

Assessment on Food Sanitation and Hygienic Practices of Food Stalls from Campus of University of Yangon

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Abstract

Food sanitation and hygienic practices of food sellers from science canteen, campus of University of Yangon (UY) and foods sold were assessed during the semester II (June to September, 2017). Three food stalls: food stall of rice and curry; food stall of breakfast foods and food stall of hot and cold drinks willingly participated in this project work. Qualities of water used and food processed were evaluated for their physical, chemical and biological constituents. Chi-square test was used to evaluate the satisfactory level of the consumers on the hygienic practices of the food stalls. No chemical contamination such as arsenic content was included in water used in the food stalls. Food borne pathogens such as *E.coli* and *Coliform* were found in the stored water and ice samples. Pathogenic bacteria such as *Samonella* and *V.cholerae* were not detected in food served. It has been observed that *E.coli*, *Coliform*, and *Staphylococcus aureus* consisted in the food sold with the acceptable limit of <10 CFU/g. Bacterial constituents were also found in Swap samples such as worker hand, cutting board and serving plate with the allowable limit of 200 CFU/cm².

Keywords: Food sanitation, Hygiene, Food-borne pathogens

I. Introduction

Food safety is an area of public health action to protect consumers from the risks of food poisoning and food borne acute or chronic illnesses. Unsafe food can lead to a range of health problems: diarrhoeal disease, viral disease, reproductive and developmental problems, and cancers. Mishandling of food plays a significant role in the occurrence of food borne illnesses. Improper food handling may be implicated in 97% of all food-borne illness associated with catering outlets (Howes et al., 1996). Food safety practices in food preparation, cooking and serving by food sellers are important to protect health risk for consumers and fitness for food consumption.

Good hygienic handling of food processing relies on the sanitation facilities in public and sanitary utilities such as running pipe potable water versus stored water in containers, availability of garbage bins, adequate washing facilities, and storage at vending units (Pokhrel and Sharm, 2016). In order to promote clean and good sanitary food service in university campus, this study focused on food sanitation and hygiene practices in the food canteen with the aspects of food safety issue, safe and potable water supply and food handling and food contamination.

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II. Materials and methods

Physical contamination and hygienic practices

Questioning 15 regular consumers (age varied from 16 to 48, mostly university students) was conducted for the presence of physical constituents such as hair fall out, dirt, some impurities in water and food sold and hygienic practices of food handlers. Chi-square test was used for the responses of the consumers on satisfactory level of the hygienic practices.

Chemical contamination of water supply

Water supply to food stalls is pipe water from a large concrete storage tank that sourced from a tube well at the university campus. Each food stall has a washing basin near the cooking area and water was stored in a large plastic container. Cleaning practice of water container was once a week and sometimes once in two weeks.

pH

pH of the water used as cooking and washing purpose was measured using a pH meter (SM 100 pH meter (Pen Type)).

Calcium hardness and alkalinity

Water kit (MD 100 Cl-Br-pH-Cys-Ta-Calcio Tablets Photometer) was used to measure hardness and alkalinity.

Arsenic content

Arsenic (As) content was measured using AAS (Atomic Absorption Spectroscopy, As-250717) at the Universities' Research Center.

Biological contamination

Swab samples such as food contact surfaces, workers' hands, and cutting boards were collected based on the procedures of Food and Agriculture Organization of the United Nations TCP/MYA/3401(D).

Aerobic plate count in workers' hands, cutting boards, serving plates and food sold

Aerobic Plate Count in workers' hands, cutting boards, plates and Food was carried out using 3 MTM PetrifilmTM plates according to AOAC 990.12.

Coliform and E.coli

Coliform and *E.coli* counts in water and food sold were determined using 3 MTM PetrifilmTM plates according to AOAC 998.08.

Salmonella

The presence of *Salmonella* was observed using 3MTM PertrifilmTM plates following the procedure of Bacteriological Analytical Manual (BAM) (2007).

Vibrio cholera

The presence of *V. cholera* was observed using 3MTM PertrifilmTM plates following the procedure of ISO 21872-1.

Staphylococcus aureus

The presence of *S. aureus* was observed using 3M™ Pertrifilm™ plate following the procedure of AOAC 2003.11.

III. Results and discussion

The responses on hygienic practices of food stalls are shown in Table 1. Chi-square test was used for goodness of fit for responses to food hygienic practices. Null hypothesis was placed as satisfactory level of all responses that exist with coherence of observed and expected satisfactory levels. The consumers of food stall of rice and curry showed their satisfactory level on hygienic practices, indicating chi-square = 13.17, df = 9, p = 0.155 where p value is greater than significance level of 0.05. On the other hand, unsatisfactory level of the consumers was pointed out to the hygienic practices of food stall of breakfast revealing chi-square = 38.27, df = 9 and p = 16E.05 where p value is less than significance level. Similarly, food stall of hot and cold drinks obtained the unsatisfactory level, showing chi-square = 40.22, df = 9 and p = 0.000 where p value is less than significance level.

Table 1. Satisfactory level on hygienic practices of food stalls

Questionnaires	Good, satisfactory (%)		
	Rice & Curry	Break -fast	Hot & Cold Drinks
(a) Do you see the food handlers with wound or bacterial contaminated cut in hand while preparing the foods?	66	66	66
(b) Do the food handlers wear sleeve shirts, maintain personal cleanliness, and cut their nails? Do the food handlers wear apron, disposable gloves and tie the hair during food cooking and preparing?	73	60	60
(c) How often do you see that the food handlers prepare and serve while coughing and flu?	93	93	100
(d) Do you find out the food contaminated with hair falls, insects and some dirt?	66	93	100
(e) Are these areas near the garbage bin or site or drainage? Are these areas contaminated with food waste and dogs or cats running around?	73	73	100
(f) Do you experience dirty serving plates, serving tables, staining plates, dirty folks and spoons?	80	40	60
(g) Are the trash bins placed near the cooking, storing, and serving areas? Are they not covered?	66	66	66
(h) Have you taken the leftover food?	86	93	100
(i) Do you have experience of finding sediments and dust in drinking water and juice?	93	80	80
(j) Do you see that repeated usage of soapy washed water for cleaning the plates? Are the plates to be washed placed near the drainage and garbage bin?	73	60	60

As shown in Table 2, the stored water of food stalls included neither arsenic nor calcium hardness. More or less alkalinity was measured in the stored water. Based on the alkalinity test on the tap water, it has been observed that alkalinity in pipe water originally consisted of 12 ± 1.41 ppm. The buffer action of alkalinity can stabilize the pH of water and total alkalinity in water can be changed by addition of fill water and application of sanitizers. Practically, alkalinity in water is preferable to neutralize water according to the sensitivity range (10-20 ppm) of U.S. EPA (Environmental Protection Agency).

Table 3 presents the bacterial constituents in water and ice used in food stalls. Contamination of fecal bacteria such as *E.coli* and *coliform* was observed with unacceptable amount. Zero counts of fecal bacteria are preferable in potable water specified by EPA. Their presence in potable water indicates that the pathogens could be in the water system. The presence of *E. coli* in potable water can be sourced from recent fecal contamination and offers a greater risk for illness. Usually, the food stalls used plastic containers that do not have drainage valve and consequently, it was difficult to clean inside and it favoured the growth of unwanted pathogens. The action of cleaning practices using chlorine must be taken urgently.

Table 2 Chemical quality of stored water used in food stalls

	pH	Calcium Hardness (ppm)	Alkalinity (ppm)	Arsenic (ppm)
Food Stall of Rice	6.37 ± 0.54	0.00	13.33 ± 2.05	0.00
Food Stall of Breakfast	6.53 ± 0.59	0.00	10.00 ± 1.41	0.00
Hot & Cold Drinks	6.4 ± 1.13	0.00	11.00 ± 1.41	0.00

Table 3 Bacteriological constituents in water and ice used in food stalls

		Bacteriological Constituents					
		<i>E.coli</i> (CFU/100 ml)			<i>Coliform</i> (CFU/100ml)		
Food Stall of Rice and Curry	Water	109	29	58	0	1	2
Food Stall of Breakfast	Water	36	90	40	0	1	0
	Ice	136	42	120	0	0	12
Hot & Cold Drinks	Water	127	80	128	0	0	0
	Ice	190	18	2	0	13	0

Bacterial contamination was also found in swab samples such as worker hand, cutting board, serving plate, teaspoon and teacup. The APC (aerobic plate count) of all the swab samples as tabulated in Table 4, pointed out under the legal limit of 200 CFU/cm² by ICMSF (International Commission on Microbiological Specification for Foods). It was observed that allowable contamination in swab samples was found however, attention should be paid to sanitation of the cooking and preparation area of the food stalls.

IV. Conclusion

This study revealed poor hygienic practices of food handlers of university campus. Knowledge of food handlers on microorganisms and their pathogenesis is found to be poor. The main customers of the food stalls of university canteen are university students, faculty and office staff. Knowledge on basic food safety practices is urgently required to the food sellers in university campus. Enforcement is required in the implementation of basic food hygienic practices such as washing hands during food preparation, serving, after using the toilet, sneezing, coughing and handling contaminated materials like exchange of money.

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