

Determination of the Significance of the Compliance to Food Safety Practices of Foodservice Restaurant in a Selected Municipality of Region II Using Statistical Analysis

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Abstract - This study was conducted to assess the level of compliance to food safety practices of foodservice restaurants in a selected Municipality of Region II result of which served as the basis for an advocacy campaign. As revealed in the study, there was a significant difference in the level of food sanitation and safety practices between the different restaurants, and significant differences were established in the level of compliance to personal hygiene and kitchen hygiene between and among the respondents. Based on the results and conclusions of the study the following were recommended as inputs for an advocacy campaign to strengthen the implementation of food sanitation and safety practices in the foodservice establishments. Effective implementation of the food safety practices campaign in terms of the different areas to be spearheaded by the Local Health Unit in order to decrease the possibility of food-related problems; Conduct of regular multisectoral consultations, symposia, and dialogues in the community to ensure awareness of restaurant owners on the programs and activities related to food safety practices; Values formation seminars that incorporate responsible food safety practices should be conducted regularly to pave the way for a more dynamic restaurant force, one in which each member will strive toward the improvement of food services and in order to start the ball rolling in the advocacy campaign, a Regional Convention on Foodservice Operations is hereby proposed.

Index Terms - Compliance, food safety practices, food service restaurant

INTRODUCTION

To assure the safety of foods, significant improvements in food technology, processing and packaging techniques, and rigorous measures are now being addressed along the entire food chain. The food processing sector may generate high-quality and safe goods by using quality management systems such as Good Manufacturing Practices (GMP), Hazard Analysis Critical Control Points (HACCP), and Quality Assurance Standards. In addition, the aforementioned systems alter quality assurance procedures at each stage of the organic phenomenon, from suppliers and transporters to wholesalers and retailers. Despite these advancements, hazardous microbes and chemicals can still occur naturally, resulting in contamination and disease if food is handled incorrectly [1]. According to the World Health Organization (WHO), foodborne illness affects 30% of the total population of developed countries each year. As a result, over 75 million individuals in the United States fall sick from food-related illnesses each year, resulting in 325,000 hospitalizations and 5,000 deaths [2]. Errors in food preparation at home, in restaurants, and in other public settings have emerged as major causes of foodborne disease in these nations [1]. Food safety is a shared responsibility of all parties involved from "farm to fork"/"farm to table," according to the European Union and the World Health Organization, and consumers should understand and follow basic pointers in purchasing, transporting, storing, preparing, and consuming food in order to maintain their individual and social group well-being [1].

Locally, statistics from Milagros Albano District Hospital, Cabagan Isabela. Table 1 showed that in the 2016 food poisoning incidence 24 confirmed cases out of 44 incidents came from eating “halo-halo”, and the most probable culprit was the canned milk used. On the other hand, the fresh mushroom used in preparing the dishes were just harvested in their backyard which could probably be the poisonous type. All the victims complained of abdominal pain and vomiting. They were admitted to the hospital.

With this scenario and incidence, the research was undertaken to design and enhance the food safety practices of foodservice restaurants in Cabagan, Isabela. This study aimed to assess the compliance to food safety practices of foodservice restaurants in a selected Municipality of Region 02. It specifically aims to determine the food safety practices adopted by foodservice crews and the level of compliance to food safety practices in kitchen hygiene. The study seeks to determine the significant difference in the level of compliance to food safety practices in kitchen hygiene between and among the respondents from the different restaurants and advocacy campaigns that can be formulated.

TABLE 1
2016 FOOD/CHEMICAL POISONING

Number of Classes	Location	Source	Age	Time and Date of Ingestion	Case
24	San Vicente, San Pablo, Isabela	Milk (Halo-Halo/ street vendors)	2-21 years old	3/12/16	Confirmed/ Alive
1	Centro, Sto. Thomas, Isabela	Insecticide (Magnum EC5)	53 years old	4/13/16	Confirmed/ alive
1	Luquilu, Cabagan, Isabela	Toilet Bowl Cleaner	20 years old	4/25/16	Confirmed/ alive
1	Guminga, San Pablo, Isabela	Drugs	34 years old	8/7/16	Confirmed/ alive
4	Tallag, Cabagan, isabela	Mushroom	8-59 years old	8/16/16	Suspected/ alive
13	San Antonio, Cabagan, isabela	Mushroom	2-57 years old	8/22/16 – 11 am	Suspected/ alive

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The study seeks to determine the significant difference in the level of compliance to food safety practices in kitchen hygiene between and among the respondents from the different restaurants and advocacy campaigns that can be formulated.

The biological process, aesthetics, and microbiological characteristics of the meal all contribute to the overall quality of the food. All three characteristics of food quality should be present and maintained through excellent food handling techniques. Appropriate food handling methods by food service staff result in a high level of food safety. Several investigations of food-handling methods in school cafeterias have found that there are some areas of concern that need to be addressed [3]. A food quality model for school foodservice operations was created and tested by Gilmore, Brown, and Dana [4]. These researchers observed reception methods, food production sanitation steps, and food-handling skills during food production in eight school kitchens in Iowa and Minnesota as part of this process. Clean clothing, short and unpolished fingernails, adequate use of utensils/gloves for handling food, cleaning of work surfaces, and thawing of foods were all sound sanitary standards. Hand washing was infrequent, hair restrictions were not worn, and jewelry was not confined to a watch and wedding band, according to the researchers. In other kitchens, they also noticed the usage of reusable towels to dry dishes and utensils. These findings are in line with later research studies' observations of food-handling practices. An FDA research [5] was done to provide baseline data on foodborne illness risk factors in retail food service operations, such as schools, hospitals, nursing homes, restaurants, and retail food shops. Employees in 15 Silicon Valley school districts were watched by Giampaoli, Cluskey, and Sneed [2]. They discovered that proper handwashing practices were frequently not followed, that the majority of employees did not wear hair restraints, and that employees were seen eating and drinking in the kitchens. Some food storage procedures were ineffective, such as storing boxes on the floor, storing raw meats above other foods, and failing to mark and date food in storage. Sanitizing issues were also noted, such as not verifying temperature/sanitizer concentrations and not mistreating sanitizing agents on food contact surfaces. According to the Centers for Disease Control and Prevention (CDC), about one-fourth of the population gets food poisoning every year. The widespread production of processed foods such as raw vegetables, fruits, and meats is a major contributor in this shifting pattern. Cross-contamination of these items with soil or animal feces might occur due to improper handling [6].

METHODS

The research made use of the descriptive survey method of research to determine the extent of compliance of the selected foodservice restaurants in the Municipality of Region 02 in terms of personal and kitchen hygiene.

The random sampling method of selecting the respondents was utilized. The main tool which was used to gather data was the survey questionnaire constructed by the researcher in combination with site observation of the food service crews of the different restaurants. On the other hand, food safety practices used Frequency count, percentage, rank, and weighted mean. Analysis of Variance was used to test for significant differences in the level of food safety practices between and among the respondents.

RESULTS AND DISCUSSION

The following presented the results of the study. It displays some tables to represent the result in tabular order.

TABLE II
FOOD SAFETY PRACTICES IN TERMS OF ATTIRE

ATTIRE	f (Yes) %	R	f (No) %	R
1. Have you worn your hair restraint	5 0%	3	5 0%	0
2. Have you worn this beforehand washing and before starting work	7 5%	1	2 5%	2
3. Have you properly worn, or did you cover the entire hair without a single strand showing?	3 7%	4. 5	6 2%	.5
4. Your work clothes with Apron and Uniform must be worn inside the kitchen.	5 6%	2	4 4%	1
5. Your apron is all light color to easily reveal the dirt.	3 7%	4. 5	6 2%	.5
6. Footwear exclusively for kitchen use only.	1 2%	9. 5	8 7%	
7. Practice wearing footwear outside the food preparation area should not be worn inside the food preparation.	6 %	1 1.5	9 4%	.5
8. Footwear is a clog shoe/closed shoes, not open-toed ones.	1 2%	9. 5	8 7%	
9. wear facial masks.	6 %	1 1.5	9 4%	.5
10. Do you observe wearing gloves.	1 9%	7. 5	8 1%	.5
11. Sanitize and change your day or whenever necessary gloves	1 9%	7. 5	8 1%	.5
12. Immediately replace the torn or soiled gloves.	2 5%	6	7 5%	

With regards to personal hygiene based on attire, results, and findings of table II showed that the top three (3) practices were those pertaining to the wearing of the personal protective clothing like hair restraint, apron, and uniform inside the kitchen, beforehand washing and starting to work. These 3 were practiced by 75%, 56%, and 50% of the respondents. On the other hand, the least practiced were wearing of facial masks; footwear worn outside the preparation area should not be worn inside the kitchen; the footwear exclusively for kitchen use and these should be clog shoes/closed shoes and not open-toed ones for safety purposes [7].

Ninety-four percent (94%) of the respondents did not wear facial masks and appropriate footwear inside the kitchen or preparation area which was a clear violation of the safety standards. Also, a high percentage (87%) did not use clogs / closed shoes.

TABLE III
FOOD SAFETY PRACTICES IN TERMS OF WORKING HABITS

WORKING HABITS	f (Yes)%	R	f (No)%	R
1. Take a bath every day.	94%	1	6%	13
2. Maintain trimmed nails.	75%	2.5	25%	11.5
3. Observe and practice proper handwashing.	69%	4.5	31%	9.5
4. (For Male) maintain short, neat haircuts.	44%	7.5	56%	6.5
5. (For Male) shave your beards and mustaches.	37%	9	62%	5
6. Practice properly covered of your wounds/cuts with a moisture-proof bandage.	25%	10	75%	4
7. Observe not wearing jewelry.	62%	6	37%	8
8. (For females) practice not wearing nail polish.	44%	7.5	56%	6.5
9. Eat and smoke inside the kitchen premises.	6%	12.5	94%	1.5
10. Use a separate bowl and spoon when tasting food.	69%	4.5	31%	9.5
11. Use your teeth for opening packages.	6%	12.5	94%	1.5
12. Practice blowing air into a plastic bag.	19.%	11	81%	3
13. Proper storage of personal belongings away from food preparation areas.	75%	2.5	25%	11.5

Table III presents the food safety practices of the respondents particularly in terms of their working habits. Findings revealed that out of indicators, five (5) were really practiced by most of the respondents (69%-94%), these practices included taking a bath every day; maintaining trimmed nails; proper storing of personal belongings away from food preparation areas, observing and practicing proper hand washing and using separate bowl and spoon when tasting food.

However, there were unsanitary and unhygienic practices when the respondents still do, that needed to be changed as follows; smoking and eating inside the kitchen premises; use of teeth for opening packages; blowing air into a plastic bag; improper covering of wounds/cuts with moisture-proof bandages [8]. Taking a bath daily is the most basic requirement among food handlers as it ensures their cleanliness. Also, trimmed nails are required for food preparation. Untrimmed nails are not only unsightly but also potential sources of contamination. Wounds and cuts must be properly covered and with a moisture-proof bandage which must be frequently changed to prevent the risk of contamination. A high standard of cleanliness must be always practiced by food handlers. Any unhygienic practice that could result in cross-contamination of food such as smoking and eating inside the kitchen should not be allowed. Eating and smoking areas must be provided outside the kitchen premises.

TABLE IV
COMPLIANCE WITH DESIGN AND CONSTRUCTION

Design and Construction	WM	Descriptive Index	Rank
1. All doors are self-closing tight-fitting and do not allow entry of insects, pests, and other animals.	2.00	Often practiced	5
2. All windows have been screened.	2.31	Often practiced	6.5
3. Separate area for storage of food and non-food ingredients.	1.81	Often practiced	1.5
4. All shelves have at least 6 inches off the floor.	2.31	Often practiced	6.5
5. The restrooms are constructed away from the food preparation area.	1.94	Often practiced	3.5
6. Handwashing facilities like soap and toilet paper as well as other facilities like trash bin with receptacles.	1.94	Often practiced	3.5
7. Flooring is tiled.	2.75	Sometimes practiced	7
8. Flooring is smooth and flat, cleanable, and light color to easily reveal dirt.	1.81	Often practiced	1.5
Sub Mean	2.11	Often practiced	

The compliance of the selected foodservice establishments to kitchen hygiene is presented in Tables IV to VIII. Table IV in terms of design and construction the restaurants often practiced seven (7) of the eight (8) indicators listed and only one, i.e., tiled flooring was sometimes practiced. Design and construction obtained a sub mean of 2.11 described as often practiced. The top practices were the provision of a separate area for storage of food and non-food ingredients; and flooring which was smooth, flat, cleanable, and light in color to easily reveal dirt to ease cleaning. However, the floorings were not tiled, not all windows had screens and not all shelves were at least 6 inches off the floor. These practices were not compliant with the standards for kitchen design and construction.

TABLE V
COMPLIANCE WITH EQUIPMENT AND UTENSILS

Equipment and Utensils	WM	Descriptive Index	Rank
1. Use stainless steel as countertop, sink, table, or shelf.	2.19	Often practiced	1.5
2. All chopping boards are classified and differentiated according to use.	2.31	Often practiced	4
3. Use a separate chopping board for meat.	2.25	Often practiced	3
4. Use the color-coding method as a way of classifying chopping boards according to use.	2.88	Sometimes practiced	5.5
5. Use food-grade acrylic blocks type of chopping boards.	2.94	Sometimes practiced	8
6. Do not use wooden boards as your type of chopping boards.	2.81	Sometimes practiced	7
7. Equipment with a removable detachable part.	2.88	Sometimes practiced	5.5
8. Use of small, clean kitchen brush for removing food particles and visible dirt.	2.19	Often practiced	1.5

Table V shows the safety practices on equipment and utensils. Out of the eight (8) survey statements on equipment and utensils, four (4) were often practiced as follows: Use of stainless steel as countertop, sink, table, or shelf; all chopping boards classified and differentiated according to use; Use of separate chopping board for meat; and use of small, clean kitchen brush for removing food particles and visible dirt. On the other hand, four (4) were sometimes practiced, i.e., Use of the color-coding method as a way of classifying chopping boards according to use; use of wooden boards as the type of chopping boards; and equipment with a removable detachable part.

In general, the respondents sometimes practiced the practices in terms of equipment and utensils. With regards to equipment and utensils, the selected establishments were only compliant with four (4) out of the eight (8) indicators. The best practices pertained to the use of stainless steel or countertop, sink, table, or shelf; and the use of a small clean kitchen brush for removing food particles and visible dirt. However, they still use wooden boards instead of food-grade acrylic block type of chopping boards.

TABLE VI
COMPLIANCE WITH SANITARY FACILITIES

Sanitary Facilities	WM	Descriptive Index	Rank
1. Exhaust fans and fume hoods installed above the stoves.	2.50	Sometimes practiced	6
2. With adequate and potable water supply?	1.19	Always practiced	1
3. Plumbing kept in good repairs through proper maintenance.	1.94	Often practiced	3
4. With proper lighting in all areas of food preparation.	1.88	Often practiced	2
5. All light bulbs shielded.	2.31	Often practiced	5
6. There is a garbage collector who regularly collects all your garbage.	2.13	Often practiced	4
7. Practice separating biodegradable waste from non-biodegradable ones in your restaurant.	2.56	Sometimes practiced	7
8. Practice 3Rs	2.69	Sometimes practiced	8
Sub Mean	2.15	Often practiced	

The sanitary facilities practices in table VI revealed that out of the eight (8) indicators only one (1) was always practiced (i.e., the presence of adequate and potable water supply); four were often practiced (Plumbing kept in good repairs through proper maintenance; proper lightning in all areas of food preparation; all light bulbs shielded and there is a garbage collector who regularly collects all the garbage) while the rest of the indicators were sometimes practiced [9]. Overall, the respondents often practice in sanitary facilities as evident with a sub mean of 2.15.

TABLE VII
SANITARY PRACTICES DURING PREPARATION AND PRODUCTION

Sanitary Practices during Preparation and Production	WM	Descriptive Index	Rank
1. Always practice the First-in, First-out (FIFO) food system.	1.94	Often practiced	15
2. Store items labeled with the name and date of preparation or purchase.	2.25	Often practiced	27
3. In cold storage, do you cover all food.	2.06	Often practiced	18.5
4. In cold storage, not practice overstocking.	2.50	Sometimes practiced	34.5
5. Discard food that exceeds beyond its expiration date.	1.75	Often practiced	4.5
6. Store vegetables and fruits above the meat items.	2.56	Sometimes practiced	36.5
7. The raw meat items stored below cooked food.	2.38	Often practiced	29.5
8. Not store in the freezer the dry goods such as flour.	2.00	Often practiced	16.5
9. Not store in the freezer the dry goods such as nuts.	2.06	Often practiced	18.5
10. In dry storage area, do not store food on floors.	1.75	Often practiced	4.5
11. Store foods on floors but on shelves as least 6 inches above the ground.	2.13	Often practiced	24.5
12. Thaw the frozen food in a refrigerator.	2.13	Often practiced	24.5
13. Wrap in a moisture-proof wrapping the meat that is to be thawed.	2.19	Often practiced	26
14. Sanitize utensils and cutting boards always.	1.56	Often practiced	1.5

15. Cook food to a temperature higher than the minimum safe internal temperature to ensure food safety.	1.88	Often practiced	9.5	foods.			
16. In cook food, do not practice overloading of ovens.	2.00	Often practiced	16.5	30. Purchase ice from a reliable service to ascertain its safety.	2.06	Often practiced	18.5
17. In cooking of food, monitor and control time and temperature.	1.88	Often practiced	9.5	31. Clean and sanitize drip pans after each use.	1.56	Often practiced	1.5
18. Use ice bath to cool liquid mixture.	2.50	Sometimes practiced	34.5	32. Not undergo any heat treatment, once food has been prepared for serving.	2.06	Often practiced	18.5
19. Practice frequent stirring to facilitate the mixing of the cold liquids with hot liquid.	2.44	Often practiced	32.5	33. Sanitize and clean the utensils used for serving before and after each task.	1.69	Often practiced	3
20. To cool the large cuts of meat, cut first into smaller portions.	1.88	Often practiced	9.5	34. Clean and sanitize the serving utensils at least once every 4 hours.	2.06	Often practiced	18.5
21. Wrap the cut pieces before store in the refrigerator.	1.81	Often practiced	7.5	35. Practice using separate utensils for each food item.	1.75	Often practiced	4.5
22. Practice store of hot foods in refrigerator?	2.75	Sometimes practiced	38	36. Use serving utensils with long handles.	2.31	Often practiced	28
23. Use ovens and microwaves too reheat the food.	2.56	Sometimes practiced	36.5	37. Use tongs or gloves to minimize contact of food with bare hands.	2.44	Often practiced	32.5
24. Reheat food in two hours.	2.81	Sometimes practiced	39	38. Practice proper hand washing in bussing of dirty	1.88	Often practiced	9.5
25. Reheat the food in small batches to reduce heating time.	2.94	Sometimes practiced	41	39. Hold the stem of glasses and cups.	1.88	Often practiced	9.5
26. Practice using of chafing dishes for reheating or cooking food.	2.38	Often practiced	29.5	40. Hold the bottom or edge of plates.	1.88	Often practiced	9.5
27. Discard food that has not been held after 4 hours.	2.88	Sometimes practiced	40	41. Use scooper to get ice.	1.81	Often practiced	
28. Not mix old food with new food or raw food with cooked.	2.06	Often practiced	18.5	Sub Mean	2.14	Often practiced	
29. Do not place directly on ice the ready-to-eat cold	2.38	Often practiced	29.5				

Table VII revealed that out of the forty-one (41) practices, there were eight (8) which were only sometimes practiced while the rest of the thirty-three (33) statements were oftentimes practiced. The grand mean of 2.14 indicated that the safety practices during preparation and production were often practiced. The best practices were noted to be those pertaining to sanitizing cutting boards, utensils, and drip pans, as well as utensils for serving before and after each use.

This was followed by discarding expired foods, not storing dry foods on the floor, and using separate utensils for each food item.

However, although considered not good practices due to economic reasons, the respondents said that they sometimes practice reheating food in small batches to reduce heating time and reheat food in two hours using ovens and microwaves.

TABLE VIII
ANOVA FOR SIGNIFICANT DIFFERENCE IN THE LEVEL OF COMPLIANCE OF THE DIFFERENT RESTAURANTS

F-value	Critical value @.05	Interpretation	Decision
24.60	1.68	Significant	Reject Ho

Table VIII shows the results of the test for significant differences between and among the respondents on the level of compliance. Results revealed that there is a significant difference in the practices done by the restaurants as evidenced by the F- ratio computed at 24.60 which was greater than the critical value of 1.68 at a 5 % level of significance resulting in the rejection of the null hypothesis.

TABLE IX
ANOVA FOR SIGNIFICANT DIFFERENCE IN LEVEL OF FOOD SAFETY AND SANITATION PRACTICES BETWEEN THE FOODSERVICE RESTAURANTS IN TERMS OF KITCHEN HYGIENE

Variable	F value computed	F value critical, 0.5%	Interpretation	Decision on Ho
Design and Construction	21.82	1.72	Highly significant	Reject
Equipment and Utensils	1.51	1.72	Not significant	Accept
Sanitary Facilities	6.00	1.72	Highly Significant	Reject
Sanitary practices during preparation & production	1.40	1.03	Significant	Reject

Table IX presented the significant difference in level of food safety and sanitation practices between the food service restaurants in terms of kitchen hygiene. Food safety is an important public health issue. The government is intensifying its efforts to improve food safety in response to the increasing number of the food safety problem and consumer concerns. Most cases of food poisoning happen in foodservice establishments and usually affect a great number of people.

Commercial foodservice establishments have been identified as the leading source of food-borne illnesses outbreaks (Bean et.al, 1996 as cited by Ang and Balonan, 2010). But foodborne illnesses could be prevented if food service workers have proper training, techniques, and tools in food management. It is the duty and responsibility of food service operations to fully understand the dangers employed in serving food. A high percentage of foods borne illnesses are caused by people preparing and handling food. Poor standards of personnel can lead to food contamination (Ang and Balonan, 2010). Based on kitchen hygiene practices, highly significant differences existed between the 16 foodservice establishments in terms of design and construction and sanitary facilities. Differences could be due to the location or size of the establishment, as well as the capitalization of the owners. It could be presumed that the higher the capitalization, the better the facilities. The same would hold true for equipment and utensils. Those establishments with more finances to spare for the design and construction and for sanitary facilities had more updated and upgraded facilities. These could probably be those who own the space and the building. On the other hand, those who had to lease the property would more likely have to spend just on the basic requirements for the limited space. However, no significant differences were noted in terms of equipment and utensils. There are standard equipment and utensils that are required for all food service establishments to follow to comply with the kitchen hygiene safety and sanitation practices. This is one of the requirements for the issuance of a business permit.

CONCLUSION AND RECOMMENDATION

Taking a bath daily and wearing hair restraints were the best personal hygiene practices by the respondents while wearing facial masks and eating and smoking inside the kitchen area were the worst personal hygiene practices. In terms of the kitchen hygiene, compliance with sanitary facilities was the best practice while compliance with equipment and facilities was not favorable; Significant differences were established in the level of compliance to personal hygiene and kitchen hygiene between and among the respondents, therefore, the null hypothesis was rejected.

Based on the findings and conclusions of the study the following recommendations were given which could serve as inputs in the formulation of an advocacy program to strengthen the implementation of food sanitation and safety practices in foodservice establishments. Effective implementation of the food safety practices campaign in terms of the different areas to be spearheaded by the Local Health Unit to decrease the possibility of food-related problems. Conduct regular multisectoral consultations, symposia, and dialogues in the community to ensure awareness of restaurant owners on the programs and activities related to food safety practices.

Values formation seminars that incorporate responsible food safety practices should be conducted regularly. Such seminars can pave the way for a more dynamic restaurant force, one in which each member will strive toward the improvement of food services. Restaurant owners and staff should be always guided by the code of professional conduct and ethical standards. Moreover, they should ensure that they must familiarize themselves with the food safety practices, and hence, initiate necessary action. Follow-up research in this area, involving many restaurant owners is also recommended. To start the ball rolling in the advocacy campaign, a Regional Convention on Foodservice Operations is hereby proposed.

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