCIATED FACTORS OF FOOD HANDLERS WORKING IN SUBSTANDARD FOOD ESTABLISHMENTS IN GONDAR TOWN, NORTHWEST ETHIOPIA, 2013/14

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ABSTRACT

Introduction: Food safety is an increasingly important public health issue to prevent food borne illnesses. The global incidence of food borne disease is difficult to estimate, but it has been reported that 2.1 million people died each year from diarrheal diseases attributed to contamination of food and drinking water. Objective: This study was conducted to assess food safety knowledge, attitude and associated factors of food handlers working in substandard food establishments of Gondar town, Northwest Ethiopia, 2013/14. Methods: Cross sectional study design was used. Four hundred three food handlers were taken randomly as study subjects and data were collected by face to face interview. Ordinal logistic regression model was fitted to analyze the predictor variables. Results: The overall level of food safety knowledge (high level - 47.40%, moderate level- 41.70% and low level - 10.90%) and attitude (positive - 31.80%, neutral - 65% and negative - 3.20%) were reported. Among the food handlers who had moderate or high level knowledge, only 85 (23.68%) of the handlers had deep knowledge and the rest have superficial knowledge. Educational status, food safety information, feedback from consumers, supervision by manager, food hygiene and safety training and attitude were identified as predictor variables of knowledge. Attitude was not statistically associated with any of the predictor variables. This is because of the aggregation of respondents in one categorical variable and hence, the analysis did not pass the assumption of ordinal and multinomial logistic regression. Conclusion: Compared to other similar studies, Low level of food safety knowledge and attitude were reported. Among the food handlers who had moderate or high level knowledge, the highest proportion of food handlers had superficial knowledge.

Keywords: Food safety knowledge, Food safety attitude, Food handlers, Food establishments, Ordinal logistic regression, Gondar town.

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Contribution/ Originality

This study is one of very few studies which have investigated the level of food safety knowledge and attitude and associated factors among food handlers. Therefore, this study can contribute as base line information for implementing food borne diseases prevention and control strategies and an input for policy makers.

1. INTRODUCTION

Food safety is an increasingly important public health issue to prevent or control food borne illnesses. Food borne diseases are a widespread and growing public health problem both in developed and developing countries.

The global incidence of food borne disease is difficult to estimate, but it has been reported that 2.1 million people died each year from diarrheal diseases. A great proportion of these cases can be attributed to contamination of food and drinking water [1].

In industrialized countries, the percentage of people suffering from food borne diseases each year has been reported to be up to 30%. In the United States of America (USA), for example, around 76 million cases of food borne diseases, resulting in 325,000 hospitalizations and 5,000 deaths, are estimated to occur each year [2].An estimated 1.05 and 1.3 billion persons harbor the whipworm *Trichuristrichiura* and the roundworm *Ascarislumbricoides* [3], respectively. Among children, an estimated 59 million cases of Ascaris infection are associated with significant morbidity; the estimate for acute illness is 12 million cases per year with approximately 10,000 deaths [3].While less well documented, developing countries bear the brunt of the problem due to the presence of a wide range of food borne diseases, including those caused by parasites. The high prevalence of diarrheal diseases in many developing countries suggests major underlying food safety problems [1].Food borne diseases create an enormous burden on the economy include medical, legal, and other expenses. The costs in the USA associated with five major pathogens amounted to at least $6.9 billion annually [4]. In the European Union, the annual costs incurred by the health care system as a consequence of Salmonella infections alone are estimated to be around EUR €3 billion [5]. In the United Kingdom, care and treatment of people with the new variant of CreutzfeldtJakob disease (vCJD) are estimated to cost the health services about £45,000 per case from diagnosis [6].

1.2. Objectives of the Study

To assess food safety knowledge, attitude and associated factors of food handlers working in substandard food establishments in Gondar town, Northwest Ethiopia, 2013/14

2. METHODS AND MATERIALS

2.1. Study Design

Cross sectional study design was used.

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2.2. Study Population

The target population of this study was food handlers who had been working in randomly selected substandard food establishments in Gondar town.

2.3. Inclusion and Exclusion Criteria

2.3.1. Inclusion Criteria

Food handlers working in substandard food establishments and who had direct contact with food and food contact surfaces were included in the study.

2.3.2. Exclusion Criteria

Food handlers who had not direct contact with food and food contact surfaces were excluded from the study.

2.4. Sample Size Determination

Single proportion formula was used to determine the sample size with the following assumptions.

- p (proportion of food handlers' knowledge and attitude) = 0.5 since there are no similar studies conducted in the area to assess food safety knowledge, attitude and associated factors of food handlers working in substandard food establishments.
- w (Margin of error or level of precision or maximum error to committed) = 5%
- 95% confidence interval (standard normal probability)
- z = the standard normal tabulated value
- α = level of significance

$$n = \frac{\left(z_{\alpha/2}\right)^2 p(1-p)}{w^2} = \frac{(1.96)^2 0.5(1-0.5)}{0.5^2} = 384$$ (With 5% non response rate, the final sample size has been taken as n = 403).

2.5. Sampling Method and Procedure

Systematic random sampling method was used to select the primary study units i.e. food establishments and simple random technique or lottery method was employed to reach the secondary study units i.e. food handlers.

2.6. Data Collection Methods and Instruments

Data were collected from 403 food establishments. To prevent redundant responses within the establishment, only one food handler was interviewed from each establishment. Data were collected by face to face interview by using standardized questionnaire. The questionnaire had three sections: 1) general information such type of establishment, license statues, demographic information; 2) training and related information; 3) knowledge and attitude towards food safety.

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2.7. Study Variables

2.7.1. Dependent Variables

- Knowledge on food safety, and Attitude on food safety

2.7.2. Independent Variables

Sex, Age, Marital status, Educational status of the handlers, Person/s whom the handlers live together, Educational status of persons whom the food handlers live, Monthly income, Service year, Food safety information, Supervision by the owner or manager, Feedback from the customers, Food safety training,

2.8. Data Management, Processing and Analysis

Data were entered using EPI INFO version 3.5.3/2011 statistical software and were exported to SPSS version 20.0 for further analysis. Descriptive statistics of the collected data were done for most variables in the study using statistical parameters: percentages, means and standard deviations. Ordinal logistic regression analysis was used to check which variables are associated with the dependent variable. Finally the variables which had significant association were identified on the basis of AOR, with 95%CI.

3. ETHICAL CONSIDERATIONS

This study was carried out after getting permission from the ethical review committee of University of Gondar and the copy of permission letter was given for north Gondar administrative zone health bureau. Then, data were collected after getting written consent from the health bureau. Informed verbal consent was also obtained from each food establishments and study participants to conduct the study. Confidentiality was granted for information collected from each study participants. Participants' involvement in the study was on voluntary basis; participants who were unwilling to participate in the study & those who wish to quit their participation at any stage were informed to do so without any restriction. Each respondent was informed about the objective of the study and privacy during interview was ensured.

4. RESULTS

A total of 403 food handlers working in substandard food establishments were interviewed to assess their food safety knowledge, attitude and associated factors with 100% response rate. Data were collected on socio - demographic information; training and related information; knowledge and attitude towards food safety.

4.1. Socio Demographic Characteristics of Respondents

From the total respondents, 318(78.90%) were female and 85(21.10%) were male with 1:3.74 male to female sex ratio. The mean age of the respondents was 23.53 years with standard deviation of 5.40 years (23.53 ± 5.40) and range 33 years (15 – 48 years). About 351(87.10 %) of the respondents were Orthodox Christian. Two hundred twenty seven (56.30 %) of the

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respondents were attending secondary education and 306(75.90%) were not married. The mean monthly income of the respondents was 484birr (table 1).

Table-1. Socio - demographic characteristics of food handlers working in substandard food establishments in Gondar town, March, 2014

Socio – demographic variables	Frequency	Percent
Sex of the respondents		
Male	85	21.10
Female	318	78.90
Age of the respondents		
15 - 17	27	6.70
≥18	376	93.30
Religion of the respondents		
Orthodox	351	87.10
Catholic	2	0.50
Protestant	18	4.50
Muslim	32	7.90
Educational status		
Illiterate	45	11.20
Primary education (1 – 8 Grade)	105	26.00
Secondary education (9 – 12 Grade)	227	56.30
Higher education (12+)	26	6.50
Marital status		
Single	306	75.90
Married	66	16.40
Divorced	31	7.70
Monthly income		
<200	29	7.20
200 – 600	307	76.20
≥600	67	16.60

4.2. Types of Establishment

Data were collected from different food establishments found in Gondar town to assess food safety knowledge, attitude and associated factors. The type of establishments in which data were collected is presented below.

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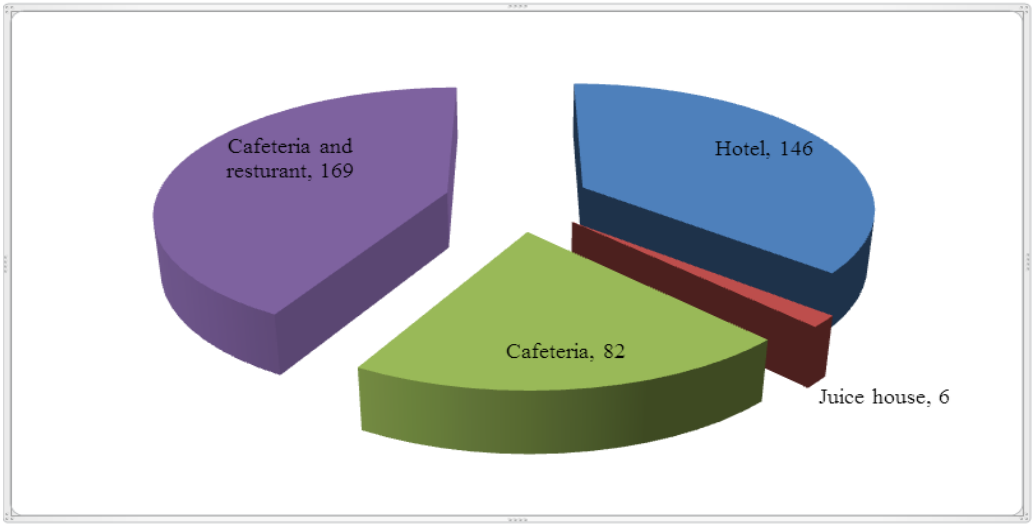
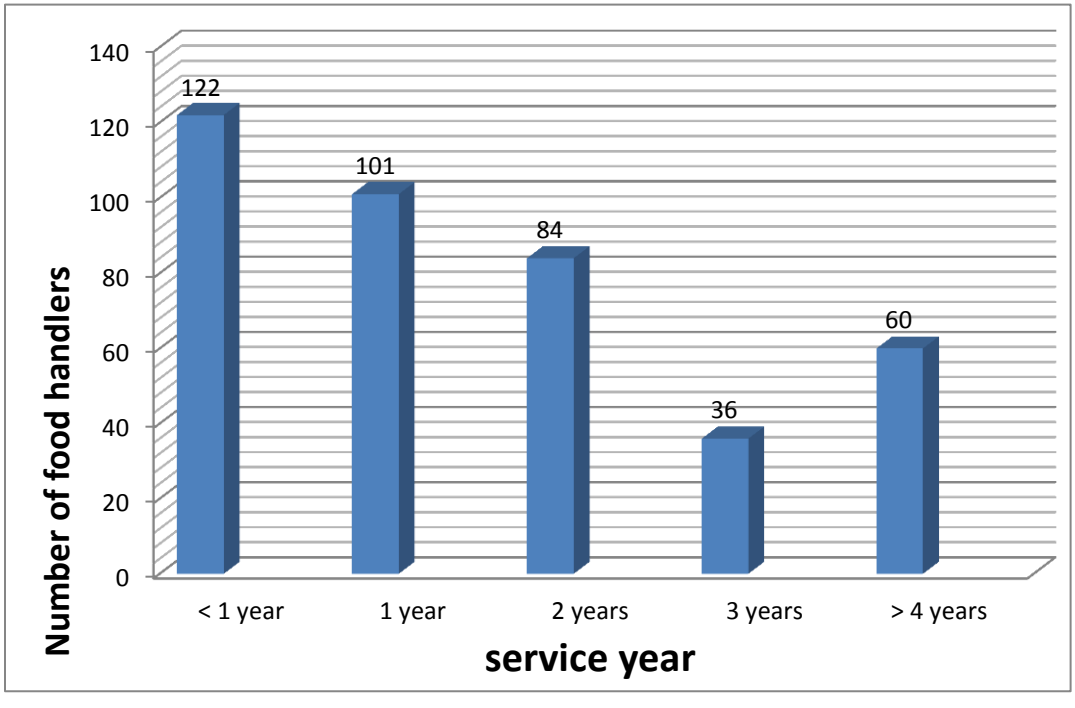
Figure-1. Types of establishments in which data were collected to assess their food safety knowledge, attitude and associated factors among food handlers working in substandard food establishments in Gondar town, March, 2014



4.3. Work Experience

To assess the contribution of work experience on food safety knowledge and attitude, data were collected about service year of the handlers. The result is summarized by graph below.

Figure-2. Work experience of food handlers working in substandard food establishments in Gondar town, March, 2014



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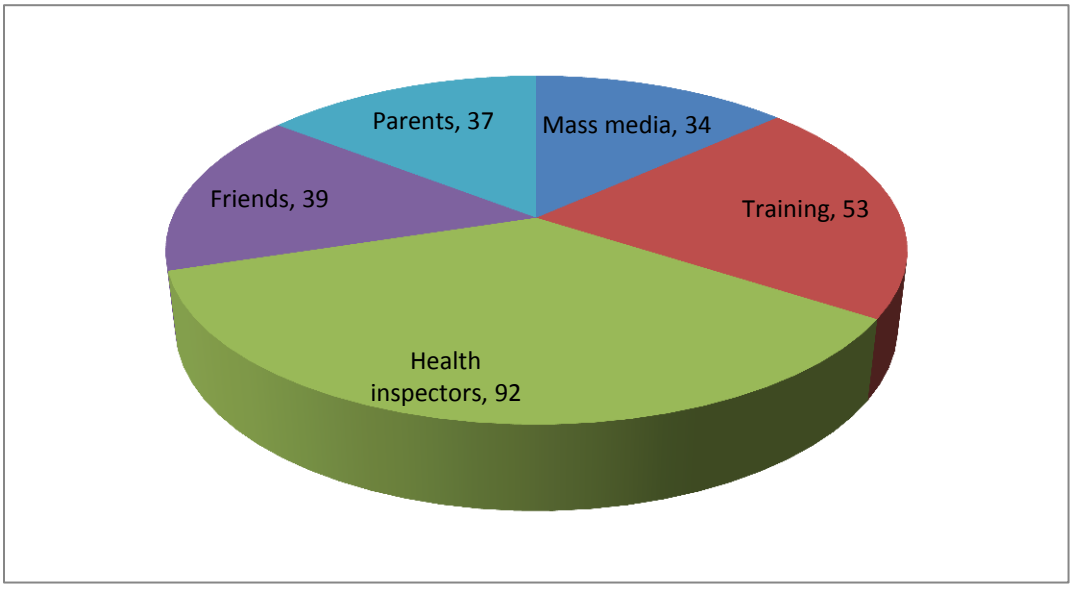
4.4. Food Hygiene and Safety Information

Out of the total food handlers interviewed about food hygiene and safety information and their source of information, 255 (63.30%) have food hygiene and safety information and 148 (36.70%) handlers have not any information. Source of information for food handlers who have food hygiene and safety information is presented below.

Figure-3. Source of food hygiene and safety information for food handlers working in substandard food establishments in Gondar town, March, 2014



4.5. Level of Food Safety Knowledge and Attitude

4.5.1. Superficial Knowledge

Bloom's cut off points was used to determine knowledge level. A total of 18 yes/ no questions were prepared by using the CODEX food hygiene and safety principles. A score of 1 was given for each correct response and 0 score for wrong response. Based on the sum scores level of knowledge was classified into Low level knowledge (Less than 59%), Moderate level knowledge (60-80%) and High level knowledge (80-100%).

4.5.2. Attitude

Attitude was assessed by 17 questions which were prepared from food hygiene and safety principles of CODEX and put on Likert's scale. The questions on Likert's scale had positive and negative responses that ranged from strongly agree, agree, neither agree nor disagree, disagree and strongly disagree. The scoring system used with respects to respondents' responses was as follows:

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Positive Statement		Negative Statement	
Choice	Scores	Choice	Scores
Strongly agree	4	Strongly disagree	0
Agree	3	Disagree	1
Neutral	2	Neutral	2
Disagree	1	Agree	3
Strongly disagree	0	Strongly agree	4

The scores varied from 0 to 68 and all individual answers were summed up for total scores and calculated for means. The scores were classified into Positive Attitude (80%-100%), Neutral Attitude (60%-80%) and Negative Attitude (Less than 59%) based on bloom's cut off points.

Therefore, based on the above measurements, level of food safety knowledge and attitude of food handlers is summarized below.

Table-2. Level of food safety knowledge and attitude of food handlers working in substandard food establishments in Gondar town, March, 2014

Variables	Frequency	Percent
Level of superficial knowledge		
Low level	44	10.90
Moderate level	168	41.70
High level	191	47.40
Level of attitude		
Negative	13	3.20
Neutral	262	65.00
Positive	128	31.80

form 359 who have food safety knowledge (168 - Moderate level and 191 - High level), only 85 (23.68%) of the handlers have deep knowledge and the rest have superficial knowledge. Deep knowledge was measured by seven analytical questions. The result is summarized below

Table-3. Assessment result of deep knowledge on food safety of food handlers working in substandard food establishments in Gondar town, March, 2014

Questions which can assess depth of food safety knowledge	Frequency	Percent
List the 5 Keys to Safer Food		
Those who can't list	300	74.44
Those who can list 1 – 2 keys	55	13.65
Those who can list 3– 4 keys	48	11.91
Those who can list 5 keys	0	0.00
How do you store large amounts of food in refrigerator?		
Those who knew the correct storage	145	36.00
Those who didn't know the correct storage	258	64.00
How should dishes be washed to prevent food poisoning?		
Those who knew the correct procedure	160	39.70
Those who didn't know the correct procedure	243	60.30
Where is the best place to store raw meat in the refrigerator?		

Continue

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Those who knew the storage place	216	53.60
Those who didn't know the storage place	187	46.40
For how long can you store meat and chicken in the refrigerator to eat later?		
Those who knew the storage time	73	18.11
Those who didn't know the storage time	330	81.89
When should you wash your hands?		
After visiting toilet	37	9.20
Before and after preparation of foods	117	29.00
After touching the skin, nose	14	3.50
After I receive money	5	1.20
Before washing of utensils	98	24.30
During two or more of the above pick times	132	32.80
What is the best way to wash your hands?		
Those who knew the correct procedure	187	46.40
Those who didn't know the correct procedure	216	53.60

4.6. Determinants of Food Safety Knowledge and Attitude of Food Handlers

Table-4. Ordinal logistic regression of food safety knowledge with predictor variables of food handlers working in substandard food establishments in Gondar town, March, 2014

Variables	Adjusted Odds ratio	p-value	95% C.I of the adjusted AOR	
			Lower Bound	Upper Bound
Level of knowledge				
Low level knowledge	3.2446	0.306	0.3403	30.9385
Moderate level knowledge	71.3074	0 *	7.0851	717.6629
High level knowledge [1]	-	-	-	-
Sex				
Male	1.3703	0.303	0.7528	2.4918
Female [1]	-	-	-	-
Age				
15 - 17	0.9822	0.968	0.4144	2.3303
≥18 [1]	-	-	-	-
Educational status				
Illiterate	0.1561	0.003 *	0.0450	0.5412
Primary education	0.4824	0.205	0.1561	1.4888
Secondary education	0.6108	0.361	0.2116	1.7612
Higher education [1]	-	-	-	-
Marital status				
Single	1.2093	0.740	0.3942	3.7134
Married	0.9753	0.978	0.1628	5.8416
Divorced [1]	-	-	-	-
With whom you live				
Alone	1.3298	0.448	0.636991	2.778747
With my husband or wife	1.6389	0.604	0.253599	10.59095
With my sons or daughter (s)	3.4591	0.089	0.826133	14.49784
With my friend(s)	1.0747	0.862	0.474734	2.432696
With Parents [1]	-	-	-	-
Educational status of persons				

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whom you live				
Illiterate	1.8908	0.268	0.613239	5.829901
Primary education	0.845354	0.72	0.337564	2.117
Secondary education	1.658643	0.17	0.805735	3.41781
Higher education [1]	-	-	-	-
How long have you been working				
< 1 year	1.349859	0.432	0.639544	2.846243
1 year	1.004008	0.992	0.477114	2.110659
2 years	1.457904	0.342	0.67032	3.174023
3 years	1.675313	0.295	0.638266	4.40174
> 4 years [1]	-	-	-	-
Monthly income				
≤ 200	0.932394	0.896	0.327915	2.65382
200 -600	0.703984	0.345	0.340275	1.457904
>600 [1]	-	-	-	-
Do you have food hygiene and safety information				
Yes	2.138276	0.006 *	1.248571	3.665629
No [1]	-	-	-	-
Did you receive feedback from your customers				
Yes	1.919376	0.011 *	1.16416	3.164516
No [1]	-	-	-	-
Did the owner or manager supervise you				
Yes	2.389299	0.026 *	1.110711	5.13459
No [1]	-	-	-	-
Have you ever received any food hygiene and safety training				
Yes	6.753089	0 *	3.231673	14.09754
No [1]	-	-	-	-
Attitude				
Positive	18.80269	0 *	4.5768	77.24638
Neutral	6.494788	0.006 *	1.698932	24.85354
Negative [1]	-	-	-	-

NB: since attitude was not associated with any of the predictor variables, we have not presented the outcome of the model.

5. DISCUSSION

5.1. Level Food Safety Knowledge and Attitude

This cross sectional study was conducted to determine food safety knowledge and attitude of food handlers working in substandard food establishments in Gondar town. Standardized questions were used to assess food safety knowledge and attitude. And Bloom cut off point was used to determine the level.

Accordingly, 191 (47.40%), 168 (41.70%) and 44 (10.90%) food handlers had high, moderate and low level food safety knowledge respectively. However, the knowledge they had was superficial. From those food handlers who had moderate and high level knowledge, only 85 (23.68%) of the handlers had deep knowledge. Similar study conducted by Md Mizanur, et al. [7] in Malaysia showed that 36.80%, 41.60% and 20.50% of the food vendors had high, moderate and

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low level food safety knowledge respectively. Another study conducted by Thidarat, et al. [8] in Bangkok revealed that 13.0% of the food handlers had a good level of food safety knowledge.

Majority [262 (65%)] of the food handlers had neutral attitude towards food safety. The rest 128 (31.80%) and 13 (3.20%) had positive and negative attitude respectively. Md Mizanur, et al. [7] in Malaysia also found that 62.90%, 19.10% and 17.20% of the food vendors had neutral, positive and negative attitude towards food safety respectively. Thidarat, et al. [8] in Bangkok obtained that 18.5% of the food handlers had a good level of food safety attitude.

As mentioned above, the finding of this study was lower, slightly similar and higher as reported by different studies including the above [7-9]. This may be due to the variation of educational status of the handlers, study setup and the provision of food hygiene and safety trainings.

5.2. Associated Factors with Food Safety Knowledge and Attitude

The study also conducted to identify the associated factors of food safety knowledge and attitude of the handlers. This study revealed that educational status, food hygiene and safety information, feedback from consumers, supervision by manager or owner, food hygiene and safety training and attitude were statistically associated with food safety knowledge of the food handlers.

Attitude was not statistically associated with any of the predictor variables. This is because of the aggregation of respondents in one categorical variable. Hence, the number of respondents for each category of attitude was not balanced; the analysis did not pass the assumption of ordinal logistic regression.

5.3. Significant Variables with Food Safety Knowledge

This study analyzed that increasing educational levels have been associated with the level of food safety knowledge. Illiterate individuals compared with higher educators may have a chance to have either low or moderate level than high level knowledge (AOR = 0.1561, 95% C.I = 0.0450 – 0.5412). Maizun and Naing [10] in Malaysia also found that education level has a significance association with food safety knowledge.

This study showed that the level of food safety knowledge is increased if the food handlers had food hygiene and safety information. Food handlers who had food hygiene and safety information may have higher probability to have high level knowledge (AOR = 2.1383, 95% C.I = 1.2486 – 3.6656). Similar studies conducted in Malaysia, Columbia and Mauritius also identified food hygiene and safety information as a factor [10, 11].

Food handlers who have received feedback from their customers had higher probability of having high level knowledge (AOR = 1.9194, 95% C.I = 1.1642 – 3.1645). Other studies conducted in in USA and Canada supported this finding [12, 13].

As other studies, this study has depicted that the supervision of managers or owners of the establishment has significant contribution to increase the level of food hygiene and safety knowledge of the handlers. Those food handlers who had supervised by the manager or the

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owner may have a chance to have high level knowledge than low or moderate level (AOR = 2.3893, 95% C.I = 1.1107 – 5.1346). Brita, et al. [13] also revealed that supervision had an impact on food handlers' food safety knowledge.

The present study showed that handlers who received food safety training were more likely to have high level knowledge than low or moderate level (AOR = 6.7530, 95% C.I = 3.2317 – 14.0975). This finding was also supported by other similar studies [10, 11].

The result of this study has revealed that the level of food safety knowledge is significantly related to attitude of the handlers. Food handlers who have positive attitude may have a chance to have high level knowledge than low or moderate level (AOR = 18.8027, 95% C.I = 4.5768 – 77.2464). A study on behavioral science and food safety explained that attitude was statistically associated with food safety knowledge [14].

6. CONCLUSION

Compared to other similar studies conducted in developed and developing countries, low level of food safety knowledge (high level - 47.40%, moderate level- 41.70% and low level - 10.90%) and attitude (positive - 31.80%, neutral - 65% and negative - 3.20%) were reported. Among the food handlers who had moderate or high level knowledge, the highest proportion of food handlers (76.32%) had superficial knowledge.

Of a number of predictor variables analyzed educational status, food hygiene and safety information, feedback from consumers, supervision by manager or owner, food hygiene and safety training and attitude were the identified factors affecting food safety knowledge of the food handlers.

7. RECOMMENDATIONS

For the employers or managers

- Establish personal hygiene rule and posted
- Organize and give training
- Continuously supervise the handlers

For inspectors or environmental health practitioners

- Conduct periodic inspection
- Design and implement food safety awareness creation program

For the local mass media

- Disseminate basic food safety information frequently

For the customers

- Give feed back to the handlers or employers

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