Original Research Article

Food safety and hygiene practices in medium size hotel in Ondo State, Nigeria.

Abstract

The increasing rate of diseases associated to food has called for serious attention. This assertion forms the basis for undertaken this study that hinged on ensuring food safety and hygienic practices in medium size hotels in Ondo State, Nigeria. The study State was divided into three clusters and two hotels were randomly selected in each of the cluster. A field observation was undertaken to assess the level of compliance with standard guidelines on hygiene and safety measures, examining the equipment used in food preparations and safety measures. The food handlers in the selected hotels were randomly selected while visitors were purposively selected based on their willingness to participate in the study. A well-designed questionnaire was utilized to gather information from both tourists and food handlers. Microbial laboratory analysis was carried out on the collected food samples. The perceptions of the customers on the cleanliness and hygiene examined using a set of ten indicators revealed that customers had positive and good perception of the hotels' environment (weighted mean =4.51 to 4.92) . The results revealed that on the average the food handlers observed most of the itemized practices (weighted mean= 3.28 to 4.0). The viable count (TVC)/ Total viable bacteria count (cfu/g) ranged between **(**4-1**)**$\times 10^3$cfu/g. Though, the selected hotels adhered to food safety and hygiene practices, there is need to maintain and sustain this high level of performance by the relevant stakeholders.

Keywords: customers, cleanliness, food handlers, food safety, hygiene practices

INTRODUCTION

Food borne infections are a serious health issue around the globe today; hence, food safety is seen as a global health objective (Velusamy et al., 2010). These illnesses are pervasive and are becoming a bigger public health issue in both emerging and industrialized nations. Even though there was and continues to be limited water and poor sanitation post-World War II, traveling for fun to developing nations grew in popularity (Kean, 1963). The most prevalent disease among visitors to these nations is still food poisoning, which is typically brought on by germs that may be wiped out by hygienic food production and preparation processes (Shlim, 2005). Although there is no trustworthy information available, this issue poses a considerable effect on the health and economics of poor nations (Martins et al., 2012; Redmond and Griffith, 2003; WHO, 2006), although most seasoned travelers claim that when choosing a destination and making travel plans, food safety comes in second place (MacLaurin, 2003).

WHO (2006) affirmed in 2005, that a population of 1.8 million individuals had died from diarrheal illnesses, which are primarily caused by using tainted food and water. Each year, foodborne illnesses impact a third or more of the world's population, particularly in third-world nations. Among the primary aims of food safety programs at both international and national level is to prevent the cause and growing effect of these illnesses (Notermans et al., 1995). According to a study Campos et al. (2009) stated that stakeholders handling the production, preparation, and

serving of meal performs an important part in food contamination. Undercooked animal products, produce tainted with excrement, and shellfish containing biotoxins are only a few instances of dangerous food, particularly in industrial settings (WHO, 2015).

According to Chassy (2010), the bulk of food-borne illnesses are brought on by poor dietary practices and a failure to minimize the risk associated with food safety. According to the EFSA (2010), about 48.7% illnesses associated with food-borne resulted from the service sector of food industry such as hotels, restaurants and bars while producing food. Even in highly regarded hotels and restaurants, intelligent tourists typically take strict care to avoid eating or drinking anything that may not be safe since they are aware of the absence of food hygiene which tend to alter people's behaviour (WHO, 2010).

The Centers for Disease Control and Prevention (CDC) project that food handlers may be to be blamed for up to 20% illnesses associated with food risk (Assefa et al., 2015). According to Egan et al. (2007), it appears that improper handling of food is the fundamental reason for almost 97% of all food related diseases that are spread through catering services which is a typical department in the hotel. The use of dangerous components, inadequate cooking or rewarming of food, contamination between raw and cooked meals, wrong temperature, storage, and cooling of foods are unsanitary practices that lead to foodborne microbial illnesses (Egan et al., 2007; Webb and Morancie, 2015). These aforementioned elements are typically linked to a lack of practice and understanding (Webb and Morancie, 2015). The transmission of such infections during the preparation of food is facilitated by food workers' ignorance of food safety (Pichler et al., 2014). To sustain safe production of food, it is therefore essential to expand the breadth of food handlers' understanding about food hygiene and the effective use of current data in food processing (Bolton et al., 2008) especially in an hotel setting.

For the fact that so many meals are served each day in the food industry such as hotels, food safety is a top priority. Worldwide reports of food-borne outbreaks due to such large-scale food services facilities are documented (Jones and Angulo, 2006). Although there are many potential causes of foodborne illness, including parasitic and chemical ones, those resulting from microbiological elements stand out as providing the greatest threat to public health. Several variables can cause outbreaks of foodborne illness, but one among the critical factors is unhygienic personal practices (Pichiler et al., 2014). Many studies have shown that food handlers' hands contain harmful germs, making such a very important source of foodborne illnesses (Ferreira et al., 2013; Soares et al., 2012). Therefore, careless handling, coupled with the wrong heat utilization while preparing food and preservation, contamination between items, insufficient tools, and poor personal hygiene, is to be blamed in almost all the several cases of food related illnesses. Another significant element which may contribute significantly to food safety behavior and procedures is the attitude of the individuals handling food (Al-Shabib et al., 2016). Refresher education and consistent focus on the best practices of how to properly handle food could sustainably enhance sanitation procedures among individuals handling food. According to a recent systematic review of food safety training, it increases technical know-how and improves attitudes about how to keep hands safe for food preparation. (Soon and Baines, 2012).

Studies indicate that even if there is more information about food safety, good hygiene measures are not always followed (Ansari-Lari et al., 2010; Buccheri et al., 2010; Ferreira et al., 2013; Park et al., 2010) in the food and beverage section of several hotel establishments, that may be due to significant obstacles, such as the negative attitudes of superiors and coworkers, time constraints, and/or a staffing shortage, as well as structural reasons like the availability of

facilities and materials (Soares et al., 2012; Laikko-Roto and Nevas, 2014). According to several findings, certified kitchen supervisors and managers were more proactive than their non-certified counterparts during food handlers' orientation (Laikko-Roto and Nevas, 2014; Roberts & Barret, 2009). It has also been recommended that having certified supervisors who guide the procedures of how staff handle food is essential for reducing non-adherence (Cates et al., 2009; Kassa et al., 2010), which limit food related diseases contamination in hospitality outlets (Hedberg et al., 2006).

Hotels are significant components of the tourism sector, particularly in Nigeria, where all-inclusive lodging and sizable culinary operations are commonplace. According to Kukoyi and Ijose (2023), holidays can be a time for rest and enjoyment as it is implied in the adage which states that "All work and no play makes Jack a dull boy", this suggests that recreation is necessary for people to live a good life. However, travelling for the purpose of holidays especially when the need to stay in a hotel arises, could also present concerns for travelers with food allergies (Tuncer and Akolu, 2020), which necessitates the hospitality outlets to be cautious with food preparation to prevent health risks for visitors (Baser et al., 2017). In the hospitality industry, by improving food handlers' understanding of food issues and food safety management practices and competencies, hotels can prevent various health hazards and allergic responses by avoiding the use of particular foods as recipe thereby eliminating cross-contamination among different food types (Shafie and Azman, 2015).

The occurrence of food-borne illnesses, which can ruin the promotion of a nation as a tourism domain, is substantially influenced by the non-availability of safety regulations for how to prepare meal and a deficient training system for food safety (World Health Organization, 1999). Therefore, less advanced nations would gain from food service industries that implement certified food safety standards by providing food quality assurance, which is expected to boost the hotel's competitiveness while creating positive awareness for the country as a reputable travel destination. Examples of such standards are the GHP and HACCP standards. For instance, a rating system for a food establishment's degree of food safety has been in existence for ten years in Los Angeles. More than 90% of those polled thought the system was effective, and there has been a 13% decrease in the number of hospitalizations for food-borne illnesses (Collins, 2010).

The most crucial factors for hotel staff to safely manage meals may include their familiarity with probable allergen menu items, preparation techniques for hygienic meal, food presentation and storage protocols (Abbott et al., 2009; Wen and Kwon, 2019). In respect to Ondo state in Nigeria, allegedly, a considerable number of small scale hotels tend to employ non-certified food handlers to execute their food and beverage production and services for reasons which may not be far from the need to cut cost. There is high probability that employing the services of certified food specialist in an hotel may somehow cost the management a good sum of money that may seem difficult to recover especially when visitors' influx are limited and not constant. This act of cutting cost in an attempt to achieve revenue management would definitely be detrimental to the health of the visitors who consume food and beverages produced and served by handlers that fail to adhere to standardized food safety protocols.

There are many research studies about food handlers' understanding on the safety of food in various nations, such as Taiwan (Wu, 2012), Ghana (Kunadu et al., 2016), Turkey (Baser et al., 2017; Tokuç et al., 2009; Baş et al., 2006), Malaysia (Shafie and Azman, 2014), Brazil (Soares et al., 2012; Rebouças et al., 2017), Vietnam (Samapundo et al., 2016) and Jordan (Osaili et al., 2017; 2018). Indices from numerous studies indicate that participants' understanding of food safety was lacking. Furthermore, in a Nigerian context, little to no information is readily

available to ascertain food safety and hygiene compliance in small sized hotels which are often overlooked by regulatory agencies, hence, this study was conducted to uncover the issues associated with food safety and hygiene in small size hotels in Ondo State, Nigeria.

RESEARCH METHODOLOGY

The study area

In the southwest of Nigeria, Ondo State is situated between latitudes $5^0$45' and $7^0$52' N and longitudes $4^0$20' and $6^0$50' E. The governing capital city of Akure, as well as other sizable communities like Ondo and Owo, are located in the central region. Together with Akure, these cities are home to the majority of the state's governing bodies and nongovernmental organizations (Akinbode et al. 2008). Comparatively speaking, the northern and southern portions are not as developed as the central portion. Overall, the terrain rises from the coastlines (llaje and Ese Odo), which are less than 15m above the average sea level, in the south to the rugged slopes in the northeast region of the northern (Akoko) part. The slope of the area consists of lowlands as well as rugged terrain with granular outcrops in multiple places. Some interior communities, like Idanre, are characterized by hills that are higher than 250 meters. The region's major rivers flow southward into the Atlantic Ocean.

The study area is located in Nigeria's wet and dry climatic zones and the tropical rain forest environmental zone, respectively (Mamman et al. 2000; Eludoyin et al. 2014). The tropical rain forest has a fairly narrow temperature range, reaching a maximum of 288 °C in the warmest month and 268 °C in the month with the lowest temperature. The highlands (north), coastline (south), and middle (or center) regions of Ondo State can be distinguished. The rainy season runs from April to October, and the period without precipitation runs from November to March of the following year. The mean monthly precipitation displays a seasonal fluctuation pattern. In contrast, mean, highest, and lowest temperatures fluctuate inversely with rainfall; they are greater during the dry period than during the rainy season. Based on spatial interpolation of the available climatic data, heat has shown a pattern that represents regional variability, whereas average rainfall has dropped as one moves further north. The cluster of the hotel and road networks is as shown in figure 1

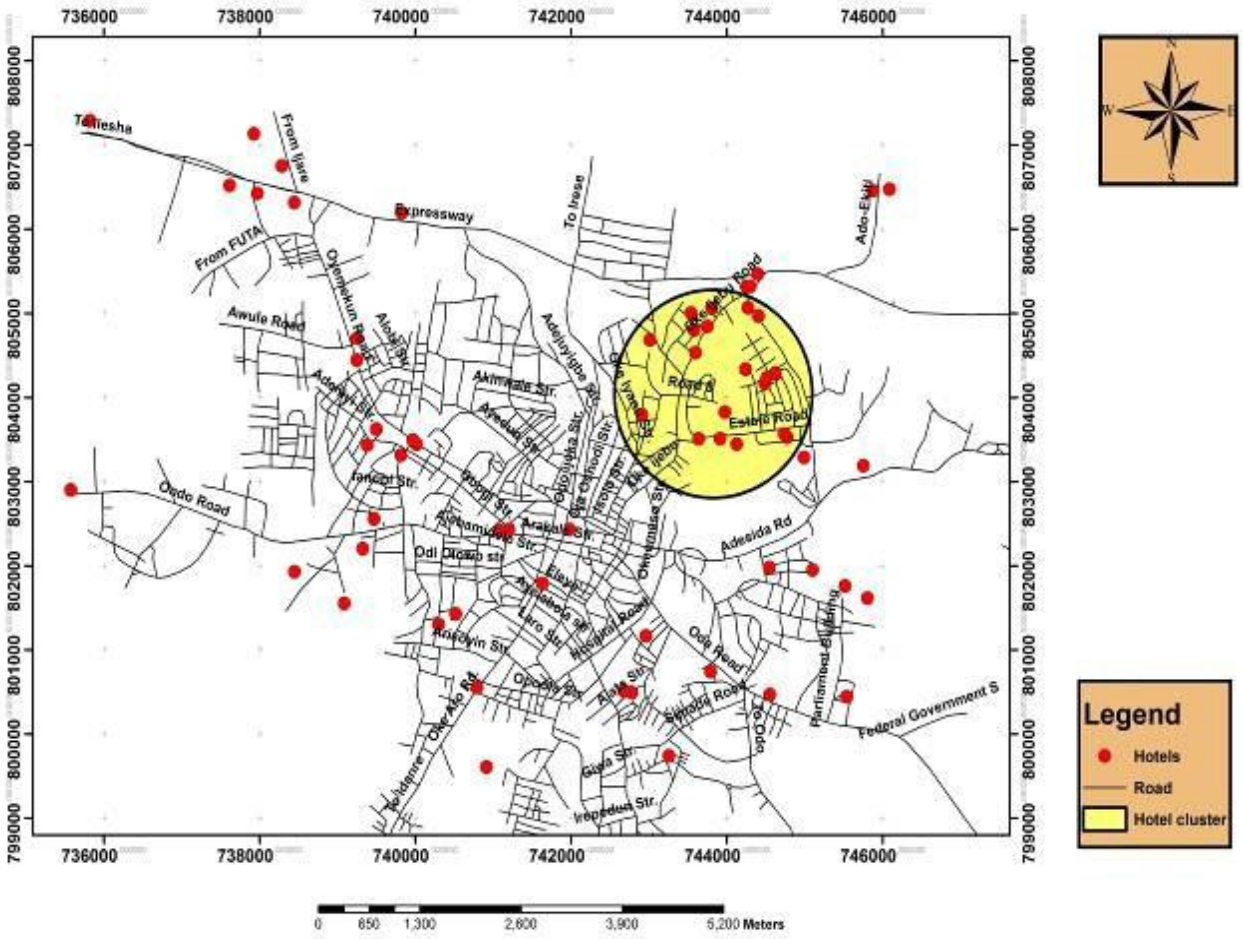

Figure 1: Map showing hotel cluster in Akure.

SOURCE: Adeyemi, 2013.

3.2 Materials and Methods

Methods and Procedure for Data Collection

For the purpose of this study, population sample were the staff and visitors/tourists at the selected hotels in the three senatorial districts in Ondo State. For this research, random sampling techniques described by Bryman and Cramer (2005) were used in selecting the staff in order to give every staff equal rights of participation. The questionnaire was administered to visitors who were willing to participate in the study. The content validity of the instrument was measured by subjecting them to constructive criticism from educational research experts within the faculty in the university also by the researcher's supervisor. Their criticism correction and suggestion might lead to the rejection of some Items some will be approved before the research work

Sample size

A total of three hundred and eighty two tourists/ visitors were purposively selected from the six medium sized hotels randomly selected across the three Senatorial districts/clusters in Ondo State. The selected Medium sized hotels are based on Glen and Mearns, 2018 categorical

explanation that small sized low-rise lodging establishment similar to a limited service with relatively fewer than 50 rooms and limited employees. Two hotels were randomly selected in each cluster. Additionally, 100 hotel employees that are food handlers were randomly selected for the study using parameters such as the job status and years of working experience in food preparation, handling or serving of food, cleaning of plates, dishes, tables, kitchen, operating food equipment and any operation that involving direct contact with food.

Instrument for Data Collection

This study was accomplished using;

Field Observation: A visit to the hotels was carried out by the researcher to assess the level of compliance with standard guidelines on hygiene and safety measures, conduct a sensory evaluation in each hotel, examining the equipment used in food preparations and safety measures.

Questionnaire: A well-designed questionnaire was utilized to gather information from both tourists and food handlers. The survey instruments are divided into numerous sections that cover a variety of sociodemographic topics, including age, gender, travel experiences, country of origin, revenue, and level of education. Customers' opinions of the state of cleanliness and sanitation of the hotel's environment were rated on a Likert scale with five points ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), the level of hygiene practices and safety in the kitchen design and environment of the hotel were rated on a five-point Likert scale that varied from 1 (Strongly Disagree) to 5 (Strongly Agree), and the level of adherence to personal hygiene of food handler cleanliness practices and safety of kitchen equipment and supplies for food storage, processing, and preparation are graded in hotels on a Likert scale with four points, ranging from 1 (very poor) to 4 (very high).

Microbial laboratory analysis

The following foods: (1) Fried rice and beef were bought at Frankel international lodge Ore (2) Beans, fried plantain, egg were bought at St Jecob Hotel, Alagbaka, Akure (3) Pounded yam, egusi soup with fish and ponmo were bought at Consider Top 1 Hotel (4) Eba, vegetable, ponmo were purchased at Towlab Hotel, Akure (5) Jollof rice, moimoi with chicken were purchased at Niman Hotel, Ikare. (6) Fufu and egusi soup, with ponmo and fish were bought at Bollinton Hotel, Ikare. The foods were immediately taken to the laboratory, stored in a refrigerator at 4º C for further analysis

Microbial analyses of Food

Preparation of culture media

The media used in this study effort were: Nutrient Agar (NA), MacConkey Agar (MCA), Mannit ol Salt Agar (MSA) and Potato Dextrose Agar (PDA). These were all prepared as instructed on the containers, according to the manufacturer's specifications.

Sterilization of materials and culture media

Glassware such as conical flasks, measuring cylinders, Petri dishes, McCartney bottles, cork borer, and other glass containers were all cleaned, drained, and dried. They were then autoclaved at 121 °C for 15 minutes for sterilization and allowed to cool to 40 °C before use. Nutrient Agar (NA), Maconkey Agar (MCA), Monitor Salt Agar (MSA) and Potato Dextrose Agar (PDA) were also sterilized by autoclaving. Swabbing work surfaces with 95% ethanol disinfects them. Spirit lamps were used to create an aseptic working atmosphere.

Preparation of diluent

Per 100 ml of distilled water, 0.85 g of NaCl was measured into it and dissolved by mixing, while 9 cc of the solvent was poured into serial dilution bottles and sterilized for serial dilutions.

Microbial counts of the food

A total of 225 milliliters of sterile saline water were mixed with 25 milliliters of each cookie sample. The jar was properly combined with this using the pour plate method. Individually sterilized agar was introduced and swirled to fill the petri dish's surface after each specimen (1 ml) was put into sterile petri dishes. The microbial development was measured using a colony counter after the coliform count and complete viable count plates were incubated at 32 °C for 24 hours. 72 hours were spent incubating the total count plates at room temperature (APHS, 2008).

Method of Data Analysis

Descriptive analysis was employed to analyze the questionnaire using SPSS IBM version 21. All results were illustrated using tables and charts; inferential statistics were deployed for testing the hypotheses. Data on interview were analyzed qualitatively through thematic analysis.

RESULTS

The results of this study are presented in this chapter. For the tourists/visitors , all the three hundred and eighty-two (382) questionnaire administered were on them were retrieved and found suitable for the analysis carried out in view of the good quality of information supplied thereby giving 100% retrieval rate. However, the numbers of questionnaire retrieved from the food handlers that are staff of the hotel varies based on their responses to the questions asked however the retrieval rate was high and useful for the subsequent data analysis.

The socio-demographic characteristics of the tourists/visitors/customers

The result of analysis on gender distribution shows that the males constituted the majority (68.3%) while the females accounted for 31.7% (Table 1). It can also be seen that tourists of different age brackets were involved in the study with those between 25 to 54 years forming the majority (74.6%) while those who fell within the age range of 18 to 24 years accounted for 22% and the remaining 2.2% were those between 55 to 64 years of age. With respect to the distribution of respondents on the basis of occupation, the results reveal that those who were into business accounted for 39.5%, while the remaining 3.4% fell within the age 55 to 64 years. The distribution of respondents by educational status reveals that majority (74.6%) acquired Tertiary education while the remaining 25.4% had secondary school education. The distribution of respondents according to marital status reveals that the married formed 40.8%, while the singles accounted for 59.2%. The distribution of respondents by monthly income reveals that on cumulative basis, the majority (95.3%) earned between N30, 000 to N150, 000 out of which only 22% earned less than N 90,000. The distribution of respondents by national background reveals that majority (91.4%) was Nigerians and only 8.6% were foreigners.

Table 1: Socio-Demographic Characteristics of Tourists/visitors/customers

Gender	**Frequency**	**Percentage**	**Cumulative Percentage**
Female	121	31.7	31.7
Male	261	68.3	100.0
Age (years)			
18-24	84	22.0	22.0
25-54	285	74.6	96.6
55-64	13	3.4	100.0
Occupation			

Civil servant	29	7.6	7.6
Business	151	39.5	47.1
Others	202	52.9	100.0
Education			
Secondary	97	25.4	25.4
Tertiary	285	74.6	100.0
Marital status			
Married	156	40.8	40.8
Single	226	59.2	100.0
Household size			
1-3	132	34.6	34.6
4-6	154	40.2	74.9
above 6	96	25.2	90.8
Monthly income (Naira)			
<30,000	-	-	-
30,000-60,000	16	4.2	4.26
61,000-90,000	68	17.8	22
91,000-120,000	91	23.8	45.8
121,000-150,000	189	49.5	95.3
above 150,000	18	4.7	100.0
Nationality			
Nigerian	349	91.4	91.4
Foreigner	33	8.6	100.0
Total	382	100.0	

Customers' Perception of the Cleanliness and Hygiene of the Hotels' Environment

The perception of the customers (tourists) was examined using a set of ten (10) indicators such as the state of the hotels' bedroom, bathroom, dining restaurant, swimming pool, etc as displayed in table 2. The results indicate that the customers had positive and good perception of the cleanliness and hygiene of the hotels' environment; this is established by the weighted mean response score which ranges from 4.51 to 4.92. The grand mean response score of 4.74 also substantiate the finding. On the average, the sampled hotel customers strongly agreed that the cleanliness and hygiene of the hotels were in good condition.\

Table 2: Customers' Perception of the Cleanliness and Hygiene of the Hotels' Environment1520, 312 1755, 124

S/N	Items	SA	A	N	D	SD	WS	WM	Decision
1	The bedroom is neat	304	78	-	-	-	382	4.80	SA
2	The bathroom is neat	351	31	-	-	-	382	4.92	SA
3	The dining restaurant is neat	317	65	-	-	-	382	4.83	SA
4	The swimming pool is neat	248	89	45		-	382	4.53	SA
5	The hotel's environment is free from odour and pollution	247	83	52	-	-	382	4.51	SA
6	The toilet in the hotel is neat	240	142	-	-	-	382	4.63	SA
7	There is provision of proper waste disposal in the hotel	315	67	-	-	-	382	4.82	SA
8	The hotel environment is neat and tidy	302	80	-	-	-	382	4.79	SA
9	The staff is neat and attractive	306	63	13	-	-	382	4.77	SA
10	The food is neat and appealing	289	93	-	-	-	382	4.76	SA
	Grand mean response score							4.74	SA

NOTE: SA = Strongly agreed, A = Agreed, N = Neutral, D = Disagreed, SD = Strongly disagreed, WS = Weighted sum, WM = Weighted mean

Socio-Demographic Characteristics of the food handlers/staff

The result of analysis on gender distribution shows that the males constituted the majority (60.0%) while the females accounted for 40% (Table 3). The distribution of the staff by age reveals that those between 25 to 54 years formed the majority (60%) while those who fell within the age range of 18 to 24 years accounted for 28% and the remaining 4% were those between 55 years and above. The distribution of respondents by educational status reveals that majority (64.0%) acquired Tertiary education while the remaining 36.0% had secondary school education. With respect to the distribution of respondents on the basis of job status/position, cleaners and cook, managers and waiter/waitress accounted for 12%, 32%, 24% and 32% respectively. The distribution of respondents by job experience, those who had between 1 to 3 years formed 28%, 4 to 6years(32%), 7 to 10 years (12%) and those who had more than 10 years accounted for 28%.

Table 3: Socio-Demographic Characteristics of the Food handlers (Hotel Staff)

Gender	Frequency	Percentage	Cumulative Percentage
Female	40	40.0	40.0
Male	60	60.0	100.0

Age (years)			
18-24	28	28.0	28.0
25-54	68	68.0	96.0
55 and above	4	4.0	100.0
Education			
Secondary	36	36.0	36.0
Tertiary	64	64.0	100.0
Job status			
Cleaner	12	12.0	8.0
Cook	32	32.0	40.0
Server	24	24.0	68.0
Waiter/Waitress	32	32.0	100.0
Job experience (years)			
1-3	28	28.0	28.0
4-6	32	32.0	60.0
7-10	12	12.0	72.0
Above 10	28	28.0	100.0
Total	100	100.0	

Food Safety and Hygiene Practices among Food Handlers

In order to examine the level of personal hygiene of food handlers in the hotels, questions were asked on how often certain practices were observed in the course of discharge of their duties (Table 4). The results reveal that on the average, they always observe most of the itemized practices such as "keeping hands clean", "wear suitable hygienic clothing, including gloves, hair covering, footwear, where necessary", "avoid touching ready-to-eat foods with bare hands", "avoid wearing wrist watches or jewelries", "avoid careless spitting, sneezing, touching face or hair and eating food, while handling food", "washing of hands", "keeping fingernails short and neat", "keeping all cuts, burns and other opening of the skin covered when handling food" as indicated by weighted mean response score which ranges from 3.28 to 4.0. They however indicated that they occasionally observed "stepping on the footbath before food handling" and "drying hands using a disposable towel before and after handling food" as reflected by the estimated weighted mean response of 3.28 and 3.56 respectively.

Table 4: Food Safety and Hygiene Practices among Food Handlers

S/n	Items	Always	Occasionally	Rarely	Never	WS	WM	Decision rule
1	Keep hands clean	100	-	-	-	100	4	Significant
2	Stepping on the footbath before food handling	40	18	18	-	76	3.28	Not Significant
3	Wear appropriate, hygienic attire, including gloves, hats, and shoes when	76	15	2	-	93	3.79	Significant

	necessary.							
4	Do not use bare hands when touching prepared dishes.	88	6	-	1	95	3.9	Significant
5	Avoid wearing wrist watches or jewelries	76	12	-	2	90	3.8	Significant
6	When handling food, refrain from eating, spitting, touching your face or hair, or smoking.	80	3	4	2	89	3.81	Significant
7	Washing of hands, especially							
i	when raw meat is handled	100	-	-	-	100	4	Significant
ii	prior to and shortly after putting on gloves	76	15	2	-	93	3.79	Significant
iii	immediately after using the toilet	100	-	-	-	100	4	Significant
iv	after touching waste	96	-	2	-	98	3.96	Significant
v	when cleaning is done	96	3	-	-	99	3.96	Significant
vi	when fingers are used in wiping nose	100	-	-	-	100	4	Significant
vii	shortly after fingers come in contact with phones	76	12	4	-	92	3.78	Significant
viii	after touching light switches	56	24	6	-	86	3.58	Significant
ix	after handling door handles	56	24	4	1	85	3.58	Significant
x	after handling money	64	12	8	1	85	3.63	Significant
8	Drying hands using a disposable towel	60	6	8	4	78	3.56	Significant
9	Keeping fingernails short and neat	84	-	4	2	90	3.84	Significant
10	Keeping all cuts, burns and other opening of the skin covered when handling food	88	3	2	1	94	3.89	Significant

Food Safety and Hygiene Practices in Kitchen Design and Environment

On the examination of food safety and hygiene practices in kitchen design and environment, the results indicate that the respondents rated very high all the indicators used for the assessment of this aspect of the hotels. The indicators range from the materials used in the floor and wall construction, ceiling and overhead fittings, nature of the doors, washing facilities, ventilations, drainage system and storage facilities among others. The estimated weighted mean response score ranges from 4.24 to 4.68. The grand mean response score of 4.6 indicates that this aspect of the hotel is rated high by the respondents as they strongly agreed with the opinion statements presented (Table 5). 450

Table 5: Food Safety and Hygiene Practices in Kitchen Design and Environment

S/n	Items	SA	A	U	D	SD	WS	WM	Decision
1	Floors are made of materials that are simple to maintain, safe to walk on, and kept in good condition.	90	10	-	-	-	100	4.9	Significant
2	The materials used to construct walls are washable, non-hazardous, long-lasting, and simple to clean and maintain.	79	18	3	-	-	100	4.76	Significant
3	Ceilings and above fixtures (lighting, plumbing, and cabling) are made to avoid dirt buildup, mold growth, moisture, and contamination risk.	70	22	8	-	-	100	4.62	Significant
4	Windows are made to avoid dirt gathering and, when necessary, feature insect screens.	84	12	4	-	-	100	4.80	Significant
5	Doors are made of materials that are not absorbent and are simple to clean.	70	18	6	-	-	94	4.40	Significant
6	Smooth, washable, non-toxic, corrosion-resistant materials are used for surfaces, and they are kept in good shape.	80	16	-	2	-	98	4.68	Significant
7	There are enough appliances and food washing machines that have hot as well as cold water.	85	13	-	2	-	100	4.81	Significant
8	Separated from areas where food is prepared are staff restrooms and hand washing stations with soap, running water that is both hot and cold, and sanitary drying.	75	22	3	-	-	100	4.75	Significant
9	Kitchen is well ventilated	64	24	11	-	1	100	4.50	Significant
10	There is adequate lighting of the kitchen	65	32	3	-	-	100	4.62	Significant
11	There is drainage for kitchens	65	15	10	-	-	100	4.15	Significant
12	When necessary, facilities are provided for personnel to change their attire.	65	23	12	-	-	`100	4.53	Significant
13	Cleaning agents, disinfectants, and other chemicals are kept in a separate or dedicated store.	78	14	6	2	-	100	4.62	Significant

Hygiene Practices and Safety of Kitchen Utensils and Equipment, Food Storage, Processing and Preparation in the Hotels

Assessment of safety and hygienic practices of kitchen utensils and equipment, food storage, processing and preparation carried out revealed that the respondents scored the various components very high. The indicators used include cleanliness of the cooking tools and equipment, the use of food safety and metal detectable equipment, prevention of contamination of ready-to-eat foods from cutting boards, plates and cutleries, the use of non-toxic storage containers, the use of safe water and ingredients, washing of food materials thoroughly, cooking of food thoroughly, keeping of food at safe temperatures among others. The weighted mean response score ranges from 3.52 to 3.92 (Table 6).

Table 6: Hygiene Practices and Safety of Kitchen Utensils and Equipment, Food Storage, Processing and Preparation in the Hotels

S/N	Items	Very High	High	Low	Very Low	WS	WM	Decision
1	Using of safe water and ingredients	92	6	-	-	98	3.92	Significant
2	Washing of food materials thoroughly	76	18	-	-	94	3.76	Significant
3	Cooking of food thoroughly	72	21	-	-	93	3.76	Significant
4	Keeping of food at safe temperatures	84	12	-	-	96	3.84	Significant
5	Separating raw food items from cooked food	80	12	2	-	94	3.76	Significant
6	Checking and observing the use-by dates on food products	80	12	2	-	94	3.76	Significant
7	Storing food in suitable, covered containers.	80	15	-	-	95	3.8	Significant
8	If you have wounds that are open or skin infections, diarrhea, vomiting, or an infectious sickness, don't work in a food preparation area.	88	9	-	-	97	3.88	Significant
9	Storage of food in safe and non-contaminated environment free from rodents and insects.	76	18	-	-	94	3.76	Significant
10	Raw food products are always purchased from safe sources	72	21	-	-	93	3.72	Significant
11	Ensure that cooking tools and equipment are clean and sanitized	80	15	-	-	95	3.8	Significant
12	The use of food safety equipment and metal detectable equipment	56	30	2	-	88	3.52	Significant
13	Preventing cutting surfaces and other kitchen equipment from	56	30	2	-	88	3.52	Significant

	contaminating ready-to-eat food							
14	Plates, cups and other cutleries are always thoroughly washed and sanitized before use	72	18	2	-	92	3.68	Significant
15	The use of strong and non-toxic food storage containers	76	18	-	-	94	3.76	Significant

Microbial count on the food

The method is based on counting the colony-forming units (CFU) that have been produced on agar. The viable count (TVC)/ Total viable bacteria count (cfu/g) is one of the microbiological quality of both water and food. Microbial counts on food are presented in Table 7. The viable count (TVC)/ Total viable bacteria count (cfu/g) ranged between **(**4-1**)**$\times 10^3$cfu/g. The Sample S1, (1×10^3) had the lowest value while sample S4, (4×10^3), had the highest value. Sample S2, and sample S6 had similar value (2×10^3), while similar value (3.00×10^3) was also observed in sample (S3) and (S5).

Table 7. Microbial count of the prepared food

Sample	Total viable count (cfu/g)	*Staphylococcus aureus* (cfu/g)	Coliform count cfu/g	Fungal count sfu/g
S1	1.00×10^3	Nil	Nil	Nil
S2	2.00×10^3	1.00×10^3	Nil	Nil
S3	3.00×10^3	Nil	Nil	Nil
S4	4.00×10^3	1.00×10^3	Nil	Nil
S5	3.00×10^3	Nil	Nil	Nil
S6	2.00×10^3	Nil	Nil	Nil

Six samples of the food were formulated as presented;

- Sample 1 (S1) = 10g of Eba : 5g vegetable : 5g of ponmo
- Sample 2(S2) = 10g of pounded yam: 5g of Egusi soup : 5g of fish : 5g ofponmo
- Sample 3 (S3) = 10g of Fufu : 5g of Egusi soup: 5g of ponmo: 5g offish
- Sample 4 (S4) = 10g Beans:5g of fried plantain : 5g of egg
- Sample 5 (S5) = 10g of fried rice : 5g of beef
- Sample 6 (S6) = 10g of Joulof Rice: 5g of chicken : 5g of moinmoin

Discussion of Findings

Food Safety and Hygiene Practices among Food Handlers

Generally speaking, the results of this study scored the handlers of food in the hotels' in respect to the safety of food and hygienic practices. This is a positive development for the hospitality industry especially the hotel sub sector. This assertion aligns with Bharwani *et al* (2015) who identified that hygiene as a critical contributor of risk in hospitality establishments, hence it is perceived to be pertinent by hoteliers. The study placed particular emphasis on hotels' adherence to food preparation hygiene standards and visitors' physical safety. The workers in the kitchen

significantly contribute to food safety since they have direct contact with the food items. To emphasize, the hospitality sector should recognize, adopt, and apply best practices for food safety in order to decrease the incidence of what is known as an avoidable illness. It is important to take seriously the need for personnel to be retrained and educated to pay closer attention to personal cleanliness. This is particularly important in view of the fact that food handlers in this study did not really considered it significant to observe the practice of "stepping on the footbath before food handling" and "drying hands using a disposable towel before and after handling food". The cleanliness of the space where food and beverages are prepared is something that hotel management should take into consideration (Sneed et al., 2004; Shi, 2017). The cleanliness and quality of the food offered are important aspects that affect how satisfied guests are with hotel services (Darko et al., 2015). The food items should be prepared and served in a way that does not constitute threats to the consumers.

Customers' Perception of the Cleanliness and Hygiene of the Hotels' Environment

It is interesting to note that, on the average, customers of the hotels examined in this study had good and positive perception regarding the cleanliness and hygiene of the hotels' environment. This is an indication of customers' satisfaction with these facilities. The satisfaction of customers in hotel services according to Darko *et al* (2015) is based on the quality of hygiene of food, clean rooms, bathrooms, kitchen and the dining restaurants. Customers place high premium on the state and quality of facilities such as bedroom, bathroom, dining restaurant, swimming pool, toilets and the general outlook of the hotel environment (Baquero, 2023). Failure to ensure good quality of the hotel facilities and its environment may have negative impacts on their performance.

Food Safety and Hygiene Practices in Kitchen Design and Environment

The design of the hotels' environment especially that of the kitchen is considered very important to food safety and hygiene practices. If they are well designed in the appropriate manner, they can contribute positively to this issue, otherwise good hygiene practices may be difficult. The findings of this study also revealed that on the average, the kitchens of the examined hotels were well constructed and designed in ways that promote food safety and hygiene practices. The kind of materials used in the construction of kitchen floors, walls, ceilings, windows and doors of the hotel are capable of reducing risks to food safety (Ntawubizi, et al., 2023). Provision was made for ventilation, lightening and good drainage system in the kitchens.

Hygiene Practices and Safety of Kitchen Utensils and Equipment, Food Storage, Processing and Preparation in the Hotels

Food safety management practices that help to prevent and control food hazards during production, storage, processing and preparation is very key to ensure the safety of food consumption of the hotel customers. In likewise manner, the kitchen utensils and equipment that are used must not constitute threats to food safety. The findings of this study established a high level of adherence to these practices among the selected hotels. In recognition of the importance of this area, Al Yousuf *et al* (2015) emphasized that hotels should apply a Hazard Analysis Critical Control Point (HACCP) food safety management system to minimize and control food hazards in the hospitality industries.

Microbial count on the food

The bacteria detected could be as a result non sterile water used with high micro particles. This could be as result of non-sterile water water with high miro particles as reported by Fraser *et al.*, 2009). It was also revealed that there were no growth of *Staphylococcus aureus, coliform* count, in sample (1), (3), (5) and (6) but a slight contamination with food borne microbes of human

origin resulting from improper handling and processing was observed in sample (2) and (3).. This is in line with the observation of Al-Bahry*et al*., 2014 that *Staphylococcus aureus* are commonly found in the skin of mammals, nasal passages, throat, hair of the carrier and food is usually contaminated from nasal secretions, sneezing, coughing and direct hand contact of infected carriers. Foods that were carried to the laboratory were processed according to standard guidelines adopted from (Eisenberg *et al*.,1975). and then most probable number method (MPN) was applied to find out the total coliform count. About 90 % of the samples were found to have lower or no coliform count (<100 per gram) that's satisfactory level, similar to the observation reported by Susmita*et al.*, 2020. The growth and metabolic activity of fungi (Yeasts and moulds) in food can have different effects. On the one hand, undesirable changes such as decay and spoilage and even toxin formation may occur. This research showed no fungi recorded which may be an indication that the prepared food are safe for consumption.

Conclusion and Recommendations

It can be concluded that the selected hotels in this study are faring well with respect to adherence to food safety and hygiene practices. The finding is viewed as a good development for the hospitality industry in Ondo state. There is however the need to maintain and sustain this high level of performance by the relevant stakeholders for the future of the industry.

Recommendations

Based on the findings of this study, the following are recommended:

- The relevant stakeholders must not relent in upholding the safety rules and regulations guiding the activities of hotelsin Ondo state for the overall interest of the sector.
- Close monitoring and supervision of hotels in Ondo state by the regulators should be embraced and promoted for economic gains
- The hotel management should continue to train and retrain their staff for better performance
- The relevant authorities should ensure that hotels are not built indiscriminately especially in non-serene environment for customers' comfort and satisfaction.

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