

# Perception of Hygiene Knowledge among Staff Working in Top Five Famous Restaurants of Male'

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**Abstract**—One of the major factors which can contribute greatly to success of catering businesses is to employ food and beverage staff having sound hygiene knowledge. Individuals having sound knowledge of hygiene has a higher chance of following safe food practices in food production. One of the leading causes of food poisoning and food borne illnesses has been identified as lack of hygiene knowledge among food and beverage staff working in catering establishments and restaurants. This research aims to analyze the hygiene knowledge among food and beverage staff working in top five restaurants of Male', in relation to their age, educational background, occupation and training. The research uses quantitative and descriptive methods in data collection and in data analysis. Data was obtained through random sampling technique with self-administered survey questionnaires which was completed by 60 respondents working in 5 different restaurants operating at top level in Male'. The respondents of the research were service staff and chefs working in these restaurants. The responses to the questionnaires have been analyzed by using SPSS. The results of the research indicated that age, education level, occupation and training correlated with hygiene knowledge perception scores.

**Keywords**—Food and beverage staff, food poisoning, food production, hygiene knowledge.

## I. INTRODUCTION

OVER the past few years catering industry has expanded at an exponential rate due to factors like globalization, urbanization and changing lifestyle adaptations. With an increase in work force consisting of both males and females, eating out of home has become a convenience and time saving habit. In each catering business, hygiene has become an essential component of food production since maintaining good hygiene greatly drives their business and ensures their success and has become a part of food production that cannot be overlooked. Ensuring good hygiene from production to consumption of food has become a crucial factor in ensuring individuals public health in both developed and developing countries. Reference [1] reports that 9.4 million people suffer from food-borne diseases worldwide, where actual scale of the problem is not identified since most of the cases are not recorded properly. In USA, according to reports published by Center for Disease control, approximately 48 million people get sick, 128,000 are hospitalized and 3000 people die of food-borne diseases. In UK an estimated figure of 97% of food poisoning occur from improper hygiene practices in food production process [1].

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Food is contaminated with pathogenic micro-organisms through many routes during production of food inside kitchens, which includes fecal, oral and through hands. There are many number of reasons why food poisoning occurs. These includes consumption of food prepared under unhygienic standards, improper handling of food, improper practices of hand washing, lack of hygiene education and training, less experience in the field, time-temperature abuse in food production, improper methods of food storage and unhygienic cleaning [2].

Ensuring personal hygiene, food hygiene and equipment and kitchen hygiene during food production are very essential to ensure the safe production of food. Perhaps one of the most quintessential factors that individuals want to ensure while eating out is to know whether proper food safety and food hygienic standards have been followed in food production. The cost of food poisoning and poor hygiene can be many. The irrevocable damage it can cause to human health, the loss of working days and productivity, the closed down of catering establishments, bad publicity which can greatly damage brand image, fines and cost of legal actions and high staff turnover due to staff being unable to tolerate poor hygiene standards are all problems that can arise as a result of poor hygiene knowledge and food poisoning in catering businesses. A study conducted in USA in 2010 has shown that food borne diseases resulting from pathogenic microorganisms has cost the US economy \$152 billion annually [3].

This study is conducted to attempt to study the perception of hygiene knowledge among staff working in top 5 famous restaurants of Male'. The 5 famous restaurants of Male' was selected by going through TripAdvisor and identifying the top 10 famous and well established restaurants of Male'. Out of the 10 restaurants the restaurants which granted access was selected for this research. Following hygiene practices in personal hygiene, food hygiene, equipment and kitchen hygiene can ensure success in catering businesses. In this research an attempt will be made to find out whether good hygiene practices followed by staff working inside kitchens of 5 most famous restaurants of Male', is related to the perception of hygiene knowledge according to their age, occupation, education and training background

Research questions trying to explore whether age, occupation, educational background and training received increase knowledge of hygiene among staff working in 5 famous restaurants of Male will be explored.

A sample of 12 staff from food and beverage department of each restaurant was selected. Structured self-administered survey questionnaires consisting of questions relating to

personal hygiene, food hygiene and kitchen hygiene were formulated after reviewing relevant literature review. The data was analyzed using SPSS and relevant tables and graphs have been generated.

## II. BACKGROUND INFORMATION

The top five famous restaurants in Male' was selected for this research through TripAdvisor. The top 5 famous restaurants selected for this research are Sala Thai Restaurant, SeaHouse Restaurant, Shell Beans, Pizza Mia and Symphony Classic Restaurant.

### A. Sala Thai Restaurant

Sala Thai Restaurant was opened in 2014 and is one of the best Thai restaurants in Male' serving authentic Thai food. The restaurant produces food using fresh and healthy ingredients especially brought from Thailand. The food quality and consistency in taste remains the same since the restaurant follows strict guidelines in food production and service. The whole purpose of the restaurant is to create a wholesome and inviting meal experience to their customers. The restaurant follows ISO certified standard of Hazard Analysis Critically Control Points in their food production and service [4].

### B. SeaHouse Restaurant

SeaHouse Restaurant was opened in 2006 and has a great location with an amazing view of the sea and is situated near the airport ferry terminal of Male'. Customers enjoy a relaxing and calming dining experience while eating food ordered from mixed cuisine menu. The restaurant provides exotic food along with relaxing atmosphere and a stylish décor. Customers also get to enjoy free Wi-Fi access, breakfast, lunch and dinner buffets with entertainment from local artists and bands [5].

### C. Shell Beans

Shell Beans was opened in 2002 and since then the restaurant has opened two more restaurants in Male'. The Shell Beans restaurant selected to this research is situated in front of airport jetty number 7 in Male'. The vision of Shell Beans restaurant is to "become the market leader in Café and Restaurant Industry in the Maldives by providing exceptional customer service and a tantalizing menu". Shell Beans cater to a wide range of market segments with a mixed cuisine menu consisting of signature sandwiches, healthy cuisine and main from around the world. The food quality, taste, food consistency, foodservice and ambience create a very fulfilling meal experience to their customers. The restaurant follows ISO certified standard of Hazard Analysis Critically Control Points in their food production and service [6].

### D. Pizza Mia

Pizza Mia was opened in 2014 and since then had been an instant success delivering exotic and authentic pizzas' in different flavor and styles. Within a period of 2 years to restaurant opening the restaurant has been selected among the best 10 restaurants of Male' by the TripAdvisor. With an

efficient and fast customer service and tasty and appealing food the restaurant is greatly admired by many people looking for a quick bite in a fast paced life. The restaurant follows ISO certified standard of Hazard Analysis Critically Control Points in their food production and service [7].

### E. Symphony Classic Restaurant

Symphony Classic restaurant was opened in 1982, and was among the few restaurants that were opened during that time. Symphony Classic restaurant boasts a very contemporary interior with cozy and comfortable setting. It is one of the leading casual dining restaurant in Male', renowned for its exquisite food and highly standardized service quality. Perhaps the most noticeable factor of the restaurant is the consistency of the food in terms of taste and quality, backed up with customized service delivery. The secret to their success in developing a restaurant brand is the highly talented and skilled chefs that work to create extraordinary meals and highly trained service staff that work together to create value in the whole meal experience. The restaurant caters an a'la carte menu to their customers [8].

## III. PROBLEM STATEMENT

Over the years in the capital city of Maldives, Male', catering businesses has expanded at very high rate. Catering establishments open with different concepts and images and food products. Among the numerous catering establishments very few run the businesses successfully. This research has chosen 5 famous restaurants in Male' to assess whether the perception of hygiene knowledge relates to their age, occupation, education and training. Acquiring sound hygiene knowledge and maintaining good hygiene practices can contribute greatly to the overall success of catering businesses [3].

## IV. AIM OF THE RESEARCH

The aim of this research is to study how the staff working in food and beverage department of chosen 5 famous restaurant of Male' perceives hygiene in relation to their age, occupation, educational background and training received.

## V. OBJECTIVE OF THE RESEARCH

- Analyze the level of hygiene knowledge among staff of food and beverage working in chosen 5 famous restaurants of Male'.
- Identify and explore the relationship that exists between hygiene knowledge in relation to age, educational background, occupation and training.
- Propose an analysis of hygiene knowledge and how food hygiene is perceived by the food and beverage staff working in chosen top 5 famous restaurants of Male' in relation to their age, educational background, occupation and training.
- Explain the importance of proper food hygiene in food production.

## VI. LITERATURE REVIEW

Hygiene inside the kitchen can be divided into personal hygiene, food hygiene and equipment and kitchen hygiene. Perhaps the most common source of food contamination is food handlers. Reference [9] reports that a study conducted in USA showed that 97% of food borne illnesses resulted from improper handling of food in catering organizations. Reference [9] also posits that in a study that evaluated the hand cleanliness of food handlers a considerable amount of bacteria was found in bare hands of 184 food handlers. Hence food handlers are required to give special attention to their personal hygiene. As explained above human beings are carriers of pathogenic bacteria and can easily transfer harmful bacteria into food. The hands of the food handlers are most of the time in contact with food and food handlers must frequently wash their hands in food preparation process. Proper hand washing techniques using hot water and liquid soap in basins must be used in hand washing after using the toilet, before and after work, after handling raw meat, poultry, vegetables and fruits, after discarding waste food and refuse, after coughing, smoking eating and combing hair. Hand washing is required to be carried out in wash basins specially designed for hand washing and not in sinks or basins used for food items. The nails of food handlers are required to be kept short and clean and hands are required to be dried with disposable paper towels. Similar to the use of light colored protective uniforms, covering the hair with a hairnet and avoidance of wearing jewelry must be adhered by food handlers in order to prevent food contamination. All septic cuts and boils must be covered with a colored water proof dressing to prevent physical contamination of food. All food handlers who are ill with symptoms of food poisoning and other diseases must report illness to the supervisor. This will prevent the disease from spreading to other food handlers and food items [10]. Reference [1] recognizes the worst habits the food handlers have inside the kitchen as tasting or touching food with bare hands, touching the nose and mouth, scratching the acne and head, avoiding washing hands after touching nose or mouth, washing food preparation items in hand wash basins and etc.

Reference [11] defines food hygiene as a process comprising of measures taken to ensure the safety and freshness of food from preparation to the end consumer. Food hygiene consists of many steps taken to ensure the safety of food. These steps involve eliminating contaminated food, washing food items thoroughly to remove harmful contaminants, effective cleaning of equipment and food premises, ensuring high standards of personal hygiene, preventing food spoilage and risk of food poisoning and using correct form of cooking techniques to eliminate bacteria from food. With urbanization, globalization and increase in workforce with more females and males in jobs, the habit of eating out has become a norm in order to save time. It is estimated that people working buy at least one meal from outside their home whether it's a whole meal or just a snack like a sandwich [1].

Food poisoning is an illness where the symptoms of

vomiting, diarrhea, nausea, and headache usually present suddenly after consuming harmful food containing disease causing or pathogenic bacteria. The micro-organism which causes disease is known as pathogenic bacteria and can be divided into three types. They are the disease causing or pathogenic bacteria and spoilage bacteria. Reference [12] identifies four basic requirements for bacterial growth, namely temperature, food moisture and time. In favorable conditions of food moisture and time pathogenic bacteria can multiply through binary fission producing 1000 in numbers within 20 minutes [13]. The most common types of bacteria that causes food poisoning is identified as Salmonella, Clostridium Perfringens, Staphylococcus Aureus, Bacillus Cereus and Clostridium Botulinum where the severity of the illness can differ from one type to another. For example, Clostridium Botulinum resulting from consumption of canned food items gone bad or ingesting undercooked or raw sea food can be lethal. On the other hand, although severe symptoms of diarrhea, vomiting, nausea, fatigue, headache, gastrointestinal burn can occur in food poisoning related to bacteria Salmonella it can be treated if quick medical intervention is sought out.

Raw meat, food handlers, animals and dust can cross contaminate food by transferring bacteria from a contaminated food source to an uncontaminated food source. Cross contamination of food can occur from hands of a food handler, droplets of liquid from sneezing and coughing, kitchen equipment's and drops of liquid from raw meat and other food items. High risk food such as eggs, milk, raw meat and poultry, seafood and allergen food items like flour and all types of nuts must be prevented from cross contamination to prevent food poisoning. The contamination of food can be avoided by separating raw food items from ready to eat food items at all stages of food preparation, during storage and distribution. The liquid from high risk foods such as meat items should be stored and handled in a way that the liquid from the meat does not come into contact with high risk foods or ready to eat foods. For example, this can be achieved by storing meat and meat products at the bottom of the freezer and using red color cutting boards for meat products. At the same time control of pests using pesticides, using correct hand wash techniques, correct cleaning procedures will greatly reduce the risk of food contamination inside kitchens. The bacteria in food can be stopped from growing inside the food by applying correct temperatures in storage [13]. According to research carried out in Turkey, the knowledge of food safety in relation to what has been explained above has been low and training helped the staff to increase their knowledge on food hygiene [3].

One of the most important ways to prevent food poisoning is through temperature control. This can be achieved by applying correct temperatures in food preparation to chilling, freezing, thawing, cooking and reheating food in food processes. For example, all the food items in chiller must be kept below 5 degree Celsius, and thawing foods must never be kept near a heat source and must be defrosted thoroughly by keeping food items like chicken and turkey in the chiller for

one day. Alternatively, defrosting can be done by keeping poultry items under running water in sinks. Cooking food items must be cooked to temperatures above 70 °C. The temperature of cooked foods like large minced meat dishes where the bacteria at the surface is rolled and distributed to the center of the meat must be checked with a thermometer to ensure that it is cooked thoroughly. Research carried by [3], has identified that cross-contamination of food, personal hygiene and mishandling of food temperatures in food preparation processes as the common mistakes made by food handlers in the cooking process that can result in food poisoning. Similarly, the study of [14] also has similar results which posit that food handler's lack of temperature control knowledge in food production can increase the risk of food poisoning.

Equipment and kitchen hygiene involves cleaning all the premises, work tables, work surfaces and equipment's, storage rooms, walls, doors and ceilings on a regular basis inside the kitchen in order to prevent bacterial contamination of food through dust and refuse. One of the bacteria that thrive in dust *Listeria Monocytogens* which when transferred to food can cause food poisoning. Hence it is imperative to ensure that Cleaning schedules be made regularly where cleaning is required to be followed and supervised. All plates, utensils, knives, chopping boards, machines used in food productions, kitchen premises and floor must be cleaned regularly. Reference [1] also reports that many food handlers in catering establishments do not wash knives and cutting boards after cutting raw meat before using them again. It is recommended to use cleaning materials like detergents, disinfectants and hot water in the cleaning process. Waste must be removed regularly without letting it over flow. Reference [9] also identifies a study conducted in Iowa, which assessed the microbiological quality of food contact surfaces to explore the effectiveness of cleaning and sanitation. The study showed that there was a high chance of harboring pathogenic bacteria on the food contact surfaces since the cleaning and sanitation was not as effective as it should be. Similarly, [9] also states that more than 39% of cross contamination occurs from using sponges and towels which are not cleaned thoroughly.

As explained above the cost of food poisoning can be many folds. The number one concern in food poisoning is the harmful effects it causes on individuals' health. In UK an outbreak of salmonella resulted in 766 cases of food poisoning with 2 deaths. Consequently, there is an estimated amount of 144,000 cases of food poisoning associated with the bacteria *Clostridium perfringens* in UK out of which most of the cases go unreported annually. Similarly, [11] reports a total number of 8 cases of lethal food poisoning caused by the bacteria *Clostridium Botulinum* in Italy in 1998. Likewise, there were a total number of 6 cases of infant botulism in UK in 2002. A typical outbreak of food poisoning occurred in Texas, associated with the bacteria *Staphylococcus Aureus* found in food, where a staggering number of 1364 school attending children were affected.

There are many number of factors related to the perception of hygiene among food handlers. Research done by [9] has

found that the amount of bacteria found in the hands of inexperienced food handlers to be more than experienced food handlers. This correlation is further stressed by the findings of [3] has concluded that food handlers hygiene knowledge increase with age as number of experience of years in the field increases. Furthermore, [1] has found that food handlers who have received training has a higher perception of hygiene knowledge and also states that food handlers who come from better socio-economic background and who are well educated have a higher hygiene knowledge.

If food handlers have insufficient knowledge about hygiene inside the kitchen it can be detrimental to individuals consuming the food and for the overall image and business of catering organizations. If proper food handling, food storage procedures, personal hygiene and equipment hygiene is not followed there will be huge chance of causing food borne illnesses or food poisoning to consumers. Maintaining high standards of hygiene inside the kitchen needs to be proactive, controlled, supervised and supplemented with continuous training for staff from the managers in order to succeed.

## VII. HYPOTHESIS

The hypothesis of this research is to assess whether the hygiene knowledge of F&B staff in selected 5 catering organizations increase in relation to their age, occupation, educational background and training.

## VIII. METHODOLOGY

### A. Research Design

For the purpose of this research descriptive and explanatory design of research is used. This research is conducted through data collection on perception of Hygiene by F&B staff of selected 5 famous restaurant of Male', and by analyzing the data and describing it according to current practice by using descriptive design of research. At the same time, the information gathered from descriptive design of the research, will be used to establish relationships that exists between perceived hygiene knowledge by staff and how it relates to their age, gender, educational background and experience [15].

### B. Population and Sampling

The population used for this research is the staff working in selected 5 famous restaurants of Male', namely SeaHouse, Sala Thai, Shell Beans, Pizza Mia and Symphony. Total of 12 respondents from food and beverage department from each restaurant was selected. Likely response rate for the questionnaires will be assessed by looking into similar surveys that has been done before and drawing an estimation of likely response rate [15].

The research has used simple random sampling technique in data collection. This was achieved by providing questionnaires to each staff of the selected sample, without rather than focusing on one type of staff working in the kitchen. The questionnaires will be distributed randomly to staff working in selected top 5 famous restaurants of Male' so that the sample



is not biased. This will be done by dividing the questionnaires to 2 parts of 12 questionnaires to kitchen production chefs and 12 questionnaires to waiters.

### *C. Data Collection Methods*

Since this research will use a descriptive and explanatory design, the research delivery and collection survey questionnaires were used [15]. In order to identify the perception of hygiene knowledge a total number of 60 questions will be assessed. The research will use close-ended rating statements in the Likert-style rating, containing different answers from which the respondents can answer. As [15] explains, close ended questions have many benefits such as generating a fast response from the respondents with ease and it is easy to analyze since the responses are predetermined in the questionnaire. Every even question in the questionnaire has a negative answer of very much disagree and odd question has a positive answer of very much agree. The questions will be coded with actual numbers ranging from 5-4, where 5 interprets very much agree, 4 interprets Agree, 3 interprets neutral, 2 interprets disagree and 1 interprets very much disagree for each question having a positive answer. These questions are identified as odd numbered questions. For questions having negative answers the questions are coded as 5 for very much disagree, 4 for disagree, 3 for neutral, 2 for agree and 1 for very much agree. These questions are identified as even numbered questions. This reverse coding is used so that it will be easy to generate answers from SPSS.

Each questionnaire has an informed consent form attached. The questions are adopted according to the suggestion of [15] where respondents are given the choice of both negative and positive statements from which they can choose to tick after careful consideration. The questionnaires contain a demographic section of age, occupation, educational background and training. The first 14 questions are relating to personal hygiene, the second 14 questions relate to food hygiene and the remaining 15 questions relate to equipment and kitchen hygiene. The questions used are adopted from literature review and from sample survey questionnaires which are available online.

### *D. Mechanisms to Ensure Quality of Study*

The questionnaire used for the research was pilot tested with 4 people due to time limitations, before it was distributed to the respondents. Pilot testing was conducted with friends to check the questionnaires face validity [16]. Necessary amendments to the questionnaires were made after pilot testing to refine the questionnaire.

To ensure internal validity of the research the questions was administered to the responds by directly delivering and collecting the questionnaires to the respondents. Confidentiality and the voluntary nature of the research were explained while distributing the questionnaire. The answered questionnaires had a Cronbach's alpha value at 0.9 value, which shows the internal consistency of the values in questionnaires.

### *E. Time Frame for the Research and Limitations*

The questionnaires were distributed over a period of 1 week. The estimated time to conduct this research was 1 and 1/2 months. Time was a huge limitation in the research because the research was completed in a very tight work schedule

### *F. Data Analysis Methods*

Questionnaire responses were analyzed using computer software program of Statistical Package for Service Solution (SPSS). One-way ANOVA was used to analyze hygiene knowledge against the variables of age, occupation, education and training. The P value or significance value is set at 0.05 to test the hypothesis. One-way ANOVA provides a detailed descriptive of total number of staff employed marked as "n" each categorical variable, mean total of results, standard deviations of mean within groups and standard error, a lower and upper bound of 95% confidence interval in which the mean score can occur. In the one-way ANOVA analysis the P value, written as "sig" is given which is used to identify the statistical significance level of each testing variables. If the P value is higher than 0.005 it is concluded that there is no statistical significance in the mean difference of the result, hence post hoc analysis will not be done. However, if P value is less than 0.005 it is concluded that there is difference in statistical significance in the mean differences of the results and post hoc tests will be carried to identify the mean differences within groups.

While analyzing the total value for hygiene knowledge it was assumed that a total mean value of hygiene knowledge falling in between values of 1-26 in results is a low score, 27-53 is a medium score and 54-85 is a high score. The mean average of hygiene knowledge scores was obtained by adding up the score of personal hygiene, food hygiene and kitchen hygiene knowledge and dividing it by three.

## IX. RESULTS AND FINDINGS

### *A. Participant's Characteristics of Sala Thai Restaurant*

Demographic information of Food and beverage staff working in Sala Thai Restaurant is shown in Table I. About 17% fall into 20-30 years of age category and 33% fall into 31-40 years of age category and 50% fall into 41+ age category. There are 50% chefs and 50% waiters working in the restaurant out of which 50% are trained and 50% are untrained.

### *B. Age Based Data Analysis for Staff of Sala Thai Restaurant*

Age based analysis showed no significant difference in the statistics within the age groups with the results being  $P=0.39$  within groups for personal hygiene knowledge,  $P=0.08$  for kitchen hygiene knowledge. However, a significant difference in statistics is evident from the food hygiene knowledge with a  $P=0.01$  value. The highest mean score in personal hygiene, food hygiene and kitchen hygiene was obtained by the 41+ years of age category with mean values of 65.5, 67.7 and 75.1 respectively. On the other hand, 20-30 years of age category

has mean scores of 31.6, 33.3 and 36 for personal hygiene, food hygiene and kitchen hygiene. The age category of 31-40 years scored mean values of 43 in personal hygiene, 45 in food hygiene and 47 from kitchen hygiene.

The results of perception of hygiene knowledge in relation to age based analysis are shown in Tables II and III.

The highest mean average in hygiene knowledge was obtained by 41+ year's age category with a mean value of 69. The second highest mean average in hygiene knowledge was scored by 31-40 years age category with a mean average value of 48 and the lowest mean average for hygiene knowledge was obtained by 20-30 years category with a mean average value of 33. The results suggest that within the age groups of 31-40 years age category and 41+ years age category the hygiene knowledge is high while 20-30 years age category has medium knowledge in hygiene.

#### *C. Occupation Based Data Analysis for Staff of Sala Thai Restaurant*

Analysis of the hygiene perceptions of participants in relation to occupation status was found to be statistically insignificant within the groups with a P value of  $P=0.194$  for personal hygiene knowledge,  $P=0.421$  for food hygiene knowledge and  $P=0.566$  for kitchen hygiene knowledge. The chef's category in the occupation variable scored the highest marks with a mean average of 61.8 for personal hygiene, 57.8 for food hygiene and 62.3 for kitchen hygiene. The waiters scored 46.3 in personal hygiene, 49.3 in food hygiene and 54.5 in kitchen hygiene. The total mean value for hygiene knowledge for chefs was 61 and for waiters the total mean score for hygiene knowledge was 50. The results of perception of hygiene knowledge in relation to occupation is shown in Table IV (descriptives) and Table V (one-way ANOVA) in the Appendices.

#### *D. Education Based Data Analysis for Staff of Sala Thai Restaurant*

In the education category there is no statistical difference in scores in hygiene knowledge with  $P=0.209$  for personal hygiene category,  $P=0.048$  for food hygiene knowledge and  $P=0.44$  for kitchen hygiene knowledge. Among the education groups the highest result of mean values is obtained by graduates with 70 for personal hygiene knowledge, 70 for food hygiene knowledge and 80 for kitchen hygiene knowledge. The second highest score of mean values are obtained by high school leavers with 63.6 for personal hygiene knowledge, 65.3 for food hygiene and 73.3 for kitchen hygiene knowledge. The secondary school leavers achieved mean score values of 45.4 for personal hygiene, 43.8 for food hygiene and 45.85 for kitchen hygiene knowledge. Among the individuals the highest mean average score for hygiene knowledge is obtained by the graduates with a total value of 73.3, followed by high school leavers with a mean average value of 67 and for secondary school leavers with a mean average value of 45. The results of perception of hygiene knowledge in relation to education are shown in Tables VI and VII.

#### *E. Data Analysis of Training for Staff of Sala Thai Restaurant*

In the training category, there is a significance difference in scores within the groups with  $P=0.051$  for personal hygiene category,  $P=0.000$  for food hygiene category and 0.01 for kitchen hygiene category. Trained staff had a mean score of 63, 66 and 73 for personal hygiene, food hygiene and kitchen hygiene. On the other hand, untrained staff had mean score values of 41 for personal hygiene knowledge, 36 for food hygiene and 38 for kitchen hygiene knowledge. The total mean average score for hygiene knowledge of trained staff was 67.3 and for untrained staff the average mean score of hygiene knowledge was 38.3. The results of perception of hygiene knowledge in relation to training are shown in Tables VIII and IX.

#### *F. Participant's Characteristics of SeaHouse Restaurant*

Demographic information of food and beverage staff working in SeaHouse restaurant is shown in Table X. About 33% fall into 20-30 age category, while 25% fall into 30-40 age category and 42 % fall into 41+ age group. There are 58% chefs and 42% are waiters. Total 83% of staffs are trained while 17% are untrained. There are 8% primary school leavers, 33% secondary school leavers, 42% high school leavers and 17% graduates.

#### *G. Age Based Data Analysis for Staff of SeaHouse Restaurant*

Age based analysis showed no significant difference in the statistics within the age groups with  $P=0.021$  for personal hygiene,  $P=0.012$  for food hygiene and  $P=0.025$  for kitchen hygiene knowledge. The highest mean score values were achieved by 41+ age category with a mean value of 70 for personal hygiene, 70 for food hygiene and 80 for kitchen hygiene knowledge. The second highest mean score values for hygiene knowledge was obtained by 20-30 years of age category with a mean score of 55 for personal hygiene, 56.7 for food hygiene and 64.25 for kitchen hygiene. The lowest mean value for hygiene knowledge was obtained by 31-40 years of age category with 50 for personal hygiene, 51 for food hygiene and 54 for kitchen hygiene. The highest average mean score for hygiene knowledge was 73.3 in 41+ age category, followed by 58.6 in 20-30 year's age category. The 31-40 years age category had the lowest average mean score in hygiene knowledge with a value of 40. The results of perception of hygiene knowledge in relation to age based analysis is shown in Tables XI and XII.

#### *H. Occupation Based Data Analysis for Staff of SeaHouse Restaurant*

Analysis of the hygiene perceptions of participants in relation to occupation was found to be statistically significant for personal hygiene knowledge and food hygiene knowledge with  $P=0.04$  and  $P=0.03$  respectively. Among the participants, statistic was found to be insignificant for kitchen hygiene knowledge component with  $P=0.08$  value. The highest mean value score for hygiene knowledge was achieved by chefs, with means values of 67.2 for personal hygiene, 67.5 for food

hygiene and 77 for kitchen hygiene. The waiters achieved comparatively low score in hygiene knowledge with mean values of 50 for personal hygiene, 51 for food hygiene and 56 for kitchen hygiene. The average mean scores in hygiene knowledge for chefs was 70.5 and 52.3 for waiters. The results of perception of hygiene knowledge in relation to occupation is shown in Tables XIII and XIV.

#### *I. Education Based Data Analysis for Staff of SeaHouse Restaurant*

In the education category there is no statistical difference in scores in hygiene knowledge with  $P=0.148$  for personal hygiene,  $P=0.110$  for food hygiene and  $P=0.203$  for kitchen hygiene category. The graduates scored the highest mean values for hygiene knowledge with mean values of 68 for personal hygiene, 65 for food hygiene and 107 for kitchen hygiene. The second highest mean value for hygiene knowledge was obtained by high school leavers with 62.4 mean value in personal hygiene, 59.4 mean value in food hygiene and 97.6 mean value in kitchen hygiene. The secondary school leavers scored mean score values of 57 for personal hygiene, 51 for food hygiene, 91.3 for kitchen hygiene knowledge. The lowest mean scores were obtained by primary school leavers with scores of 31.5 for personal hygiene, 25 for food hygiene and 64.5 for kitchen hygiene. The average mean scores for hygiene knowledge achieved among the educational groups are average mean value of 80 for graduates, 73.1 for high school leavers, 66.4 for secondary school leavers and 40.3 for primary school leavers. The results of perception of hygiene knowledge in relation to education are shown in Tables XV and XVI.

#### *J. Data Analysis of Training for Staff of SeaHouse Restaurant*

In the training category, there is a significance difference in scores for hygiene knowledge within the personal hygiene group with  $P=0.04$ . However, the statistics is insignificant for food hygiene knowledge and kitchen hygiene knowledge with  $P=0.045$  for food hygiene and  $P=0.018$  for kitchen hygiene. Trained staff had a mean score value of 63 in personal hygiene category, 63.5 value for food hygiene knowledge and a mean value of 72 for kitchen hygiene knowledge category. Untrained staff achieved a mean score value of 41 for personal hygiene knowledge, 47.5 for food hygiene knowledge and 47 for kitchen hygiene knowledge. The highest mean average score of hygiene knowledge was obtained by trained staff with a value of 66.1 and untrained staff achieved an average mean value of 45. The results of perception of hygiene knowledge in relation to training are shown in Tables XVII and XVIII.

#### *K. Participant's Characteristics of Shell Beans*

The demographic information of staff working in Shell Beans Restaurant is shown in Table XIX. About 50% fall into 20-30 age group, while 33% fall into 30-40 age group and 17% fall into 41+ age category. Among the staff 67% are chefs and 33% are waiters. In education category 50% are secondary school leavers while 8% are high school leavers and 42% are graduates. A total number of 75% are trained while

25% are untrained.

#### *L. Age Based Data Analysis for Staff of Shell Beans*

Among the age category no significant difference in the statistics was shown with  $P=0.354$  for personal hygiene,  $P=0.624$  for food hygiene and  $P=0.246$  for kitchen hygiene knowledge. The highest mean score values were obtained by 41+ age group with mean values of 67 in personal hygiene, 81 in food hygiene and 105 in kitchen hygiene. The second highest mean score values in hygiene knowledge was achieved by 31-40 age group with values of 64.25 in personal hygiene, 69.25 in food hygiene and 86.25 score in kitchen hygiene. The lowest mean score values were achieved by 20-30 age category with mean values of 52 for personal hygiene, 66.5 for food hygiene and 82.8 for kitchen hygiene knowledge. The highest average mean score in hygiene knowledge was obtained by 41+ age groups with a value of 84. The second highest average mean score in hygiene knowledge was obtained by 31-40 age groups with a value of 73.25. The age group of 20-30 categories had the lowest average mean score in hygiene knowledge with a value of 67. The results of perception of hygiene knowledge in relation to age are shown in Tables XX and XXI.

#### *M. Occupation Based Data Analysis for Staff of Shell Beans*

Analysis of hygiene perceptions in relation to occupation was found to be statistically insignificant with  $P=0.028$  value for personal hygiene knowledge,  $P=0.179$  for food hygiene knowledge and  $P=0.133$  for kitchen hygiene knowledge. The score achieved of hygiene knowledge was seen to be higher in chefs with mean score values of 65.1 in personal hygiene, 74.6 in food hygiene and 92.6 in kitchen hygiene. The waiters mean score values were found to be 45.5 for personal hygiene, 60.25 for food hygiene and 77.7 for kitchen hygiene knowledge. The highest average mean score in hygiene knowledge was obtained by chefs with a value of 77.4 and the waiters had an average mean score of 61.15. The results of perception of hygiene knowledge in relation to occupation are shown in Tables XXII and XXIII.

#### *N. Education Based Data Analysis for Staff of Shell Beans*

In the education category there is no statistical difference in scores in hygiene knowledge with  $P=0.341$  for personal hygiene,  $P=0.180$  for food hygiene and  $P=0.285$  for kitchen hygiene knowledge. Overall the graduates scored the highest mean value in hygiene knowledge with scores of 65.4 in personal hygiene, 79 in food hygiene and 96.6 in kitchen hygiene. The second highest mean scores in hygiene knowledge was achieved by high school leavers with values of 65 in personal hygiene, 79 in food hygiene and 93 in kitchen hygiene. Comparatively lower score in mean values of hygiene knowledge was obtained by secondary school leavers, with mean score values of 51.8 in personal hygiene, 60.6 in food hygiene and 80.1 in kitchen hygiene knowledge respectively. The highest average mean score was achieved by graduates with a value of 80.3 in hygiene knowledge. The second highest average mean score in hygiene knowledge is obtained by high school leavers and the lowest average mean score is



achieved by secondary school leavers with a value of 64. The results of perception of hygiene in relation to education are shown in Tables XXIV and XXV.

#### *O. Data Analysis of Training for Staff of Shell beans*

Training category shows that there is a significance difference in scores for hygiene knowledge between trained and untrained staff with  $P=0.001$  for personal hygiene,  $P=0.000$  for food hygiene and  $P=0.000$  for kitchen hygiene knowledge. Those staff that received training had high mean score values in hygiene knowledge with values of 65.4 in personal hygiene, 79.2 in food hygiene and 96.1 in kitchen hygiene knowledge. The untrained staff had considerably low mean score values of hygiene knowledge with values of 38 in personal hygiene, 41.6 in food hygiene and 62.3 in kitchen hygiene knowledge. The trained staff had an average mean score value of hygiene knowledge of 80.2, while the untrained staff achieved an average mean score value of 47.3 in hygiene knowledge. The results of perception of hygiene in relation to training are shown in Tables XXVI and XXVII.

#### *P. Participant's Characteristics of Pizza Mia*

The demographic information of staff working in Pizza Mia restaurant is shown in Table XXVIII. In Pizza Mia 25% of staff come under 20-30 age group, while 33% comes under 31-40 age category and 42% comes under 41+ age category. Among the staff 58% are chefs and 42 % are waiters. There are 17% of primary school leavers and secondary school leavers working in the restaurant. Similarly, there are 33% of high school leavers and graduates working the Pizza Mia restaurant. Among the staff 58% are trained while 42% are untrained.

#### *Q. Age Based Data Analysis for Staff of Pizza Mia*

There is a significant difference in the scores of hygiene knowledge within the groups in age based analysis with values of  $P=0.005$  for personal hygiene,  $P=0.000$  for food hygiene and  $P=0.000$  for kitchen hygiene knowledge. The age group of 41+ obtained the highest mean score values in hygiene knowledge with values of 45 in personal hygiene, 42 in food hygiene and 48.3 in kitchen hygiene knowledge. The age group p of 31-40 achieved the second highest mean score values in hygiene knowledge with scores of 32.2 in personal hygiene, 28.2 in food hygiene and 29.5 in kitchen hygiene knowledge. The lowest score in mean values of hygiene knowledge was achieved by the age group of 20-30 years with values of 22.6 in personal hygiene, 14 in food hygiene and 20 in kitchen hygiene knowledge. The highest average mean score was obtained by 41+ age category with a value of 45.1. The second highest results in average mean score of hygiene knowledge was obtained by 31-40 age categories with a value of 30. The lowest average mean score was achieved by the age group of 20-30 years with a value of 18.86. The results of perception of hygiene knowledge in relation to age are shown in Tables XXIX and XXX.

#### *R. Occupation Based Data Analysis for Staff of Pizza Mia*

Occupation based analysis of hygiene perceptions of

participants was found to be statistically insignificant with  $P=0.178$  for personal hygiene,  $P=0.136$  for food hygiene and 0.146 for kitchen hygiene knowledge. When comparing chefs and waiters the highest mean score values of hygiene knowledge was achieved by chefs with values of 54.42 for personal hygiene, 52.14 for food hygiene and 59.42 for kitchen hygiene knowledge. Waiters had a mean score values of hygiene knowledge of 33.2 in personal hygiene, 28 in food hygiene and 32.8 in kitchen hygiene knowledge. The chefs achieved a higher result in average mean score of hygiene knowledge with a value of 55.3 and waiters had an average mean score value of 31.3. The results of perception of hygiene in relations of occupation is shown in Tables XXXI and XXXII.

#### *S. Education Based Data Analysis for Staff of Pizza Mia*

In the education category there is no statistical significance in scores in hygiene knowledge within the groups with  $P=0.025$  for personal hygiene,  $P=0.021$  for food hygiene and  $P=0.043$  for kitchen hygiene knowledge. The lowest mean score values in hygiene knowledge were obtained by the primary school leavers with values of 14 in personal hygiene, 14 in food hygiene and 16 in kitchen hygiene knowledge. The highest mean score values in hygiene knowledge were obtained by graduates with values of 66.5 for personal hygiene, 70 for food hygiene and 76 for kitchen hygiene knowledge. The second highest results in mean score values of hygiene knowledge were obtained by high school leavers with values of 46.2 in personal hygiene, 45.7 in food hygiene and 49.5 in kitchen hygiene knowledge. The secondary school leavers scored the third highest results in mean score in hygiene knowledge with values of 27 in personal hygiene, 14 in food hygiene and 23 in kitchen hygiene. The highest average mean score for hygiene knowledge was obtained by graduates with a value of 70.8. The high school leavers had the second highest average mean scores in hygiene knowledge with a value of 47. The secondary school leavers had an average mean score value for hygiene knowledge of 21 while the primary school leavers scored 14.6 in average mean score value of hygiene knowledge. The results of perception of hygiene in relation to education are shown in Tables XXXIII and XXXIV.

#### *T. Data Analysis of Training for Staff of Pizza Mia*

Training category shows no significance difference in scores for hygiene knowledge within groups with  $P=0.156$  for personal hygiene,  $P=0.066$  for food hygiene and  $P=0.043$  for kitchen hygiene knowledge. Trained staff had higher mean score values in hygiene knowledge with values of 54 for personal hygiene, 54 for food hygiene and 63 for kitchen hygiene. Untrained staff had a lower mean score values for hygiene knowledge with values of 32 personal hygiene, 25.2 for food hygiene and 27.8 for kitchen hygiene. The average mean score value of hygiene knowledge for trained staff were higher with a result of 57, while the untrained staff had average mean value of 28.3. The results of perception of hygiene in relation to training are shown in Tables XXXV and



XXXVI.

*U. Participant's Characteristics of Symphony Restaurant*

The demographic information of staff working in Symphony Restaurant is shown in Table XXXVII. Among the staff working in the restaurant 58% are chefs while 42% are waiters. There are 42% of staff under the age category of 20-30 years and 31-40 years, while only 16% fall under 41+ age category. Among the staff 75% are secondary school leavers and 25% of staff is high school leavers.

*V. Age Based Data Analysis for Staff of Symphony Restaurant*

There is no significant difference in scores of hygiene knowledge within groups with  $P=0.364$  for personal hygiene,  $P=0.331$  for food hygiene and  $P=0.616$  for kitchen hygiene knowledge. The highest mean score values in hygiene knowledge were obtained by 20-30 years age group with values of 59.6 for personal hygiene, 57.8 for food hygiene and 59.8 for kitchen hygiene. The second highest mean score values for hygiene knowledge was achieved by 31-40 years age group with values of 53.4 for personal hygiene, 50.4 for food hygiene and 55.2 for kitchen hygiene. The lowest mean score value for hygiene knowledge was obtained by 41+ age group with values of 53 for personal hygiene, 49 for food hygiene and 54 for kitchen hygiene. The highest average mean score for hygiene knowledge was achieved by 20-30 age groups with a value of 59 and second highest average mean value was obtained by 31-40 age groups with a value of 53. The lowest average mean value for hygiene knowledge was 52, obtained by 41+ age category. The results of perception of hygiene knowledge in relation to age are shown in Tables XXXVIII and XXXIX.

*W. Occupation Based Data Analysis for Staff of Symphony Restaurant*

Occupation based analysis of hygiene perceptions of participants was found to be statistically insignificant with  $P=0.788$  for personal hygiene,  $P=0.789$  for food hygiene and  $P=0.572$  for Kitchen hygiene. Chefs scored the highest mean values in hygiene knowledge with values of 56.4 in personal hygiene, 53.8 in food hygiene and 58.1 in kitchen hygiene. Waiters scored lowest mean values from hygiene knowledge of 55.2 in personal hygiene, 52.4 in food hygiene and 55.4 in kitchen hygiene respectively. The highest average mean score was obtained by chefs with a value of 56 while the waiters obtained an average mean score of 54. The results of perception of hygiene in relation to occupation are shown in Tables XL and XLI.

*X. Education Based Data Analysis for Staff of Symphony Restaurant*

In the education category there is no statistical significance in scores in hygiene knowledge within the groups for food hygiene knowledge and kitchen hygiene knowledge with  $P=0.008$  and  $P=0.023$  respectively. However, there is a statistical difference in the results obtained for personal hygiene with  $P=0.001$ . The high school leavers achieved the highest mean

score values in hygiene knowledge with 65.6 for personal hygiene, 63.6 for food hygiene and 65.3 for kitchen hygiene. The secondary school leavers had comparatively low score than high school leavers in mean score values of hygiene knowledge with values of 52.6 in personal hygiene, 49.7 in food hygiene and 54.2 in kitchen hygiene. The highest average of mean for hygiene knowledge was obtained by high school leavers with a value of 65 and the secondary school leavers got a score of 52 for average mean score of hygiene knowledge. The results of perception of hygiene in relation to education are shown in Tables XLII and XLIII.

*Y. Data Analysis of Training for Staff of Symphony Restaurant*

Training category shows no significance difference in scores for hygiene knowledge within groups with  $P=0.258$  for personal hygiene,  $P=0.088$  for food hygiene and  $P=0.314$  for kitchen hygiene knowledge. Trained staff had higher mean score values in hygiene knowledge with values of 58 for personal hygiene, 56.8 for food hygiene and 59 for kitchen hygiene. Untrained staff had a lower mean score values for hygiene knowledge with values of 53 personal hygiene, 48.2 for food hygiene and 54.2 for kitchen hygiene. The average mean score value of hygiene knowledge for trained staff were higher with a result of 58, while the untrained staff had average mean value of 52. The results of perception of hygiene in relation to training are shown in Tables XLVI and XLV.

**X.DISCUSSIONS**

Food poisoning has become a global issue that cannot be overlooked. Reference [1] cites the report of WHO (1999) which showed that the most common cause of food poisoning cases is due to improper food handling and food production techniques used by food handlers in catering establishments. According to a Turkish study conducted from 2002-2003, a total number of 26,772 people were admitted with food poisoning cases out of which 509 people lost their lives. Reference [1] also recognizes the most common mistakes made in food production as mistakes made during food preparation, cooling, heating, reheating, thawing processes, cross-contamination mistakes, personal hygiene mistakes and time-temperature control mistakes in storage and internal temperature control of ready to eat food. Similarly, staff with low socio-economic background and low educational status tends to have less knowledge about hygienic food production. This problem intensifies if proper training is not provided to the F&B staff working in catering organizations.

The results on age category showed that mean scores for hygiene knowledge increased with age for the staff working in Sala Thai, Shell Beans and Pizza Mia. The findings of this research correlates to the research done by [9] and [3] which posits that as age increases in work field the amount of experience in the work field increases thus increasing the knowledge applied at work. This is also supported by the research done by [17], which has suggested that as age increase the amount experience and knowledge gained at work

increases. However, the staff working in SeaHouse and Symphony Restaurant had different results in age analysis where the 20-30 age groups scored the highest and 41+ age category scored the least.

Considering the results on occupational category for all restaurants, the chefs had the highest mean value score for hygiene knowledge followed by waiters. This difference in score between occupational category can be a result of number of trained and untrained staff among chefs and waiters. Among the chefs, majority are trained while in waiters majority are untrained. This result greatly suggests that not only chefs, but waiters also need to be trained properly to increase their hygiene knowledge.

The education category showed a statistical significance in the mean value scores within the group. Within the education category, the highest mean score was obtained by high school leavers and graduates for all restaurants. The scores obtained by secondary school leavers and primary school leavers were less than high school and graduates. Research done by [1] shows that the hygiene knowledge of well-educated staff tends to be higher. As individuals acquire more knowledge they tend to become more aware on a particular subject, thus imposing a positive behaviour. Reference [1] reports that while educational background can affect individual's knowledge on food hygiene, effective training can increase the knowledge and eliminate the differences. The findings of this research also corresponds to the findings of [18] which reports that the hygiene knowledge of food handlers increase with individuals with better education.

Considering the results obtained on training category, trained staff had a high mean score value for hygiene knowledge while the untrained staff had a significantly low score in hygiene knowledge for the data analyzed in all restaurants. Reference [3] explains that training staff in food poisoning as a crucial factor to prevent the risk of food poisoning and identifies training as an important factor that must be implemented and integrated in catering organizations to increase knowledge of hygiene. However, [19] states that there is little evidence which shows that increasing knowledge through training can result in positive attitude and change in behaviour in food handlers. This means that training necessarily does not change the attitude and behaviour in individuals although they might acquire more knowledge. Behavioral intention of individuals depends on attitude, subjective norms and how individuals control their behaviour through what they believe is right or wrong. Behavioral intentions frames actions and therefore, the knowledge acquired through training needs to be applied as attitudes and behaviors. On the other hand the Knowledge, attitude and Practice model by Rennie posits that behaviors can be changed through knowledge acquired in training [20]. The differences in relationship that exist between knowledge acquired, attitude and behaviour can be eliminated by fully implemented ongoing training programs, continuous supervision and through control systems. The managers and supervisors need to integrate training programs and supervise work regularly to maintain high standards of hygiene. Training needs to be

identified as a crucial component in maintaining hygiene and establishing control systems in catering establishments [1]. Training staff on hygiene knowledge can greatly assist in growing the profits of the business. According to [21] effective training on hygiene knowledge involves disseminating information in manner that it encourages positive behaviour. The positive behaviour can be encouraged by coaching, effective supervision and motivation by managers.

If restaurants have staff with adequate amount of hygiene knowledge following good hygiene practices it can provide many benefits to the catering businesses. Sound hygiene knowledge followed by good hygiene practices in kitchen of catering establishments can provide increase job satisfaction among staff, increase the profitability of catering business, improve job performance and increase team work. This is supported by the research done by [21] which posits that increased hygiene knowledge can contribute greatly to good staff performance, staff job satisfaction and promote teamwork. This research also identifies hygiene determinants as the leading component which is sought out by customers while choosing restaurants.

Apart from having sound hygiene knowledge there are many underlying factors which prevents the staff in catering organisations or restaurants from performing up to the required level. Some of the other factors that can prevent staff from working properly include low staff motivation, low wages and improper working conditions such as too long hours of work. Reference [9] also recognizes factors like low motivation, low wages and lack of control systems in discouraging food handlers to maintain high standards of hygiene inside the kitchen. Similarly, [9] explains the importance of having a good working design in catering establishments which can ensure proper food production processes. The restaurants analyzed in this research have been observed to have good design of kitchens and restaurants. Some of the restaurants had fully integrated control systems like HACCP and in all restaurants staffs were supervised continuously by managers on duty. Due to time limitations, a human resource factor that influences the performance of staff despite having sound hygiene knowledge of hygiene was not analyzed in this research. However, analyzing the human resource factors that affects the performance of staff in catering establishments can be considered as a point for further research.

## XI. CONCLUSION

Food poisoning and food borne illnesses are a major problem around the world. It is imperative for food handlers to have a sound knowledge on food hygiene. However disseminating hygiene knowledge and ensuring that good hygiene practices are adhered to is an obligation of all levels of staff working in catering establishments. In order to ensure quality, safe, healthy and wholesome food preparation and distribution all staff in catering organizations is required to have sound knowledge on hygiene. This requires food handlers to have sound knowledge on personal hygiene, food

handling and storage procedures, time-temperature control applied in food production, types of disease causing bacteria associated with unhygienic food production, cleaning procedures and techniques and hand washing techniques. Insufficient cleaning procedures resulting from lack of hygiene knowledge can greatly increase the chances of food contamination. Following proper personal hygiene and food hygiene in food production and service is a moral and legal obligation of food handlers in order to prevent food contamination. The managers are required to design and establish a working environment which is safe to work, be

proactive in supervision of staff during work procedures and provide on-going training sessions for staff. Similarly, managers need to back up these factors with good motivation by providing proper breaks, meals, rewards and benefits for staff. This research concludes that education and training as the most significant variable which can increase the hygiene knowledge among staff. Hence the importance of individual's education level and training cannot be neglected. The knowledge gained through training needs to be evaluated regularly in order to assist the staff make a habit of maintaining proper hygiene standards in food production.

## APPENDIX

TABLE I  
DEMOGRAPHIC INFORMATION OF STAFF WORKING IN SALA THAI RESTAURANT

Demographic information n=12	n-number of staff	Percentage
Age		
20-30	1	17%
31-40	2	33%
41+	3	50%
Occupation		
Chef	6	50%
Waiter	6	50%
Educational Status		
Primary School	0	
Secondary School	7	58.3%
High School	4	33.3%
Graduates	1	8.3%
Training		
Trained	3	50%
Untrained	3	50%

TABLE II  
AGE BASED DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE - DESCRIPTIVE USING ONE-WAY ANOVA FOR SALA THAI RESTAURANT

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum	
					Lower Bound	Upper Bound			
Personal hygiene knowledge	20-30	3	31.6667	6.35085	3.66667	15.8903	47.4431	28.00	39.00
	31-40	3	53.6667	27.09859	15.64538	-13.6500	120.9833	28.00	82.00
	41+	6	65.5000	11.02270	4.50000	53.9324	77.0676	43.00	70.00
	Total	12	54.0833	20.10635	5.80420	41.3084	66.8583	28.00	82.00
Food hygiene knowledge	20-30	3	33.3333	5.03322	2.90593	20.8301	45.8366	28.00	38.00
	31-40	3	45.6667	15.37314	8.87568	7.4777	83.8557	28.00	56.00
	41+	6	67.6667	5.71548	2.33333	61.6686	73.6647	56.00	70.00
	Total	12	53.5833	17.30716	4.99615	42.5869	64.5798	28.00	70.00
Kitchen hygiene knowledge	20-30	3	36.0000	23.25941	13.42882	-21.7796	93.7796	15.00	61.00
	31-40	3	47.3333	14.18920	8.19214	12.0854	82.5813	32.00	60.00
	41+	6	75.1667	8.54205	3.48728	66.2023	84.1310	59.00	80.00
	Total	12	58.4167	22.17475	6.40130	44.3275	72.5058	15.00	80.00

TABLE III  
AGE BASED DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE - ONE WAY ANOVA FOR SALA THAI RESTAURANT

		Sum of Squares	df	Mean Square	F	Sig.
Personal hygiene knowledge	Between Groups	2290.083	2	1145.042	4.778	.039
	Within Groups	2156.833	9	239.648		
	Total	4446.917	11			
Food hygiene knowledge	Between Groups	2608.250	2	1304.125	17.093	.001
	Within Groups	686.667	9	76.296		
	Total	3294.917	11			
Kitchen hygiene knowledge	Between Groups	3559.417	2	1779.708	8.660	.008
	Within Groups	1849.500	9	205.500		
	Total	5408.917	11			



TABLE IV  
OCCUPATION BASED DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE – DESCRIPTIVE OF ONE WAY ANOVA FOR SALA THAI RESTAURANT

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Personal hygiene knowledge	chef	6	61.8333	19.33305	7.89268	41.5445	82.1221	28.00	82.00
	Waiter	6	46.3333	19.27347	7.86836	26.1071	66.5596	28.00	70.00
	Total	12	54.0833	20.10635	5.80420	41.3084	66.8583	28.00	82.00
Food hygiene knowledge	chef	6	57.8333	16.49747	6.73507	40.5203	75.1464	28.00	70.00
	Waiter	6	49.3333	18.53285	7.56601	29.8843	68.7824	28.00	70.00
	Total	12	53.5833	17.30716	4.99615	42.5869	64.5798	28.00	70.00
Kitchen hygiene knowledge	chef	6	62.3333	18.94905	7.73592	42.4475	82.2191	32.00	80.00
	Waiter	6	54.5000	26.18969	10.69190	27.0156	81.9844	15.00	80.00
	Total	12	58.4167	22.17475	6.40130	44.3275	72.5058	15.00	80.00

TABLE V  
OCCUPATION BASED DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE - ONE WAY ANOVA FOR SALA THAI RESTAURANT

		Sum of Squares	df	Mean Square	F	Sig.
Personal hygiene knowledge	Between Groups	720.750	1	720.750	1.934	.194
	Within Groups	3726.167	10	372.617		
	Total	4446.917	11			
Food hygiene knowledge	Between Groups	216.750	1	216.750	.704	.421
	Within Groups	3078.167	10	307.817		
	Total	3294.917	11			
Kitchen hygiene knowledge	Between Groups	184.083	1	184.083	.352	.566
	Within Groups	5224.833	10	522.483		
	Total	5408.917	11			

TABLE VI  
EDUCATION BASED DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE - DESCRIPTIVE OF ONE WAY ANOVA FOR SALA THAI RESTAURANT

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Personal hygiene knowledge	Secondary	7	45.4286	21.98376	8.30908	25.0970	65.7602	28.00	82.00
	High School	3	63.6667	10.96966	6.33333	36.4165	90.9168	51.00	70.00
	Graduate	2	70.0000	.00000	.00000	70.0000	70.0000	70.00	70.00
	Total	12	54.0833	20.10635	5.80420	41.3084	66.8583	28.00	82.00
Food hygiene knowledge	Secondary	7	43.8571	16.06682	6.07269	28.9978	58.7165	28.00	70.00
	High School	3	65.3333	8.08290	4.66667	45.2543	85.4124	56.00	70.00
	Graduate	2	70.0000	.00000	.00000	70.0000	70.0000	70.00	70.00
	Total	12	53.5833	17.30716	4.99615	42.5869	64.5798	28.00	70.00
Kitchen hygiene knowledge	Secondary	7	45.8571	20.16125	7.62024	27.2111	64.5032	15.00	72.00
	High School	3	73.3333	11.54701	6.66667	44.6490	102.0177	60.00	80.00
	Graduate	2	80.0000	.00000	.00000	80.0000	80.0000	80.00	80.00
	Total	12	58.4167	22.17475	6.40130	44.3275	72.5058	15.00	80.00

TABLE VII  
EDUCATION BASED DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE - ONE WAY ANOVA FOR SALA THAI RESTAURANT

		Sum of Squares	df	Mean Square	F	Sig.
Personal hygiene knowledge	Between Groups	1306.536	2	653.268	1.872	.209
	Within Groups	3140.381	9	348.931		
	Total	4446.917	11			
Food hygiene knowledge	Between Groups	1615.393	2	807.696	4.328	.048
	Within Groups	1679.524	9	186.614		
	Total	3294.917	11			
Kitchen hygiene knowledge	Between Groups	2703.393	2	1351.696	4.496	.044
	Within Groups	2705.524	9	300.614		
	Total	5408.917	11			

TABLE VIII

TRAINING BASED DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE – DESCRIPTIVE OF ONE WAY ANOVA FOR SALA THAI RESTAURANT

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Personal hygiene knowledge	Trained	7	63.4286	11.45800	4.33072	52.8317	74.0255	43.00	70.00
	Untrained	5	41.0000	23.40940	10.46900	11.9334	70.0666	28.00	82.00
	Total	12	54.0833	20.10635	5.80420	41.3084	66.8583	28.00	82.00
Food hygiene knowledge	Trained	7	66.0000	6.83130	2.58199	59.6821	72.3179	56.00	70.00
	Untrained	5	36.2000	10.30534	4.60869	23.4042	48.9958	28.00	53.00
	Total	12	53.5833	17.30716	4.99615	42.5869	64.5798	28.00	70.00
Kitchen hygiene knowledge	Trained	7	73.0000	9.67815	3.65800	64.0492	81.9508	59.00	80.00
	Untrained	5	38.0000	17.84657	7.98123	15.8406	60.1594	15.00	61.00
	Total	12	58.4167	22.17475	6.40130	44.3275	72.5058	15.00	80.00

TABLE IX

TRAINING BASED DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE - ONE WAY ANOVA FOR SALA THAI RESTAURANT

		Sum of Squares	df	Mean Square	F	Sig.
Personal hygiene knowledge	Between Groups	1467.202	1	1467.202	4.924	.051
	Within Groups	2979.714	10	297.971		
	Total	4446.917	11			
Food hygiene knowledge	Between Groups	2590.117	1	2590.117	36.750	.000
	Within Groups	704.800	10	70.480		
	Total	3294.917	11			
Kitchen hygiene knowledge	Between Groups	3572.917	1	3572.917	19.460	.001
	Within Groups	1836.000	10	183.600		
	Total	5408.917	11			

TABLE X

DEMOGRAPHIC INFORMATION OF STAFF WORKING IN SEAHOUSE RESTAURANT

Demographic information n=12	n-number of staff	Percentage
Age		
20-30	4	33%
31-40	3	25%
41+	5	42%
Occupation		
Chef	7	58%
Waiter	5	42%
Educational Status		
Primary School	1	8%
Secondary School	4	33%
High School	5	42%
Graduates		
Training	2	17%
Trained	10	83%
Untrained	2	17%

TABLE XI

AGE BASED DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE – DESCRIPTIVE OF ONE WAY ANOVA FOR SEAHOUSE RESTAURANT

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Personal hygiene knowledge	20-30	4	55.0000	5.22813	2.61406	46.6809	63.3191	50.00	60.00
	31-40	3	50.3333	16.77299	9.68389	8.6669	91.9998	31.00	61.00
	41+	5	70.0000	.00000	.00000	70.0000	70.0000	70.00	70.00
	Total	12	60.0833	11.77407	3.39888	52.6024	67.5642	31.00	70.00
Food hygiene knowledge	20-30	4	56.7500	3.94757	1.97379	50.4685	63.0315	52.00	60.00
	31-40	3	51.0000	14.42221	8.32666	15.1733	86.8267	35.00	63.00
	41+	5	70.0000	.00000	.00000	70.0000	70.0000	70.00	70.00
	Total	12	60.8333	10.61588	3.06454	54.0883	67.5783	35.00	70.00
Kitchen hygiene knowledge	20-30	4	64.2500	3.30404	1.65202	58.9925	69.5075	61.00	68.00
	31-40	3	54.0000	22.86919	13.20353	-2.8102	110.8102	28.00	71.00
	41+	5	80.0000	.00000	.00000	80.0000	80.0000	80.00	80.00
	Total	12	68.2500	14.90043	4.30138	58.7827	77.7173	28.00	80.00

TABLE XII

AGE BASED DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE – ONE WAY ANOVA FOR SEAHOUSE RESTAURANT

		Sum of Squares	df	Mean Square	F	Sig.
Personal hygiene knowledge	Between Groups	880.250	2	440.125	6.144	.021
	Within Groups	644.667	9	71.630		
	Total	1524.917	11			
Food hygiene knowledge	Between Groups	776.917	2	388.458	7.555	.012
	Within Groups	462.750	9	51.417		
	Total	1239.667	11			
Kitchen hygiene knowledge	Between Groups	1363.500	2	681.750	5.688	.025
	Within Groups	1078.750	9	119.861		
	Total	2442.250	11			

TABLE XIII  
OCCUPATION BASED DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE – DESCRIPTIVE OF ONE WAY ANOVA FOR SEAHOUSE RESTAURANT

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Personal hygiene knowledge	chef	7	67.2857	4.64451	1.75546	62.9903	71.5812	60.00	70.00
	Waiter	5	50.0000	11.44552	5.11859	35.7885	64.2115	31.00	59.00
	Total	12	60.0833	11.77407	3.39888	52.6024	67.5642	31.00	70.00
Food hygiene knowledge	chef	7	67.5714	4.23703	1.60144	63.6528	71.4900	60.00	70.00
	Waiter	5	51.4000	9.60729	4.29651	39.4710	63.3290	35.00	60.00
	Total	12	60.8333	10.61588	3.06454	54.0883	67.5783	35.00	70.00
Kitchen hygiene knowledge	chef	7	77.0000	5.19615	1.96396	72.1944	81.8056	68.00	80.00
	Waiter	5	56.0000	15.76388	7.04982	36.4266	75.5734	28.00	66.00
	Total	12	68.2500	14.90043	4.30138	58.7827	77.7173	28.00	80.00

TABLE XIV  
OCCUPATION DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE – ONE WAY ANOVA FOR SEAHOUSE RESTAURANT

		Sum of Squares	df	Mean Square	F	Sig.
Personal hygiene knowledge	Between Groups	871.488	1	871.488	13.337	.004
	Within Groups	653.429	10	65.343		
	Total	1524.917	11			
Food hygiene knowledge	Between Groups	762.752	1	762.752	15.993	.003
	Within Groups	476.914	10	47.691		
	Total	1239.667	11			
Kitchen hygiene knowledge	Between Groups	1286.250	1	1286.250	11.127	.008
	Within Groups	1156.000	10	115.600		
	Total	2442.250	11			

TABLE XV  
EDUCATION BASED DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE – DESCRIPTIVE OF ONE WAY ANOVA FOR SEAHOUSE RESTAURANT

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Personal hygiene knowledge	Primary	2	31.5000	.70711	.50000	25.1469	37.8531	31.00	32.00
	Secondary	3	57.0000	20.42058	11.78983	6.2725	107.7275	34.00	73.00
	High School	5	62.4000	15.99375	7.15262	42.5411	82.2589	37.00	73.00
	Graduate	2	68.0000	7.07107	5.00000	4.4690	131.5310	63.00	73.00
	Total	12	56.8333	18.07979	5.21919	45.3460	68.3207	31.00	73.00
Food hygiene knowledge	Primary	2	25.0000	4.24264	3.00000	-13.1186	63.1186	22.00	28.00
	Secondary	3	51.6667	21.50194	12.41415	-1.7471	105.0804	28.00	70.00
	High School	5	59.4000	15.70987	7.02567	39.8936	78.9064	35.00	70.00
	Graduate	2	65.0000	7.07107	5.00000	1.4690	128.5310	60.00	70.00
	Total	12	52.6667	19.17543	5.53547	40.4832	64.8502	22.00	70.00
Kitchen hygiene knowledge	Primary	2	64.5000	2.12132	1.50000	45.4407	83.5593	63.00	66.00
	Secondary	3	91.3333	23.02897	13.29578	34.1262	148.5405	66.00	111.00
	High School	5	97.6000	21.37288	9.55824	71.0621	124.1379	62.00	111.00
	Graduate	2	107.0000	5.65685	4.00000	56.1752	157.8248	103.00	111.00
	Total	12	92.0833	21.41562	6.18216	78.4765	105.6902	62.00	111.00

TABLE XVI  
EDUCATION DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE – ONE WAY ANOVA FOR SEAHOUSE RESTAURANT

		Sum of Squares	df	Mean Square	F	Sig.
Personal hygiene knowledge	Between Groups	1687.967	3	562.656	2.360	.148
	Within Groups	1907.700	8	238.463		
	Total	3595.667	11			
Food hygiene knowledge	Between Groups	2064.800	3	688.267	2.781	.110
	Within Groups	1979.867	8	247.483		
	Total	4044.667	11			
Kitchen hygiene knowledge	Between Groups	2120.550	3	706.850	1.934	.203
	Within Groups	2924.367	8	365.546		
	Total	5044.917	11			



TABLE XVII

TRAINING BASED DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE – DESCRIPTIVE OF ONE WAY ANOVA FOR SEAHOUSE RESTAURANT

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Personal hygiene knowledge	Trained	10	63.9000	7.07814	2.23830	58.8366	68.9634	50.00	70.00
	Untrained	2	41.0000	14.14214	10.00000	-86.0620	168.0620	31.00	51.00
	Total	12	60.0833	11.77407	3.39888	52.6024	67.5642	31.00	70.00
Food hygiene knowledge	Trained	10	63.5000	7.45729	2.35820	58.1654	68.8346	52.00	70.00
	Untrained	2	47.5000	17.67767	12.50000	-111.3276	206.3276	35.00	60.00
	Total	12	60.8333	10.61588	3.06454	54.0883	67.5783	35.00	70.00
Kitchen hygiene knowledge	Trained	10	72.5000	8.40965	2.65937	66.4841	78.5159	61.00	80.00
	Untrained	2	47.0000	26.87006	19.00000	-194.4179	288.4179	28.00	66.00
	Total	12	68.2500	14.90043	4.30138	58.7827	77.7173	28.00	80.00

TABLE XVIII

TRAINING DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE – ONE WAY ENOVA FOR SEAHOUSE RESTAURANT

		Sum of Squares	df	Mean Square	F	Sig.
Personal hygiene knowledge	Between Groups	874.017	1	874.017	13.428	.004
	Within Groups	650.900	10	65.090		
	Total	1524.917	11			
Food hygiene knowledge	Between Groups	426.667	1	426.667	5.248	.045
	Within Groups	813.000	10	81.300		
	Total	1239.667	11			
Kitchen hygiene knowledge	Between Groups	1083.750	1	1083.750	7.978	.018
	Within Groups	1358.500	10	135.850		
	Total	2442.250	11			

TABLE XIX

DEMOGRAPHIC INFORMATION OF STAFF WORKING IN SHELL BEANS

Demographic information n=12	n-number of staff	Percentage
Age		
20-30	6	50%
31-40	4	33%
41+	2	17%
Occupation		
Chef	8	67%
Waiter	4	33%
Educational Status		
Primary School	0	
Secondary School	6	50%
High School	1	8%
Graduates	5	42%
Training		
Trained	9	75%
Untrained	3	25%

TABLE XX

AGE DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE – DESCRIPTIVE OF ONE WAY ANOVA FOR SHELL BEANS

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Personal hygiene knowledge	20-30	6	52.0000	20.17920	8.23812	30.8232	73.1768	24.00	65.00
	31-40	4	64.2500	1.50000	.75000	61.8632	66.6368	62.00	65.00
	41+	2	67.0000	.00000	.00000	67.0000	67.0000	67.00	67.00
	Total	12	58.5833	15.29384	4.41495	48.8661	68.3006	24.00	67.00
Food hygiene knowledge	20-30	6	66.5000	19.36750	7.90675	46.1751	86.8249	41.00	79.00
	31-40	4	69.2500	18.19112	9.09556	40.3039	98.1961	42.00	79.00
	41+	2	81.0000	.00000	.00000	81.0000	81.0000	81.00	81.00
	Total	12	69.8333	17.01782	4.91262	59.0207	80.6459	41.00	81.00
Kitchen hygiene knowledge	20-30	6	82.8333	17.01078	6.94462	64.9816	100.6851	60.00	97.00
	31-40	4	86.2500	14.17451	7.08725	63.6952	108.8048	65.00	94.00
	41+	2	105.0000	.00000	.00000	105.0000	105.0000	105.00	105.00
	Total	12	87.6667	15.95068	4.60457	77.5321	97.8012	60.00	105.00

TABLE XXI

AGE DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE – ONE WAY ANOVA FOR SHELL BEANS

		Sum of Squares	df	Mean Square	F	Sig.
Personal hygiene knowledge	Between Groups	530.167	2	265.083	1.168	.354
	Within Groups	2042.750	9	226.972		
	Total	2572.917	11			
Food hygiene knowledge	Between Groups	317.417	2	158.708	.498	.624
	Within Groups	2868.250	9	318.694		
	Total	3185.667	11			
Kitchen hygiene knowledge	Between Groups	749.083	2	374.542	1.645	.246
	Within Groups	2049.583	9	227.731		
	Total	2798.667	11			

TABLE XXII  
OCCUPATION DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE – DESCRIPTIVE OF ONE WAY ANOVA FOR SHELL BEANS

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Personal hygiene knowledge	chef	8	65.1250	1.55265	.54894	63.8270	66.4230	62.00	67.00
	Waiter	4	45.5000	22.57580	11.28790	9.5769	81.4231	24.00	65.00
	Total	12	58.5833	15.29384	4.41495	48.8661	68.3006	24.00	67.00
Food hygiene knowledge	chef	8	74.6250	13.24427	4.68256	63.5525	85.6975	42.00	81.00
	Waiter	4	60.2500	21.65448	10.82724	25.7929	94.7071	41.00	79.00
	Total	12	69.8333	17.01782	4.91262	59.0207	80.6459	41.00	81.00
Kitchen hygiene knowledge	chef	8	92.6250	12.37437	4.37500	82.2798	102.9702	65.00	105.00
	Waiter	4	77.7500	19.46578	9.73289	46.7756	108.7244	60.00	97.00
	Total	12	87.6667	15.95068	4.60457	77.5321	97.8012	60.00	105.00

TABLE XXIII  
OCCUPATION DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE – ONE WAY ANOVA FOR SHELL BEANS

		Sum of Squares	df	Mean Square	F	Sig.
Personal hygiene knowledge	Between Groups	1027.042	1	1027.042	6.644	.028
	Within Groups	1545.875	10	154.588		
	Total	2572.917	11			
Food hygiene knowledge	Between Groups	551.042	1	551.042	2.092	.179
	Within Groups	2634.625	10	263.463		
	Total	3185.667	11			
Kitchen hygiene knowledge	Between Groups	590.042	1	590.042	2.672	.133
	Within Groups	2208.625	10	220.863		
	Total	2798.667	11			

TABLE XXIV  
EDUCATION DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE – DESCRIPTIVE OF ONE WAY ANOVA FOR SHELL BEANS

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Personal hygiene knowledge	Secondary	6	51.8333	20.11384	8.21144	30.7251	72.9415	24.00	67.00
	High School	1	65.0000	.	.	.	.	65.00	65.00
	Graduate	5	65.4000	.89443	.40000	64.2894	66.5106	65.00	67.00
	Total	12	58.5833	15.29384	4.41495	48.8661	68.3006	24.00	67.00
Food hygiene knowledge	Secondary	6	60.6667	20.82947	8.50359	38.8075	82.5259	41.00	81.00
	High School	1	79.0000	.	.	.	.	79.00	79.00
	Graduate	5	79.0000	1.41421	.63246	77.2440	80.7560	77.00	81.00
	Total	12	69.8333	17.01782	4.91262	59.0207	80.6459	41.00	81.00
Kitchen hygiene knowledge	Secondary	6	80.1667	20.03414	8.17890	59.1421	101.1912	60.00	105.00
	High School	1	93.0000	.	.	.	.	93.00	93.00
	Graduate	5	95.6000	5.27257	2.35797	89.0532	102.1468	93.00	105.00
	Total	12	87.6667	15.95068	4.60457	77.5321	97.8012	60.00	105.00

TABLE XXV  
EDUCATION DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE – ONE WAY ANOVA FOR SHELL BEANS

		Sum of Squares	df	Mean Square	F	Sig.
Personal hygiene knowledge	Between Groups	546.883	2	273.442	1.215	.341
	Within Groups	2026.033	9	225.115		
	Total	2572.917	11			
Food hygiene knowledge	Between Groups	1008.333	2	504.167	2.084	.180
	Within Groups	2177.333	9	241.926		
	Total	3185.667	11			
Kitchen hygiene knowledge	Between Groups	680.633	2	340.317	1.446	.285
	Within Groups	2118.033	9	235.337		
	Total	2798.667	11			

TABLE XXVI  
TRAINING DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE – DESCRIPTIVE OF ONE WAY ANOVA FOR SHELL BEANS

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Personal hygiene knowledge	Trained	9	65.4444	.88192	.29397	64.7665	66.1223	65.00	67.00
	Untrained	3	38.0000	20.88061	12.05543	-13.8703	89.8703	24.00	62.00
	Total	12	58.5833	15.29384	4.41495	48.8661	68.3006	24.00	67.00
Food hygiene knowledge	Trained	9	79.2222	1.20185	.40062	78.2984	80.1460	77.00	81.00
	Untrained	3	41.6667	.57735	.33333	40.2324	43.1009	41.00	42.00
	Total	12	69.8333	17.01782	4.91262	59.0207	80.6459	41.00	81.00
Kitchen hygiene knowledge	Trained	9	96.1111	5.23078	1.74359	92.0904	100.1318	92.00	105.00
	Untrained	3	62.3333	2.51661	1.45297	56.0817	68.5849	60.00	65.00
	Total	12	87.6667	15.95068	4.60457	77.5321	97.8012	60.00	105.00

TABLE XVII  
TRAINING DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE – ONE WAY ANOVA FOR SHELL BEANS

		Sum of Squares	df	Mean Square	F	Sig.
Personal hygiene knowledge	Between Groups	1694.694	1	1694.694	19.297	.001
	Within Groups	878.222	10	87.822		
	Total	2572.917	11			
Food hygiene knowledge	Between Groups	3173.444	1	3173.444	2596.455	.000
	Within Groups	12.222	10	1.222		
	Total	3185.667	11			
Kitchen hygiene knowledge	Between Groups	2567.111	1	2567.111	110.864	.000
	Within Groups	231.556	10	23.156		
	Total	2798.667	11			

TABLE XXVIII  
DEMOGRAPHIC INFORMATION OF STAFF WORKING IN PIZZA MIA

Demographic information n=12	n-number of staff	Percentage
Age		
20-30	3	25%
31-40	4	33%
41+	5	42%
Occupation		
Chef	7	58%
Waiter	5	42%
Educational Status		
Primary School	2	17%
Secondary School	2	17%
High School	4	33%
Graduates	4	33%
Training		
Trained	7	58%
Untrained	5	42%

TABLE XXIX  
AGE DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE – DESCRIPTIVE OF ONE WAY ANOVA FOR PIZZA MIA RESTAURANT

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Personal hygiene knowledge	20-30	3	22.6667	12.50333	7.21880	-8.3933	53.7267	14.00	37.00
	31-40	4	32.2500	25.87631	12.93815	-8.9250	73.4250	14.00	70.00
	41+	5	70.0000	.00000	.00000	70.0000	70.0000	70.00	70.00
	Total	12	45.5833	26.26598	7.58233	28.8947	62.2719	14.00	70.00
Food hygiene knowledge	20-30	3	14.0000	.00000	.00000	14.0000	14.0000	14.00	14.00
	31-40	4	28.2500	19.56826	9.78413	-2.8875	59.3875	14.00	56.00
	41+	5	70.0000	.00000	.00000	70.0000	70.0000	70.00	70.00
	Total	12	42.0833	27.26456	7.87060	24.7603	59.4064	14.00	70.00
Kitchen hygiene knowledge	20-30	3	20.6667	4.50925	2.60342	9.4651	31.8683	16.00	25.00
	31-40	4	29.5000	23.17326	11.58663	-7.3738	66.3738	16.00	64.00
	41+	5	80.0000	.00000	.00000	80.0000	80.0000	80.00	80.00
	Total	12	48.3333	30.71965	8.86800	28.8150	67.8517	16.00	80.00

TABLE XXX  
AGE DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE – ONE WAY ANOVA FOR PIZZA MIA RESTAURANT

		Sum of Squares	df	Mean Square	F	Sig.
Personal hygiene knowledge	Between Groups	5267.500	2	2633.750	10.211	.005
	Within Groups	2321.417	9	257.935		
	Total	7588.917	11			
Food hygiene knowledge	Between Groups	7028.167	2	3514.083	27.531	.000
	Within Groups	1148.750	9	127.639		
	Total	8176.917	11			
Kitchen hygiene knowledge	Between Groups	8729.000	2	4364.500	23.782	.000
	Within Groups	1651.667	9	183.519		
	Total	10380.667	11			



TABLE XXXI  
OCCUPATION BASED DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE - DESCRIPTIVE USING ONE WAY ANOVA FOR PIZZA MIA RESTAURANT

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Personal hygiene knowledge	chef	7	54.4286	26.60737	10.05664	29.8209	79.0363	14.00	70.00
	Waiter	5	33.2000	22.51000	10.06678	5.2501	61.1499	14.00	70.00
	Total	12	45.5833	26.26598	7.58233	28.8947	62.2719	14.00	70.00
Food hygiene knowledge	chef	7	52.1429	26.21977	9.91014	27.8936	76.3921	14.00	70.00
	Waiter	5	28.0000	24.24871	10.84435	-2.1088	58.1088	14.00	70.00
	Total	12	42.0833	27.26456	7.87060	24.7603	59.4064	14.00	70.00
Kitchen hygiene knowledge	chef	7	59.4286	30.23716	11.42857	31.4639	87.3933	16.00	80.00
	Waiter	5	32.8000	26.58383	11.88865	-.2082	65.8082	16.00	80.00
	Total	12	48.3333	30.71965	8.86800	28.8150	67.8517	16.00	80.00

TABLE XXXII  
OCCUPATION DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE – ONE WAY ANOVA FOR PIZZA MIA RESTAURANT

		Sum of Squares	df	Mean Square	F	Sig.
Personal hygiene knowledge	Between Groups	1314.402	1	1314.402	2.095	.178
	Within Groups	6274.514	10	627.451		
	Total	7588.917	11			
Food hygiene knowledge	Between Groups	1700.060	1	1700.060	2.625	.136
	Within Groups	6476.857	10	647.686		
	Total	8176.917	11			
Kitchen hygiene knowledge	Between Groups	2068.152	1	2068.152	2.488	.146
	Within Groups	8312.514	10	831.251		
	Total	10380.667	11			

TABLE XXXIII  
EDUCATION BASED DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE - DESCRIPTIVE USING ONE WAY ANOVA FOR PIZZA MIA RESTAURANT

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Personal hygiene knowledge	Primary	2	14.0000	.00000	.00000	14.0000	14.0000	14.00	14.00
	Secondary	2	27.0000	14.14214	10.00000	-100.0620	154.0620	17.00	37.00
	High School	4	46.2500	27.78939	13.89469	2.0309	90.4691	17.00	70.00
	Graduate	4	70.0000	.00000	.00000	70.0000	70.0000	70.00	70.00
	Total	12	45.5833	26.26598	7.58233	28.8947	62.2719	14.00	70.00
Food hygiene knowledge	Primary	2	14.0000	.00000	.00000	14.0000	14.0000	14.00	14.00
	Secondary	2	14.0000	.00000	.00000	14.0000	14.0000	14.00	14.00
	High School	4	45.7500	28.50000	14.25000	.4001	91.0999	15.00	70.00
	Graduate	4	66.5000	7.00000	3.50000	55.3614	77.6386	56.00	70.00
	Total	12	42.0833	27.26456	7.87060	24.7603	59.4064	14.00	70.00
Kitchen hygiene knowledge	Primary	2	16.0000	.00000	.00000	16.0000	16.0000	16.00	16.00
	Secondary	2	23.0000	2.82843	2.00000	-2.4124	48.4124	21.00	25.00
	High School	4	49.5000	35.30345	17.65172	-6.6757	105.6757	16.00	80.00
	Graduate	4	76.0000	8.00000	4.00000	63.2702	88.7298	64.00	80.00
	Total	12	48.3333	30.71965	8.86800	28.8150	67.8517	16.00	80.00

TABLE XXXIV  
EDUCATION DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE – ONE WAY ANOVA FOR PIZZA MIA RESTAURANT

		Sum of Squares	df	Mean Square	F	Sig.
Personal hygiene knowledge	Between Groups	5072.167	3	1690.722	5.374	.025
	Within Groups	2516.750	8	314.594		
	Total	7588.917	11			
Food hygiene knowledge	Between Groups	5593.167	3	1864.389	5.773	.021
	Within Groups	2583.750	8	322.969		
	Total	8176.917	11			
Kitchen hygiene knowledge	Between Groups	6441.667	3	2147.222	4.361	.043
	Within Groups	3939.000	8	492.375		
	Total	10380.667	11			

TABLE XXXV

TRAINING DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE - DESCRIPTIVE USING ONE WAY ANOVA FOR PIZZA MIA RESTAURANT

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Personal hygiene knowledge	Trained	7	54.8571	25.86135	9.77467	30.9394	78.7749	17.00	70.00
	Untrained	5	32.6000	23.08246	10.32279	3.9393	61.2607	14.00	70.00
	Total	12	45.5833	26.26598	7.58233	28.8947	62.2719	14.00	70.00
Food hygiene knowledge	Trained	7	54.1429	27.08277	10.23632	29.0955	79.1902	14.00	70.00
	Untrained	5	25.2000	18.25377	8.16333	2.5350	47.8650	14.00	56.00
	Total	12	42.0833	27.26456	7.87060	24.7603	59.4064	14.00	70.00
Kitchen hygiene knowledge	Trained	7	63.0000	29.14904	11.01730	36.0416	89.9584	16.00	80.00
	Untrained	5	27.8000	20.42547	9.13455	2.4384	53.1616	16.00	64.00
	Total	12	48.3333	30.71965	8.86800	28.8150	67.8517	16.00	80.00

TABLE XXXVI

TRAINING DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE – ONE WAY ANOVA FOR PIZZA MIA RESTAURANT

		Sum of Squares	df	Mean Square	F	Sig.
Personal hygiene knowledge	Between Groups	1444.860	1	1444.860	2.352	.156
	Within Groups	6144.057	10	614.406		
	Total	7588.917	11			
Food hygiene knowledge	Between Groups	2443.260	1	2443.260	4.261	.066
	Within Groups	5733.657	10	573.366		
	Total	8176.917	11			
Kitchen hygiene knowledge	Between Groups	3613.867	1	3613.867	5.341	.043
	Within Groups	6766.800	10	676.680		
	Total	10380.667	11			

TABLE XXXVII

DEMOGRAPHIC INFORMATION OF STAFF WORKING IN SYMPHONY

Demographic information n=12	n-number of staff	Percentage
Age		
20-30	5	42%
31-40	5	42%
41+	2	16%
Occupation		
Chef	7	58%
Waiter	5	42%
Educational Status		
Primary School	0	
Secondary School	9	75%
High School	3	25%
Graduates	0	
Training		
Trained	6	50%
Untrained	6	50%

TABLE XXXVIII

AGE DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE - DESCRIPTIVE USING ONE WAY ANOVA FOR SYMPHONY RESTAURANT

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Personal Hygiene knowledge	20-30	5	59.6000	9.52890	4.26146	47.7683	71.4317	52.00	70.00
	31-40	5	53.4000	4.50555	2.01494	47.8056	58.9944	48.00	59.00
	41+	2	53.0000	4.24264	3.00000	14.8814	91.1186	50.00	56.00
	Total	12	55.9167	7.25457	2.09421	51.3073	60.5260	48.00	70.00
Food Hygiene knowledge	20-30	5	57.8000	11.36662	5.08331	43.6865	71.9135	46.00	70.00
	31-40	5	50.4000	5.68331	2.54165	43.3432	57.4568	46.00	60.00
	41+	2	49.0000	1.41421	1.00000	36.2938	61.7062	48.00	50.00
	Total	12	53.2500	8.67730	2.50492	47.7367	58.7633	46.00	70.00
Kitchen Hygiene knowledge	20-30	5	59.8000	10.03494	4.48776	47.3400	72.2600	51.00	75.00
	31-40	5	55.2000	6.97854	3.12090	46.5350	63.8650	47.00	66.00
	41+	2	54.5000	.70711	.50000	48.1469	60.8531	54.00	55.00
	Total	12	57.0000	7.78110	2.24621	52.0561	61.9439	47.00	75.00

TABLE XXXIX

AGE DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE – ONE WAY ANOVA FOR SYMPHONY RESTAURANT

		Sum of Squares	df	Mean Square	F	Sig.
Personal Hygiene knowledge	Between Groups	116.517	2	58.258	1.134	.364
	Within Groups	462.400	9	51.378		
	Total	578.917	11			
Food Hygiene knowledge	Between Groups	180.250	2	90.125	1.252	.331
	Within Groups	648.000	9	72.000		
	Total	828.250	11			
Kitchen Hygiene knowledge	Between Groups	67.900	2	33.950	.511	.616
	Within Groups	598.100	9	66.456		
	Total	666.000	11			

TABLE XL

OCCUPATION DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE - DESCRIPTIVE USING ONE WAY ANOVA FOR SYMPHONY RESTAURANT

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Personal Hygiene knowledge	Chef	7	56.4286	6.85218	2.58988	50.0914	62.7658	50.00	70.00
	Waiter	5	55.2000	8.55570	3.82623	44.5767	65.8233	48.00	70.00
	Total	12	55.9167	7.25457	2.09421	51.3073	60.5260	48.00	70.00
Food Hygiene knowledge	Chef	7	53.8571	8.27503	3.12767	46.2040	61.5103	47.00	70.00
	Waiter	5	52.4000	10.13903	4.53431	39.8107	64.9893	46.00	70.00
	Total	12	53.2500	8.67730	2.50492	47.7367	58.7633	46.00	70.00
Kitchen Hygiene knowledge	Chef	7	58.1429	9.29926	3.51479	49.5425	66.7432	47.00	75.00
	Waiter	5	55.4000	5.59464	2.50200	48.4533	62.3467	51.00	65.00
	Total	12	57.0000	7.78110	2.24621	52.0561	61.9439	47.00	75.00

TABLE XLI

OCCUPATION DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE – ONE WAY ANOVA FOR SYMPHONY RESTAURANT

		Sum of Squares	df	Mean Square	F	Sig.
Personal Hygiene knowledge	Between Groups	4.402	1	4.402	.077	.788
	Within Groups	574.514	10	57.451		
	Total	578.917	11			
Food Hygiene knowledge	Between Groups	6.193	1	6.193	.075	.789
	Within Groups	822.057	10	82.206		
	Total	828.250	11			
Kitchen Hygiene knowledge	Between Groups	21.943	1	21.943	.341	.572
	Within Groups	644.057	10	64.406		
	Total	666.000	11			

TABLE XLII

EDUCATION DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE - DESCRIPTIVE USING ONE WAY ANOVA FOR SYMPHONY RESTAURANT

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Personal Hygiene knowledge	Secondary	9	52.6667	3.27872	1.09291	50.1464	55.1869	48.00	59.00
	High School	3	65.6667	7.50555	4.33333	47.0218	84.3115	57.00	70.00
	Total	12	55.9167	7.25457	2.09421	51.3073	60.5260	48.00	70.00
Food Hygiene knowledge	Secondary	9	49.7778	4.38115	1.46038	46.4101	53.1454	46.00	60.00
	High School	3	63.6667	10.96966	6.33333	36.4165	90.9168	51.00	70.00
	Total	12	53.2500	8.67730	2.50492	47.7367	58.7633	46.00	70.00
Kitchen Hygiene knowledge	Secondary	9	54.2222	5.09357	1.69786	50.3070	58.1375	47.00	66.00
	High School	3	65.3333	9.50438	5.48736	41.7231	88.9435	56.00	75.00
	Total	12	57.0000	7.78110	2.24621	52.0561	61.9439	47.00	75.00

TABLE XLIII

EDUCATION DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE – ONE WAY ANOVA FOR SYMPHONY RESTAURANT

		Sum of Squares	df	Mean Square	F	Sig.
Personal Hygiene knowledge	Between Groups	380.250	1	380.250	19.140	.001
	Within Groups	198.667	10	19.867		
	Total	578.917	11			
Food Hygiene knowledge	Between Groups	434.028	1	434.028	11.010	.008
	Within Groups	394.222	10	39.422		
	Total	828.250	11			
Kitchen Hygiene knowledge	Between Groups	277.778	1	277.778	7.155	.023
	Within Groups	388.222	10	38.822		
	Total	666.000	11			

TABLE XLIV

TRAINING DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE - DESCRIPTIVE USING ONE WAY ANOVA FOR SYMPHONY RESTAURANT

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Personal Hygiene knowledge	Trained	7	58.0000	8.69866	3.28778	49.9551	66.0449	50.00	70.00
	Untrained	5	53.0000	3.60555	1.61245	48.5231	57.4769	48.00	57.00
	Total	12	55.9167	7.25457	2.09421	51.3073	60.5260	48.00	70.00
Food Hygiene knowledge	Trained	7	56.8571	9.90671	3.74438	47.6950	66.0193	47.00	70.00
	Untrained	5	48.2000	2.28035	1.01980	45.3686	51.0314	46.00	51.00
	Total	12	53.2500	8.67730	2.50492	47.7367	58.7633	46.00	70.00
Kitchen Hygiene knowledge	Trained	7	59.0000	9.91632	3.74802	49.8289	68.1711	47.00	75.00
	Untrained	5	54.2000	1.48324	.66332	52.3583	56.0417	52.00	56.00
	Total	12	57.0000	7.78110	2.24621	52.0561	61.9439	47.00	75.00

TABLE XLV

TRAINING DATA ANALYSIS IN RELATION TO PERCEPTION OF HYGIENE KNOWLEDGE – ONE WAY ANOVA FOR SYMPHONY RESTAURANT

		Sum of Squares	df	Mean Square	F	Sig.
Personal Hygiene knowledge	Between Groups	72.917	1	72.917	1.441	.258
	Within Groups	506.000	10	50.600		
	Total	578.917	11			
Food Hygiene knowledge	Between Groups	218.593	1	218.593	3.586	.088
	Within Groups	609.657	10	60.966		
	Total	828.250	11			
Kitchen Hygiene knowledge	Between Groups	67.200	1	67.200	1.122	.314
	Within Groups	598.800	10	59.880		
	Total	666.000	11			

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