

Knowledge, Handling Behavior Affecting to Food Safety of Industrial Kitchen Handlers

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Abstract

Worldwide, food-borne diseases are a major health burden leading to high morbidity and mortality. Our research focused on safe food handling knowledge and behaviors among industrial kitchen handlers. We described one research mentioned to the description of handling knowledge, behavior about food safety awareness of industrial kitchen handlers (IKHs). Our results demonstrated that most of IKHs were lack of general handling knowledge about food safety. About knowledge, there were 21.5% of IKHs without knowledge of egg selection; 60% of IKH without knowledge of cross-contamination during processing. About handling, there were 20.4% IKHs without awareness of product label data; 65% of IKHs without handling behavior of washing vegetable under running water tap; 16.0% of IKHs used the same chopping board without any separation between raw and cooked products.

Keywords: Knowledge; Handling; Food safety; Behavior; Industrial kitchen handler

Introduction

Food poisoning is a group of illnesses acquired by consumption of foods contaminated with a variety of causes. Foodborne diseases remain a major public health problem across the globe. The problem is more severe in developing countries because of lack of personal hygiene and food safety measures [1]. The global burden of infectious diarrhoea involves 3-5 billion cases and nearly 1.5 million deaths annually, mainly in young children, due to diarrhoeal disease caused by contaminated food and water. In a global scale addition, diarrhoeal disease has caused 3% mortality. The European Union summarized report on trends and sources of zoonoses, zoonotic agents and food-borne outbreaks in 2015. A total of 4,362 food-borne outbreaks were reported. In 2014, 864 foodborne disease outbreaks were reported in the US, resulting in 13,246 illnesses, 712 hospitalizations, 21 deaths, and 21 food recalls. The pathogenic organisms transmitted through contaminated foods are bacteria, viruses, protozoa and helminths. Foods that are contaminated may not look, taste or smell any different from foods that are safe to eat. Most commonly, the outbreaks take place due to the ingestion of pathogenic bacteria like *Salmonella* Typhi, *Escherichia coli*, *Staphylococcus aureus*, *Vibrio cholera*, *Campylobacter jejuni*, and *Listeria monocytogenes* [2]. Chemical contamination of food may result from various sources. Industrial or agricultural practices such as use of pesticides, fertilizers lead to entry of heavy metals such as cadmium, lead and mercury into the food chain.

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Frederick et al. [3] suggested a critical need for action that is focused on preventing disease transmission within the food service industry. The challenges of foodborne pathogens and antimicrobial chemotherapy were shown [4]. Several factors contribute to foodborne illnesses like lack of self-hygiene of food handlers, no clean water supply and unclean environment [5]. Food handlers are the most common source of contamination because they can spread harmful organisms by means of fecal-oral route or skin lesions, as well as unclean kitchen utensils or kitchen counters [6]. Quinlan [7] reviewed the current state of what is known about foodborne illness among, and food safety risks for, minority and low socioeconomic populations, with an emphasis on the United States and Europe. Food safety in low and middle-income countries is also reviewed by Delia Grace [8]. These suggested that developing country consumers are concerned about foodborne disease; that most of the known burden of foodborne disease comes from biological hazards; and most foodborne disease was the result of consumption of fresh, perishable foods sold in informal markets. Foodborne disease was likely to increase in low and middle-income countries as the result of massive increases in the consumption of risky foods (livestock and fish products and produce) and lengthening and broadening value chains.

While foodborne illness is not traditionally tracked by race, ethnicity or income, analyses of reported cases have found increased rates of some foodborne illnesses among minority racial/ethnic populations. We carried out one research about knowledge, handling behavior affecting to food safety of industrial kitchen handlers.

Materials and Methods

Research scope

We focused on a survey of industrial kitchen handlers in the industrial zones located in the South of Vietnam. Samples were the industrial kitchen handlers (IKHs) via interview.

$$n = Z^2 \frac{p(1-p)}{d^2}$$

Whereas

n: Minimum sample size.

Z: Reliability of 95% equivalent to $\alpha = 0.05 \Rightarrow Z = 1.96$.

p: Ratio of industrial kitchen handlers having the fail processing practice, 43.6% ($p = 0.436$)

d: Acceptable difference 6% ($d = 0.06$).

$\Rightarrow n = 262$.

So, the minimum sample in this research would be 262. With 10% of reservation by rejection or absence, so the minimum sample size should be 289. However, during the research, several samples (IKHs) were removed owing to absence so the final sample size would be 274.

Research method

Method of sampling: Samples were the industrial kitchen handlers (IKHs) in the factories of industrial zones. Each factory would be selected one industrial kitchen handler for the interview. If there were more than two IKHs, they should be randomly lucky drawn to select one candidate.

Statistical analysis: Data of knowledge and handling of IKHs were collected by interview and observation with the support of an available check list. Time of the interview was about 20 minutes for one industrial kitchen handler. After receiving enough data, we did the statistical analysis by SPSS software version 19.0. Descriptive statistics (frequency, percentage %) was focused on personal characteristics, knowledge, handling of IKHs.

Results and Discussion

General information of IKHs

TABLE 1. Characteristics of age, gender and ethnic.

Variables	Description	Frequency (n)	Percentage (%)
Age (age group) (n=274)	21 – 30 years old	15	5.5
	31 – 40 years old	70	25.5
	41 – 50 years old	82	29.9
	Over 50 years old	107	39.1
Gender (n=274)	Male	22	8.0
	Female	252	92.0
Ethnic (n=274)	Vietnamese	260	94.9
	Chinese	6	2.2
	Khmer	8	2.9

TABLE 2. Characteristics of education, career and working time.

Variables	Characteristics	Frequency (n)	Percentage (%)
Education (n=274)	Illiteracy	14	5.1
	Primary school	130	47.4
	Junior high school	90	32.8
	Senior high school	21	7.7
	University	19	6.9
Background (n=274)	Officer	16	5.8
	House care	140	51.1
	Farmer	35	12.8
	Business	60	21.9
	Others	23	8.4
Working time as the IKHs (n=274)	Below 5 years	9	3.3
	5 – 10 years	80	29.2
	Over 10 years	185	67.5

TABLE 3. Characteristics of business type, shopping time and shopping duration.

Variables	Characteristics	Frequency (n)	Percentage (%)
Business type of company	Vietnamese local company	36	13.1
	Foreign direct investment company	238	86.9
Shopping time	Morning	260	94.9
	Afternoon	4	1.5
	Any time	10	3.6
Shopping duration	Comfort	162	59.1
	Enough	105	38.3
	Not enough	7	2.6

From TABLES 1, 2 and 3, we could see variety of aspects such as age, gender, ethnic, education, career, working time, business type, shopping time and shopping duration relating to handling of IKHs.

Food safety knowledge of IKHs

Knowledge of IKHs in selecting and shopping food:

TABLE 4. Knowledge of raw meat selection by vision (n=274).

Description	Frequency (n)	Percentage (%)
Red bright color	269	98.2
Sticky	63	23.0
Elasticity	51	18.6
No rancidity	131	47.8
Veterinary check point	196	71.5
No answer	13	4.7

From TABLE 4, we could see that IKHs selected red bright color 98.2%; while 4.7% didn't know how to select raw meat.

TABLE 5. Knowledge of raw fish selection by vision (n=274).

Description	Frequency (n)	Percentage (%)
Live fish	270	98.5
Without losen by handling	135	49.3
Bright eye	222	81.0
Normal abdomen	117	42.7
No strange smell	24	8.8
No answer	5	1.8

From TABLE 5, we could see that IKHs selected live fish 98.5%; while 1.8% didn't know how to select raw fish.

TABLE 6. Knowledge of raw vegetable selection by vision (n=274).

Description	Frequency (n)	Percentage (%)
Fresh	230	83.9
Rotten	81	29.6
Clean and without soil or damage	228	83.2
Strange smell	4	1.5
No answer	8	2.9
Others	5	1.8

From TABLE 6, we could see that IKHs selected fresh vegetable 83.9%; while 2.9% didn't know how to select raw vegetable.

TABLE 7. Knowledge of raw egg selection by vision (n=274).

Description	Frequency (n)	Percentage (%)
Clean egg with chalk on outer shell	185	67.5
No shake	172	62.8
No cracking	86	31.4
Egg screening	4	1.5
No strange smell	23	8.4
No answer	59	21.5

From TABLE 7, we could see that IKHs selected clean egg 67.5%; while 21.5% didn't know how to select raw egg.

TABLE 8. Knowledge of shopping location for edible cooked food.

Variables	Description	Frequency (n)	Percentage (%)
Usually purchase edible cooked (n=274)	Yes	213	77.7
	No	64	23.4
Condition of shopping location (n=274)	Far from drainage or contaminated location	145	52.9
	Having shelf or cabinet	165	60.2
	Having clean chopping board to separate raw and cooked food	28	10.2
	Having clamp	150	54.7
	Good personal hygiene	150	54.7

From TABLE 8, we could see that IKHs selected edible cooked food 77.7%; while 23.4% didn't select one. Good personal hygiene accounted for 54.7%, while clean chopping board was 10.2%.

Knowledge of cross contamination in the industrial kitchen: From FIG. 1, we saw 28% of IKHs awared of cross contamination. Meanwhile 60% of IKHs believed there would be none of cross contamination and 12% without any answer.



FIG. 1. Awareness of cross contamination in the industrial kitchen.

TABLE 9. Reason of cross contamination in the industrial kitchen (n=274).

Description	Frequency (n)	Percentage (%)
Dirty raw material or contaminated tool	36	13.1
None well-done food or cross contamination between the cooked and raw food.	69	25.2
No prevention from dust, insect, fly or dirty hand	52	19.0
Contaminated water source	22	8.0
Toxic additives (color, borat)	7	2.6
No answer	200	73.0

From TABLE 9, the risk of cross contamination in the industrial kitchen by none well done food or cross contamination between the cooked and raw food accounted for 25.2% and 73.0% without any answer.

General knowledge about food safety of the IKHs: From FIG. 2, there were 57% of the IKHs having the general knowledge about food safety.



FIG. 2. General knowledge about food safety of the IKHs.

TABLE 10. Handling of observation on product label.

Variables	Description	Frequency (n)	Percentage (%)
Do you usually purchase canned or packed food (n=274)	Yes	250	91.2
	No	24	8.8
Observing information (n=254)	Name and address of processing company	115	42.0
	Date	215	78.5
	Usage instruction	60	21.9
	Net weight	6	2.2
	Content	26	9.5
	No answer	56	20.4

Food safety handling of IKHs

Handling of selecting and processing food: From TABLE 10, we noted that 91.2% of IKHs usually bought canned and packaged food. Meanwhile 20.4% of IKHs didn't care of information on product label.

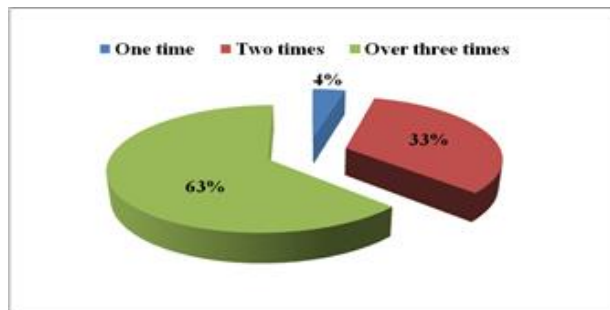


FIG. 3. Handling of vegetable washing.

From FIG. 3, there were 63% of IKHs washing vegetable in more than three times. Meanwhile, only 4% of IKHs washed vegetable in one time before cooking or eating.

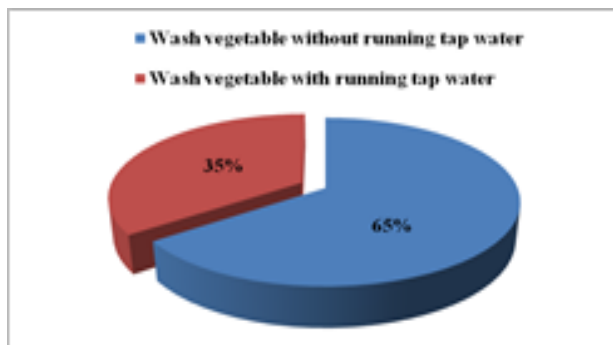


FIG. 4. Handling of vegetable washing method.

From FIG. 4, we realized that 65% of IKHs washed vegetable without running tap water and 35% of IKHs washed vegetable under running tap water.

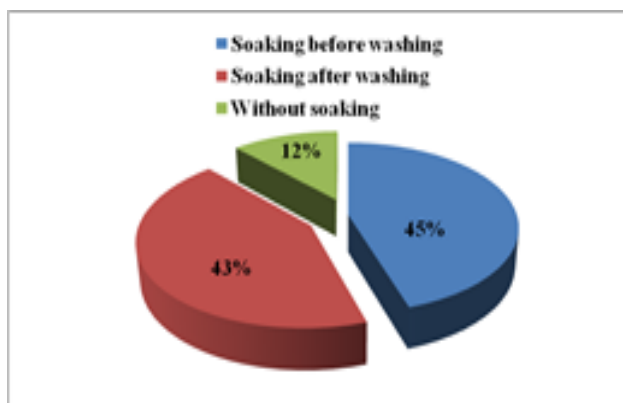


FIG. 5. Handling of vegetable soaking.

From FIG. 5, we clearly noted that 45% of IKHs having habit of soaking vegetable before washing. Meanwhile 12% of IKHs without soaking vegetable.

TABLE 11. Handling of hand wash before cooking.

Variables	Description	Frequency (n)	Percentage (%)
Washing hand before cooking (n=274)	Yes	260	94.9
	No	16	5.8
Hand wash protocol (n=274)	Wet hand	189	69.0
	Rub with soap	175	63.9
	Wash hand by clean water	255	93.1
	Dry hand by clean towel	154	56.2

From TABLE 11, we noticed there were 94.9% of IKHs having hand wash before cooking.

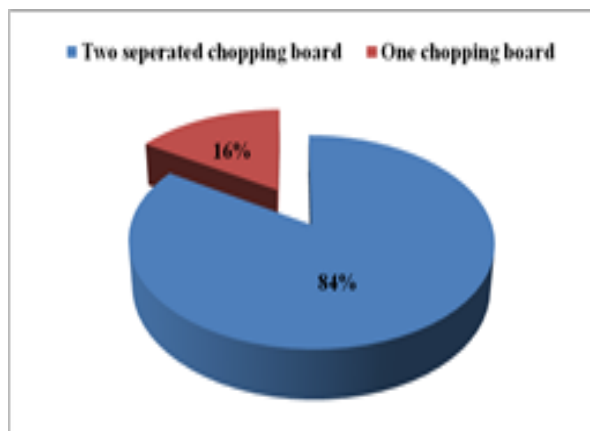


FIG. 6. Handling of the chopping board.

From FIG. 6, we saw 84% of IKHs using the separated chopping board and 16.0% of IKHs using the same chopping board.

General handling of food safety by IKHs: From FIG. 7, we noticed there were 62% of IKHs having the general handling of food safety.

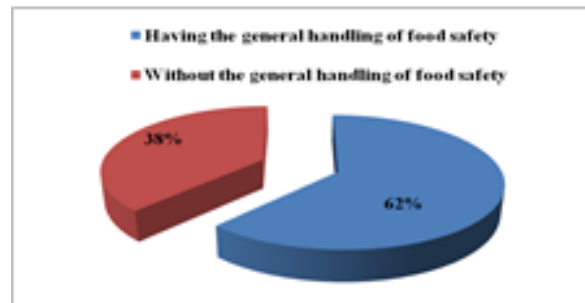


FIG. 7. General handling of food safety by IKHs.

Sanitary condition in the industrial kitchen of factory

TABLE 12. Sanitary condition in the industrial kitchen of factory.

Number	Description	Yes	
		Frequency (n)	Percentage %
1	Seperated kitchen	274	100.0
2	Table and shelf	274	100.0
3	Water tap in the kitchen	205	74.8
4	Water contained in the kitchen: Stored in the static barrel Runned from the high barrel	230	83.9
		55	20.1
5	Storing cabinet having shelf or cup	272	99.3
6	Chop stick, spoon stored in the hygiene tube	274	100.0
7	Shelf for keeping knife in dry location	274	100.0
8	Wash basin (amount): 1 2 3 Over 3	3	1.1
		75	27.4
		85	31.0
		114	43.4
9	Basket to store fruit and vegetable (amount): 2 3 Over 3	48	17.5
		79	28.8
		152	55.5
10	Scrub, washcloth	274	100
11	Soap or detergent	274	100
12	Water drainage: dry and free	271	98.9

From TABLE 12, we noticed that almost tools were met requirement. However, there were only 20.1% of the water tap derived from high barrel.

Public information about food safety

TABLE 13. **Self-confidence on food safety (n=274).**

Description	Frequency (n)	Percentage (%)
Enough	88	32.1
Not enough	106	38.7
Not clear	80	29.2

From TABLE 13, we saw that 32.1% of IKHs having enough self-confidence about the food safety.

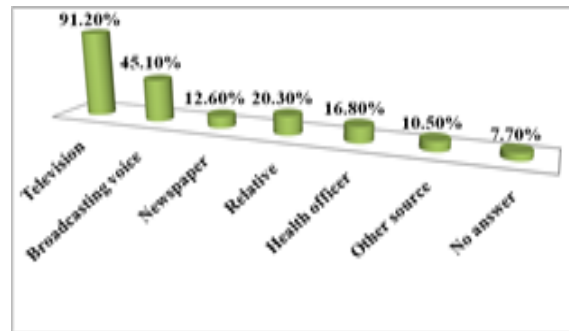


FIG. 8. **Channel of information reception.**

From FIG. 8, the IKHs received food safety information via television 91.2%; broadcasting voice 45.1%; relative relation 20.3%; other sources 10.5%. Meanwhile, there were 7.7% of IKHs without food safety information.

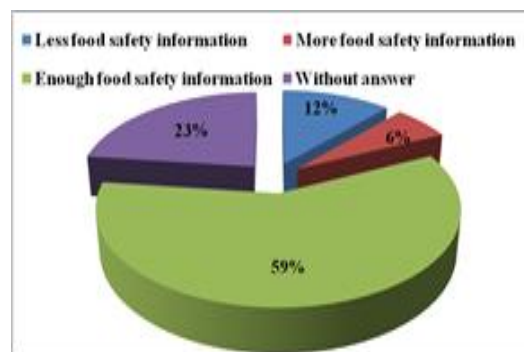


FIG. 9. **Self-evaluation of food safety information.**

From FIG. 9, there were 59% of IKHs receiving enough food safety information; 12% of IKHs receiving less food safety information; 6% of IKHs receiving more food safety information and 23% of IKHs without answer.

TABLE 14. **Benefit of food safety information reception (n=274).**

Description	Frequency (n)	Percentage (%)
Yes	247	90.1
No	5	1.8
No answer	22	8.0

From TABLE 14, up to 90.1% of IKHs believed information useful; 1.8% of IKHs believed information nonsense; 8% of IKHs was without any answer.

TABLE 15. **Information group should be advocated (n=274).**

Description	Frequency (n)	Percentage (%)
Knowledge of food selection	186	67.9
Knowledge and skill of food preservation	133	48.5
Information of contaminated food	117	42.7
Governmental regulation about food safety	15	5.5
Correct handling information during processing and preserving food	91	33.2
No answer	43	15.7

From TABLE 15, IKHs should be strengthened about food safety information. In this survey, group of food selection knowledge accounted for 67.9%; knowledge and skill of food preservation accounted for 48.5%; information of contaminated food accounted for 42.7% and the lowest percentage accounted for 5.5% belonged to governmental regulation about food safety. Moreover there were 15.7% of IKHs without any answer.

TABLE 16. **Channel of food safety information reception preferred (n=274).**

Description	Frequency (n)	Percentage (%)
Broadcasting voice	77	28.1
Speaker	19	6.9
Newspaper/ magazine	16	5.8
Television	240	87.6
Other source	20	7.3

From TABLE 16, we noticed that the most preferred channel would be television 87.6%; next was the broadcasting voice with 28.1% and the lowest one was the newspaper with 5.8%. Moreover, there were 7.3% of IKHs receiving information via other source.

Conclusion

We successfully established a research of description of handling knowledge, behavior about food safety awareness of industrial kitchen handlers. This study would be a basic demonstration for the industrial kitchen handlers as well as the Vietnamese government to propagate the importance of food safety so that public health would be enhanced.

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