International Journal of Business and Management Review
Vol.9, No.1, pp.78-93, 2021
Print ISSN: 2052-6393(Print),
Online ISSN: 2052-6407(Online)

FOOD HYGIENE MANAGEMENT AND SAFE FOOD PRODUCTION: AN OPERATIONAL ANALYSIS OF QUICK SERVICE RESTAURANTS IN PORT HARCOURT

NDU, Eugene Chigozie (PhD) and ASIEGBU, Ucheoma A.
Department of Hospitality Management and Tourism,
Faculty of Management Sciences,
University of Port Harcourt.

ABSTRACT: *Safe food production is considered as a concept of central importance because it plays an essential public health function. Unsafe food continues to be a public health problem worldwide because food borne illnesses have high prevalence locally and internationally. The objective of this study is to establish a relationship between food hygiene management and safe food production in quick service restaurants in Port Harcourt. Food hygiene management was dimensioned with personnel training, workplace design and use of personal protective equipment; while safe food production stood as standalone variable. This gave rise to three hypotheses. The cross-sectional survey of the quasi-experimental design was used to collect the data. 175 respondents returned their questionnaire copies. The data was described using frequencies and percentages while Pearson correlation statistic was used to test the hypothesis using SPSS version 21. The results showed that the dimensions of food hygiene management had significant and strong direct correlation with safe food production. Thus, it was concluded that food hygiene management is positively and significantly correlated with safe food production in quick service restaurants in Port Harcourt. Therefore, it is recommended among other things that managers of quick service restaurants in Port Harcourt should always organizes periodic staff training in order to keep members staff updated with current and safety trends in the industry.*

KEYWORDS: Personnel training, workplace design, use of personal protective equipment, standard operating procedures.

INTRODUCTION

In recent times over 600 million people globally are estimated to have post food consumption illnesses; and among these, 420,000 die annually giving rise to 33 million disability adjusted life years (DALYs) with an estimated cost of illness placed at US$3.6 billion in Nigeria yearly (Iro, et al., 2020; World Health Organization [WHO], 2017; Ezirigwe, 2018). This situation was occasioned by inadequate or faulty food hygiene and safety management. Food handlers in the food chain recurrently have insufficient knowledge of standards to assure food safety operations, and their practices mirror these shortfalls (Iro et al., 2017; Azuama et al., 2018; Amadi et al., 2018; Chukuezi, 2010); as well as in the poor microbial qualities of the food produced by the food handlers (Onyeneho & Hedberg, 2013; Ifeadike et al., 2014). Safe food production is considered as a concept of central importance because it plays an essential public health function. Unsafe food remains a public health problem worldwide because food borne illnesses have high prevalence

locally and internationally. Consequently, consumers are ever more concerned with the safety of food and food quality. They request more transparency in food production and distribution (Akonor & Akonor, 2013). Faulty food hygiene and safety management systems may lead to loss of healthy life years. (Iro et al., 2020). According to Shiklomanov (2000), safe food production is a scientific discipline that explains handling, preparation, and storage of food by adopting procedures that prevent foodborne illness as well as promote health. This includes a broad range of routines which ought to be strictly adhered to, so as to avoid severe health hazards. In the restaurants, these routines include proper sanitation of equipment, proper food storage, appropriate cooking duration and temperature, storing food within the appropriate temperature. Safe food production sometimes overlaps with food defence to prevent food spoilage and hurt to consumers. In considering market to consumer practices, food ought to be safe in the market and part of the concern is safe food delivery and presentation to the consumer (Akonor & Akonor, 2013; Shiklomanov, 2000). Safe food production ensures that the purpose of protecting the health of consumers and ensuring just practices in the food trade is achieved. Which is the primary aim of establishing the Codex Alimentarius Commission by Food and Agriculture Organization (FAO) and WHO.

Food hygiene on the other hand is a broad term used to describe the preservation and preparation of foods in a manner that ensures that the food is safe for human consumption (Malcolm & Bronwyn, 2005). Food hygiene deals with the prevention of food contamination at all stages of production, collection, transportation, storage, preparation, sale and consumption. Diseases such as E. coli O157:H7 infections connected to ground beef and ready-to-eat chicken salads, Listeriosis associated with dairy products, Salmonella infections linked to cucumbers, Hepatitis A linked to frozen berries, etc (PECB, 2014) may arise when unsafe foods are consumed. The practice of food hygiene as part of food safety measures includes a range of procedures which ought to be adhered to in order to avoid the possibility of severely hazardous health situations (WHO, 2007). These procedures should be properly managed in absolute to be able to achieve the desired goal. Codex Alimentarius defines food hygiene as "all conditions and procedures necessary to ensure the safety and suitability of food at all stages in the food chain," and food safety as "assurance that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use" (WHO & FAO, 2009).

According to World Health Organization (2007) food can transmit diseases from people to people and also favour proliferation of microorganisms; this makes work place sanitation very important. Work place sanitation entails keeping the preparation area clean and relatively germ-free. Sanitation issues in food production comprises of four components which include:

a. quality of the raw food
b. personal hygiene of the personnel handling the food.
c. the sanitation of the environment where the food is being stored, prepared and served; as well as
d. the equipment being used.

The five basic principles of food hygiene, according to WHO are:

a. prevent food contamination with pathogens spreading from people, pets, and pests.

b. separate raw foods from cooked foods to check cross contamination of the cooked foods.
c. cook foods for the appropriate duration and at the right temperature so as to kill pathogens and save the nutrients the foods are meant to provide.
d. store food within the proper temperature; and
e. use safe water and safe raw materials (WHO, 2000).

A defect in the hygiene and sanitation standards of any of the components listed above can result to food contamination and subsequently food borne diseases and food poisoning which must be avoided (Fosket & Ceserani, 2007). Moreover, Food, being an important and the only substance that is universally consumed by all humans and animals to stay alive, need to be properly handled because contamination anywhere along the food chain can have far reaching effects and sometimes fatal consequences. People mostly seek food from food service establishments when the need arises. Food service establishments are institutions that serve already prepared meals to the consumers. They mostly operate on commercial basis and help workers to cope with prolonged time away from home (Asiegbu & Igwe 2017). Food borne illnesses have become a burden because it leaves people incapacitated, leading to discomfort, pain, grief and suffering, disruption of industry and commerce and strain on the health service. Food borne disease which is usually contagious or poisonous in nature is being caused by agents that enter the body through the ingestion of food (Egan et al., 2007). Whereas a robust food hygiene management according to Iro et al., (2020) offers inestimable benefits not only to the individual consumers and the trade communities, but also to the entire nation as well as the global community. It confers good health to food consumers; increases the profitability of the food businesses; it expands the economy of the country as it opens the way for food exports – the international community imports only food and food products that have been certified to have been produced following international food hygiene and safety guidelines; it consequently lessens the volume of unsafe food that crosses international boarders; finally, it addresses four of the United Nations 17 sustainable development goals (SDGs) of the: 1. No Poverty, 2. Zero Hunger, 3. Good Health and Well-being, and 12. Responsible Consumption and Production. This study will provide information on safe food production as influenced by the nature of food hygiene management in restaurants in Port Harcourt.

Globally, millions of people suffer from food-borne illnesses, which has developed into one of the greatest widespread public health problems in the contemporary world (WHO, 2020). Analyses of foodborne disease throughout the world have shown that the majority of outbreaks result from unwholesome practices during food preparation in small food businesses, fast food restaurants, canteens, residential homes, and other places where food is prepared for human consumption. Besides, food safety continues to be a critical issue when outbreaks of foodborne illness results in substantial costs to individuals, the food industry, community health systems, and to the economy at large. Onyeneho and Hedberg, (2013) reported that many Nigerians die annually in Nigeria, as a result of illnesses resulting from the consumption of contaminated foods and more that 3 million cases of acute food poisoning are recorded yearly due to exposure of food to pesticides that are incorrectly used by farmers. There is need to assess the level of food hygiene management (FHM) in restaurants due to its influence on safe food production (SFP). It also appears that very few

related studies have been conducted on this subject matter in fast food establishments in Port Harcourt. It is based on these challenges and observed lacuna in knowledge that this study was set out to investigate the relationship between food hygiene management and safe food production in selected fast food establishments in Port Harcourt. Specifically, the study objectives were to establish the relationship between the dimensions of FHM (which include personnel training, Workplace design and use of personal protective equipment) and SFP. This perceived relationship has been captured in a diagrammatic model as shown in figure 1.

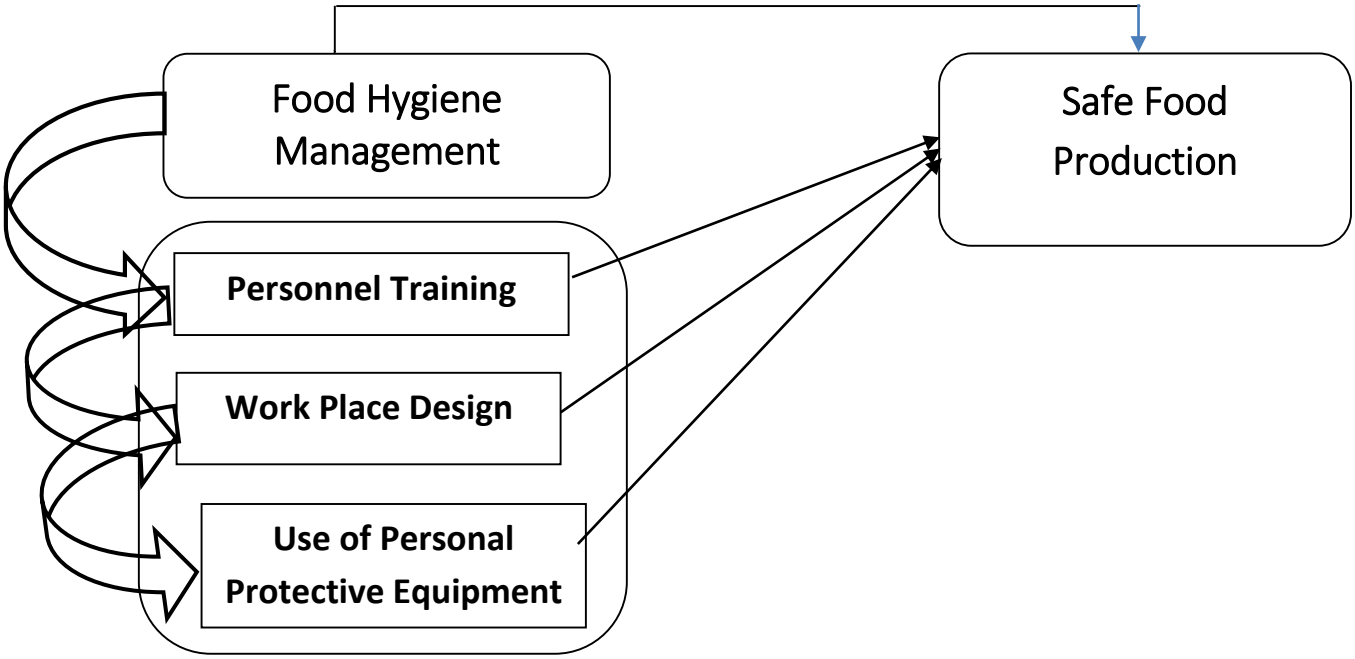

Figure 1: Conceptual Framework of Food Hygiene Management and Safe Food Production

Source: Researchers' Conceptualization (2021) based on dimensions of food hygiene management adapted from Olaitan (2011).

Theoretical Framework/Literature Review

The underlying theory for this study is the Theory of Planned Behaviour (TPB) propounded by Ajzen (1988, 1991); which is an extension of The Theory of Reasoned Action. The basic assumption of the theory is that the best way to predict behaviour is by ascertaining from people if they intend to behave in a particular way. The theory notes that the intention to behave in a particular way will not be expressed in actual behaviour if it is practically impossible to execute the behaviour or if there are unanticipated impediments standing in the way. Azjen harangued that behavioural intentions need to be explained if we assume that behaviour can be explained by intention. According to him, there are three determinants that can be used to explain behavioural intentions. These are:

1. The attitude (one's opinion about the behaviour)
2. The subjective norm (other peoples' opinion about the behaviour)
3. The perceived behavioural control (efficacy of oneself towards the behaviour i.e. personal perception of one's ability to overcome the impediments or challenges of executing the intended behaviour).

Hence, the theory conjectured that attitude, subjective norm and perceived behavioural control (PBC) predict intention; while intention predict behaviour. It presumes that people make decisions by counting the benefits and costs of alternative courses of action and selecting the option which best maximises expected benefits. This theory is apt for explaining the food hygiene management process which is intended to guarantee safe food production. The intention to produce safe food is dependent on the attitude of management, the opinion of others and the efficacy of management in overcoming impediments which may include willingness to train/retrain personnel, effecting proper workplace design and provision of PPEs for personnel. The same is applicable to employees in that their attitude towards training, workplace design and use of PPEs coupled with other peoples' opinion and their willingness to overcome challenges informs their intention to exert behaviours that guarantee safe food production.

Concept of Food Hygiene Management

The Codex Alimentarius Commission (CAC, 1999) defines food hygiene as comprising 'conditions and measures that are essential for the production, processing, storage and distribution of food intended to guarantee safe, sound, wholesome product fit for human consumption'. These measures and conditions are indeed a complex set of activities, starting from production stages with good agricultural practice (GAP); from selection of healthy unadulterated seedlings (for plant) and young healthy animals for animal husbandry. The use of pesticides, fertilizers, soil, water, feeds and veterinary drugs must be used as provided by regulations to evade residual contamination in the plants and animals (Iro, et al., 2020). Shiklomanov (2000) conceives food hygiene as a scientific field that explains the handling, preparation and storing food in such ways that inhibit food-borne illnesses. Food safety is a broader term which includes practices that are associated with food labelling, food hygiene, food additives and pesticide residues, as well as policies on biotechnology and food, and guidelines for the management of governmental import and export inspection and certification systems for foods. Food hygiene is an integral part of food safety. World Health Organization (2003) reported that about 30% of outbreaks of food poisoning in Europe occur in private homes. In 2009, a survey of food hygiene practices in the home and childhood diarrhoea, in Hani, West Indonesia was carried out. Variables associated with food hygiene practices such as mother's hand washing before meal preparation and feeding the child, child's hand washing before eating a meal, and post defecating/urinating, food preparation cleanliness of utensils, water source and safe drinking water, habits of buying cooked food, child's bottle-feeding hygiene and housing and environmental conditions (source) were implicated. Hence, individuals are said to be responsible for their personal hygiene and can accomplish this by adhering to stipulated health habits. The necessity of food and environmental hygiene is responsible for the study of good health habits which individuals ought to develop for their selves as well as encourage others around them to imbibe.

The rising rate of international trade on food and foreign travels, are yielding significant socio-economic benefits. But this also facilitates the spread of illnesses around the world (CAC/RCP 1-1969, 2003). Also eating habits, have experienced major changes in many countries over a couple of decades ago and new techniques in food production and distribution have been developed to reflect this. Therefore, effective hygiene control and management of food systems is vital to prevent the adverse effects of foodborne illnesses to human health and economy. Every individual, such as farmers and growers, manufacturers and processors, food handlers and consumers, has a responsibility to promote processes to guarantee the safety of food for human consumption. The management of any production process according to Anyakoha and Eluwa (2010) involves detailed planning, organizing, appropriate implementation and evaluation of the entire process. This enables the manager to be able to detect inefficiencies at any point before, during and after production. Therefore, managers of food establishments need to ensure the provision and control of all resources to ensure safe food production. Food hygiene management according to RentokilPCI, (2021) involves proper staff/personnel training, adopting HACCP procedures, placing visible notices, proper workplace design and sanitation, personal hygiene, good waste management, use of personal protective equipment (PPE), food storage control and safe water supply.

Personnel Training

Food handlers play an important role in ensuring food safety throughout the food production chain (WHO, 1999). In particular, food handlers who have poor handling practices or disregard hygienic practices may increase the risk of pathogens coming into contact with foods. Several studies conducted to evaluate the quality of street foods in some countries have indicated that street foods are positive vectors of food-borne illnesses (Edema and Omemu, 2008; Umoh and Odoba, 1999). Moreover, food handlers are capable of contaminating food either passively or actively. The biological hazards may be introduced from a sick handler, via organisms on the food handlers' skin or faeces, from their respiratory tract or by cross contamination after handling raw materials. Physical hazards may be introduced by food handlers wearing jewellery, bandages or out of carelessness. In particular, previous studies in some developing countries have highlighted the lack of clean (potable) water resulting in improper hand washing; waste water and garbage are discarded in the streets, which provides food for insects and rodents; food material is usually not effectively protected from dust and flies which may harbour harmful pathogens; and safe food storage becomes difficult to maintain (Ekanem, 1998) where knowledge is lacking. For these reasons, personnel training becomes indispensable.

Training provides employees a better understanding of their obligations and improves their confidence (Chefworks, 2016). It is an exercise that exposes the trainee (student) to the rudiments of a particular subject of interest. Trained employees are always at the top changing their organizational standards by helping to maintain health and safety standards (Gyaan, 2021). Personnel handling food should receive adequate training because training impacts knowledge and improve overall operations (Carey, 2021; Gyaan, 2021). It was further reported by Carey, (2021) that employees must know and practice proper food handling practices to guarantee safe food production. It is the duty of the manger to periodically organise training programs for personnel

handling food as well as other staff. Well-trained personnel form the basic means to guaranteeing success in a profit-making organization. Each employee is only as good as the training they receive (Gyaan, 2021). According to Glewwe (1999), higher formal education transfers health knowledge to people. The more educated one is the better they may appreciate proper food hygiene management.

Workplace Design

The food industry according to Sadiku et al. (2019), refers to the combined efforts of all the sectors that provide food for the populace. These efforts range from farm practices to marketing and distribution of farm produce, to industrial transformation of raw food to packed foods, and so on. The food industry falls into the sector of the economy that is highly sensitive and crucial to the healthy living of the populace since food is one of the most basic human needs. As Eastham, Sharples and Ball (2001) stated, food is essential to life, and as fuel, reinforces all that people do. Although, food is eaten fundamentally for the sustenance of life, McLauchlin and Little (2007) posited that food should nourish, attract and be free from toxic materials such as poisonous chemicals, toxins and pathogenic microorganisms. In order to attain the status of food described above which is fit for life sustenance, there is need to, in addition to the preparation and presentation of food in an attractive manner, take absolute care to reduce the occurrence of food contamination during the different processing stages. Food should be beneficial to the consumer. Thus, safe and functional workplace design becomes pertinent.

Workplace design denotes the process of manipulating and organizing an area designated for work so as to enhance the safety and performance of the worker (Safeopeadia, 2017). It is an important subject in safety and health matters for employees in both high-risk settings (such as construction sites) and low-risk workplaces (such as offices, kitchen, restaurants etc.). Kim (2015) recommended proper work place design in the food industries for positive output whereby both workers and the food materials are kept safe all the time. According to RentokilPCI (2021), food production area should be designed in a manner that promotes free flow of human traffic, well ventilated and illuminated. The work surfaces should be made with easy-to-clean materials such as stainless steel (Norman & Potter, 2001). According to WHO (2007) work place sanitation is very important. This is made simple and possible if the workplace design conforms with specified standards. Food storage area should properly separate raw foods from cooked meals so as to adequately avoid any iota of contact. The principles of workplace design involve all efforts to optimize the safety and health conditions of systematic work activities through actions such as ergonomic seating and temperature control, as well as efforts to protect workers in high-risk industries through measures like designing safe navigation routes through production places (Safeopeadia, 2017). According to the National Institute for Occupational Safety and Health (NIOSH), the use of design-driven ideas has been recognised as the most effective and reliable method of preventing occupational harm or illness (CDC, 202; NIOSH, 2021).

Use of Personal Protective Equipment (PPE)

The WHO fact sheet number 237 (2007) reveals that food-borne diseases are a widespread and growing public health problem, both in developed and developing countries with over 1.8 million

deaths recorded globally in 2005 alone from food contamination. In Bauchi state of Nigeria, data from the Microbiology Department of the State Specialist Hospital indicated a near epidemic re-occurrence of E. *coli* infection which was traceable to contaminated food consumption (Aliboh, 2009). As revealing as the above facts are, Blanch (2003) and McLauchlin and Little (2007) observed that it was very difficult to come up with accurate statistical figures for food poisoning since most affected people do not report the cases; hence, prevention becomes indispensable. This then makes the need for all stakeholders in the food industry to ensure food safety most important. As stressed by Bowman and Russell (2001), there is a 'farm-to-fork' food safety continuum. Each part of the continuum (which includes the food premises in hotels and fast food restaurants) must perform its obligation in ensuring that what eventually gets to the food consumer is safe. Unfortunately, food service establishments contribute 97% of food-borne illnesses due to food handlers' malpractices (Worsfold & Griffith, 2003). For this reason, there is need to, in addition to proper personnel and workplace design, enforce the proper use of Personal Protective Equipment (PPE). According to CDC, (2021) the proper use of PPE protects both the employee and others including the foods being prepared.

Concept of Safe Food Production (SFP)

Safe food as the inverse of food risk - the likelihood of not suffering some threat after food consumption (Henson & Traill, 2003). Safe food is considered as a concept of central importance because it plays an essential public health function. Though contamination of food can happen at any stage along the food chain, food handlers have a significant role in curbing the spread of food-borne illnesses. Indeed, previous reports have implicated handlers of food and improper food, domestic kitchen food production practices, contaminated equipment etc to be a significant source of most of these cases. Other features that have been mentioned as contributing to food-borne diseases include unsafe food storage (temperature and time), poor personal hygiene and food from unsafe sources (Akonor & Akonor, 2013). It is important to conduct a hazard analysis and set critical control points so as to guarantee safe food production (Azuama et al., 2018; Iro et al., 2017; RentokilPCI, 2021). There is also need to establish measures to prevent hazards from occurring and have a proper documentation system. Reports have it that food borne and water borne diarrhoeal diseases together lead to about 2.2 million deaths each year (Akonor & Akonor, 2013). It is a matter of immense concern.

Empirical Review of Food Hygiene Management and Safe Food Production

Tolulope et al., (2015) carried out a descriptive cross-sectional study among primary school food vendors in Jos North Local Government Area, Plateau State, North Central Nigeria to ascertain the knowledge and practice of food safety and hygiene. The version 3.5.4 of EPI info statistical software was used to analyse the data collected at 95% confidence interval with a $P \leq 0.05$ considered statistically significant. The results showed that the mean age of the food handlers in the study was 25.8 ± 5.3 years with the mean years of work experience as 7.8 ± 1.3 years. One hundred and six (60.9%) of the respondent had good knowledge with a mean knowledge score of 18.59 ± 5.90. Statistically significant relationship was found between age ($P < 0.001$) and practice of food safety and hygiene. Similarly, Bas, Ersun, and Kivanc (2007) evaluated the connexion between food hygiene knowledge and practices of safe food production in food businesses in

Turkey. Seven hundred and sixty-four food handlers from 109 food business (hospital food services, catering companies, school food services, hotels, kebab houses, takeaways, and restaurants) participated in the study. Data were collected using two questionnaires, one on food hygiene knowledge and the other on practices of safe food production. The knowledge questionnaire focused on high-risk food groups, cleaning, temperature control, cross contamination, personal hygiene, and food poisoning, as well as demographic information from the respondents. The study concluded that food hygiene knowledge contributed positively and significantly to practices of safe food production in food businesses in Turkey. Hertzman and Barrash (2007) equally investigated the relationship between food hygiene and food safety of catering employees in the southwestern U.S. city of Las Vegas. The analysis was done using a 20-question food hygiene and food safety survey and a checklist to guide the observation of food handlers' activities. Hertzman and Barrash targeted social caterers and restaurants, hotels, and casinos that offered catering services in Las Vegas. A convenience snowball sample of 23 catering events was selected, and 81 surveys were completed. The study also found that there was a significant relationship between food hygiene and food safety of catering employees in the southwestern U.S. city of Las Vegas. Relatedly, Santos et al (2008) examined the impact of practice of food hygiene on safe food production in Portuguese school canteens. An interviewer-administered questionnaire that collected data on socio-demographic characteristics, knowledge of food hygiene, self-reported behaviours towards safe food handling, and personal health and hygiene was administered to 124 food handlers from 32 school canteens. Chi-square analysis was carried out to find out the association among the variables. The study found a significant association between food sanitation, food hygiene and practice of food safety in Portuguese school canteens. However, on their part, Nurudeen, Lawal and Ajayi (2014) examined the general hygiene and safe food production of street food vendors in Nigeria. They used random sampling technique to select 110 samples of street food venders representing 18% of street food vendors in the study area. Data was collected using pre-test structured questionnaire and observation checklists. The relationships in the factors studied were determined. The study found that food vendors did not have basic training on hygiene and only 2.7% had proper training on food preparation. 63.6% acquired skills from parents while 33.7% acquired skills by self-practice. The study finally indicated that there was no significant relationship between general hygiene and safe food production of street food venders in Nigeria. It could be seen from these empirical studies that the authors approached the construct of food hygiene from a mono dimension perspective. More so, non of these studies incorporated the management component into food hygiene. These shortfalls necessitated this study; hence the hypotheses that:

H_0:1 Personnel training has no significant relationship with safe food production of Quick Service Restaurants in Port Harcourt
H_0:2 Workplace design has no significant association with safe food production of Quick Service Restaurants in Port Harcourt
H_0:3 Personal protective equipment does not significantly correlate with safe food production of Quick Service Restaurants Port Harcourt

METHODOLOGY

This study adopted the cross-sectional survey design since the various elements of the design are not under the control of the researcher; and only a snap-short of the situation measurable at a time was taken (Baridam, 2009). The population for this study consisted of employees of the selected fast food establishments in Port Harcourt. For the purpose of meaningful and convenient accomplishment of this work and since not all fast food establishments in Port Harcourt can be covered given the short duration of the study, the accessible population has been limited to five fast food establishments. However, table 3.1 below shows the selected five (5) establishments and their corresponding number of employees that makes up our population size which was determined at 95% confidence level using the Yamane's (1967) formula. Yamane formula is mathematically expressed as follows:

$$n = \frac{N}{1 + N * (e)^2}$$

Where:
n = the sample size
N = the population size
1 = theoretical constant
e = the acceptable sampling error
** 95% confidence level and p = 0.05 are assumed*

Thus:

$$n = \frac{268}{1 + 268 * (0.05)^2}$$

$$n = \frac{268}{1.67}$$

n = 160.47

Thus, the sample size was increased to 180 to accommodate attrition. Electronic copies of the questionnaire were sent to the selected employees. This is in adherence to COVID-19 protocols. Data collected were analysed with the aid of descriptive statistical techniques such as frequencies and percentages while Pearson Correlation was used to test the hypotheses at the 5% level of significance. The results presented were interpreted to fulfil the purpose for which this study was carried out. 175 copies were returned showing a response rate of 97.2%. This implies a high response rate.

RESULTS

Table 1: Frequency Distribution

Variables	N(%)
Gender	
Male	63(36)
Female	112(64)
Age	
18-24	28(16.0)
25-34	49(28.0)
35-44	7(4.0)
45-54	42(24.0)
55-64	49(28.0)
Marital Status	
Single	70(40.0)
Married	77(44.0)
Widowed	21(12.0)
Divorced	7(4.0)
Education Level	
Secondary	56(32.0)
College	28(16.0)
Post graduate	91(52.0)

Source: Survey Report, 2021

Table 2: Correlation between the Dimensions of Food Hygiene Management and Safe Food Production

Objectives	Variables		Personnel Training	Workplace design	Use ofSafe PPE	food production
Objective one	**Personnel Training**	Pearson Correlation				
		Sig. (2-tailed)				
		N				
Objective two	**Workplace design**	Pearson Correlation	.554**			
		Sig. (2-tailed)	.000			
		N	175	175		
Objective three	**Use of PPE**	Pearson Correlation	.528**	.695**		
		Sig. (2-tailed)	.000	.000		
		N	175	175	175	
	Safe Food Production	Pearson Correlation	.771**	.542**	.600**	
		Sig. (2-tailed)	.000	.000	.000	
		N	175	175	175	

Source: Results of Data Analyses, 2021

DISCUSSION

Table 1 above shows the frequency distribution of the biodata of the respondents. There were more female employees (64%) than male employees (36%). Majority of the employees were married (77%). The data also showed that majority of the employees had college education. The inferential statistics were presented in table 2. It could be observed that personnel training, workplace design and the use of personal protective equipment (PPE) had a positive and strong correlation with safe food production.

Hypothesis one: Personnel training has no significant relationship with safe food production.
The correlation results between personnel training and safe food production showed a p-value of .000 with a coefficient of .771. Since the p-value is less than 0.05, the null hypothesis was not upheld; and it was concluded that there is a significant relationship between personnel training and safe food production. This position supports the findings of Bas, et al., (2007) and Santos et al., (2008); implying that it is important to employ staff with good knowledge of food hygiene if they must handle food as well as train them periodically. This will encourage safe food production. According to Chefworks (2016), training provides employees with an improved understanding of their tasks and enhances their confidence. This in turn boosts performance. This study also supports Carey, (2021) who opined that employees must know and practice proper food handling practices to guarantee safe food production.

Hypothesis two: Workplace design has no significant association with safe food production.
The correlation results between workplace design and safe food production showed a p-value of .000 with a coefficient of .542. Again, since the p-value is less than the 0.05 significant level, the null hypothesis was not upheld. The study therefore concluded that there is a significant association between workplace design and safe food production. This is in line with the publication by NIOSH, (2021) and CDC (2021) which stated that the use of design-driven ideas have been recognised as the most effective and reliable method of preventing occupational harm or illness that is, also leading to safe food production in the restaurant business. Safeopeadia, (2017) opined that workplace design is one of the effective means of achieving satisfactory performance and safety in the workplace.

Hypothesis three: Personal protective equipment (PPE) does not significantly correlate with safe food production.
The correlation results between PPE and safe food production showed a p-value of .000 with a coefficient of .600. Since the p-value is less than the 0.05 level of significance, the null hypothesis was not upheld; and it was concluded that there is a significant relationship between Personal Protective Equipment (PPE) and safe food production. This finding corroborates that of CDC (2021) who advised the proper use of PPE to protect both the employee and others including foods being prepared by the personnel.

CONCLUSION

The results and analyses showed that the dimensions of food hygiene management related significantly and positively with safe food production. Based on these, the study concluded that there is a significant and high direct relationship between food hygiene management and safe food production. This implies that the dimensions of FHM are good predictors of safe food production. More so, the study has shown that the management of food hygiene (and not just food hygiene) is largely responsible for the level of hygiene practices in place in any establishment. This calls for strict management of the food production process so as to ensure that standard operating procedures (SOPs) that guarantee food hygiene practices are put in place in the food production chain.

Implications

The findings of this study has implications both for theory and practice. Theoretically, it lends credence to the Theory of Planned Behaviour (TPB) which conjectures that behavioural intention is the proximal determinant of behaviour. This behavioural intention is expected to encapsulate all factors that motivate and influence the intended behaviour; which indicate the level of effort one is willing to put in so as to execute the behavior (Ajzen, 1991). In this instance, the required behaviour for safe food production is dependent on the intention to exhibit such; which in turn is a function of one's self opinion about the behaviour, the opinion of others and the willingness to overcome challenges in performing the behaviour. This validates the theory as being apt for explaining behavioural intentions and for achieving behavioural modifications. In terms of practice, the findings indicate that the operations of quick service restaurants can be effectively managed in such a way as to achieving desired outcomes. Specifically, the onus is on the operations managers to ensure effective food hygiene management via the establishment of standard operating procedures geared towards safe food production.

Recommendations

Based on the findings and conclusions of this study, the following recommendations were made:

1. The management team of quick service restaurants especially the operations managers should endeavour to train and retrain their staff on the tenets of food hygiene. Such trainings should among other things focus on helping them grasp the basics of food hygiene practices that ensure safe food production. Hence, establishment of standard operating procedures as part of the training protocols will help guarantee this.
2. They should design the workplace in such a way that it facilitates food hygiene and enhances safe food production. This can be achieved by ensuring that food production area is designed in a way that promotes free flow of human traffic; is well ventilated and illuminated.; the work surface areas should be made with materials that are easy-to-clean such as stainless steel
3. They should provide personal protective equipment for all employees and ensure they wear/use them while working.
4. They should ensure that all safety protocols are observed by all workers at all time.

References

Akintaro, O. A. (2012). Food handling, hygiene and the role of food regulatory agencies in promoting good health and development in Nigeria. *International Journal of Health and Medical Information, 1*(3), 2150 - 2160.

Amadi, C. O. A, Udo, E. A., Udo-Inyang, F. O., Iro, O. K., Amadi, A. N., Ede, A. O., … Iwuoha, G. (2018). Assessment of food hygiene practices in Abia State, South East Nigeria. *American Journal of Food, Nutrition and Health, 3*(3), 31-36.

Asiegbu, U. A. & Igwe, P. (2017). Food purchasing strategies and profitability of restaurants in Rivers State. *Journal of Business and Value Creation*. University of Port Harcourt.

Azjen, I. (1988). *Attitudes, personality and behaviour*. Dorsey Press.

Azjen, I. (1991). The theory of planned behaviour. Organizational behaviour and human decision processes, 50(2),179-211. https://doi.org/10.1016/0749-5978(91)90020-T

Azuamah, Y. C., Amadi, A. N., Iro, O. K., Azuamah, E. C. & Amadi, C. O. A. (2018). HACCP checklist scores at critical control points by meat handlers in Imo State, Nigeria. *International Journal of Recent Scientific Research, 9*(12), 30162-30165. http://dx.doi.org/10.24327/ijrsr.2018.0912.3000.

Bas, M., Ersun, A., & Kivanc, G. (2006). The evaluation of food hygiene knowledge, attitudes, and practices of food handlers in food businesses in Turkey. *Food Control*, *17*, 317-322.

Baridam, D. M. (2018). *Research Methods in Administrative Sciences* (4th ed.). Sheerbrooke Associates.

CAC/RCP 1-1969, (2003). General principles of food hygiene. Retrieved 9-4-2021 from Codex Alimentarius (EN).pdf (loex.de)

CAC/RCP. (1-1969, Rev. 3(1997), Amended 1999). *Recommended international code of practice general principles of food hygiene.* Rome: Food and Agriculture Organization of the United Nations

CDC (2021). *Agriculture workers and employers: Interim guidance from CDC and the U.S. department of labour.* Retrieved 20-4-2021 from https://www.cdc.gov/coronavirus/2019-ncov/community/guidance-agricultural-workers.html

Chefworks (2016). *10 Reasons why you need to properly train employees.* Retrieved 18-4-2021 https://blog.chefworks.com/uniforms/10-reasons-why-you-need-to-properly-train-restuarant-employees/

Chukuezi, C. O. (2010). Food safety and hygienic practices of street food vendors in Owerri, Nigeria. *Studies in Sociology of Science, 1*(1), 50-57

DeBess, E., Pippert, E., Angulo, F., & Cieslak, P. (2009). Food Handler Assessment in Oregon. *Foodborne Pathogens and Disease, 6*(3), 329-335.

Egan, M. B., Raats, M. M., Grubb, S. M., Eves, A., Lumbers, M. L., Dean, M. S., & Adams, M. R. (2007). A review of food safety and food hygiene training studies in the commercial sector. *Food Control, 18,* 1180-1190.

Ezirigwe, J. (2018). Much ado about food safety regulation in Nigeria. *Journal of Sustainable Development Law and Policy, 9*(1), 109-132.

Fleury, M. D, Stratton J, Tinga, C. Charron, D. F. & Aramini J. (2008). A descriptive analysis of hospitalization due to acute gastrointestinal illness in Canada, 1995- 2004. *Canadian Journal of Public Health, 99*(6), 489-493.

Fosket, D. & Ceserani, V. (2007). *Ceserani and Kinton's: The theory of catering* (11th Ed). Hodder Arnold.

Fowora, M. (2012). *Food borne infection from food from local restaurants in Lagos Nigeria – causes and need for intervention*.

Gizaw, Z., Gebrehiwot, M. & Teka, Z. (2014). Food safety practice and associated factors of food handlers working in substandard food establishments in Gondar town, Northwest Ethiopia, 2013/14. *International Journal Food Science, Nutrition and Diet, 3*(7), 138-146.

Glewwe, P. (1999). Why does mothers' schooling raise child health in developing countries? *Evidence from Morocco, 34*(1), 124-159.

Gyaan, R. (2021). *why you need restaurant training for a successful restaurant business*. Retrieved 18-4-2021 form https://www.posist.com/restaurant-times/restro-gyaan/restaurant-training.html/

Haileselassie, M., Taddele, H., Adhana, K. & Kalayou, S. (2013). Food safety knowledge and practices of abattoir and butchery shops and the microbial profile of meat in Mekelle City. *Asian Pacific Journal of Tropical Biomedicine*, *3*(1), 407-412.

Hertzman, J., & Barrash, D. (2007). An Assessment of Food Hygiene and Food Safety of Catering Employees. *British Food Journal, 109*(7), 562-576.

Ifeadike, C. O., Ironkwe, O. C., Adogu, P. O. U., & Nnebue, C. C. (2014). Assessment of food hygiene practices of food handlers in the federal capital territory of Nigeria. *Tropical Journal of Medical Research, 17*(1), 10-15.

Ifenkwe, G. E. (2012). Food safety regulations: Reducing the risk of foodborne diseases in rural communities of Abia state, Nigeria. *Agricultural Science Research Journal, 2*(7), 384-389.

Iro, O. K., Amadi, C. O., Enebeli, U. U., &Amadi, A. N. (2017). Compliance of Meat handlers in Abia and Imo States with HACCP based standard operating procedures checklist. *Research Journal of Public Health, 3*(7), 1-15.

Iro, O. K., Enebeli, U. U., Iloh, G. U. Azuama, P. Y., Amad, A. N., Amadi, C. O, Ezejindu, C. Ingwu, J. & Ogamba, S. E. (2020). Food hygiene and safety management in Nigeria. *International Journal of Research and Scientific Innovation, 7*(5), 101-109.

Mensah, P., Mwamakamba, L., Kariuki, S., Fonkoua, M. C. & Aidara-Kane, A. (2012). Strengthening foodborne diseases surveillance in the WHO African Region: An essential need for disease control and food safety assurance. *African Journal of Food Agriculture Nutrition and Development, 12*(4), 6338-6353.

NIOSH, (2021). COVID-19 Workplace information. Retrieved 20-4-2021 from: https://www.cdc.gov/niosh/index.htm

Nurudeen, A. A., Lawal, A. O. & Ajayi, S. A. (2014). A survey of general hygiene and safe food production of street food vendors in the central states of northern Nigeria. *Journal of Public Health and Epidemiology, 6*(5), 174-181.

Nyenje, M. E. & Ndip, R. N. (2013). The challenges of foodborne pathogens and antimicrobial chemotherapy: A global perspective. *African Journal of Microbiology Research, 7*(14), 1158-1172.

Onyeneho, S. N. & Hedberg, C. W, (2013). An assessment of food safety needs of restaurants in Owerri, Imo State, Nigeria. *International Journal of Environmental Research and Public Health.* Retrieved 23-4-2021 from https://www.mdpi.com/1660-4601/10/8/3296/htm

PECB (2014). Basics in food hygiene and safety. Retrieved 8-4-2021 from https://www.pecb.com/article/Basics in Food Hygiene and Safety

Sabir, M., Ennaji, M. M. & Cohen, N. (2013). Vibrio alginolyticus: An emerging pathogen of foodborne diseases. *International Journal of Science and Technoly*, *2*(4), 302-309.

Sadiku, M. N. O., Musa, S. M. & Ashaolu, T. J. (2019). Food industry: An introduction. *International Journal of Trend in Scientific Research and Development*, *3*(4), https://www.researchgate.net/publication/334123649_Food_Industry_An_Introduction

Safeopeadia (2017). Workplace design. Retrieved 23-4-2021 from https://www.safeopedia.com/definition/5274/workplace-design

Sanlier, N. (2009). The knowledge and practice of food safety by young and adult consumers. *Food Control*, *20*(6), 538-542.

Santos, M., Noguiera, J. R., Patarata, L., & Mayan. O. (2008). Practice of food hygiene on safe food production in Portuguese school canteens and their self-reported behaviour towards food safety. *International Journal of Environmental Health Research, 18*(6), 387-401.

Seaman, P. & Eves, A. (2006). The management of food safety - The role of food hygiene training in the UK service sector. *Hospitality Management, 25,* 278-296.

Shiklomanov, I. A. (2000). Appraisal and assessment of world water resources. *International Water Resources Association*,11–32.

Smith, I. S., Agomo, C. O., Bamidele, M., Opere, O. B. & Aboaba, O. O. (2010). Survey of food handlers in bukas (a type of local restaurant) in Lagos, Nigeria about typhoid fever. *Science Research, 2,* 951-956.

Tolulope, O. A., Zuwaira, I. H., Danjuma, A. B. & Zaman, M. (2015). Knowledge and practice of food safety and hygiene among food vendors in primary schools in Jos, Plateau State, North Central Nigeria. *E3 Journal of Medical Research, 4*(2), 016-022.

WHO (2007). Food safety and foodborne illnesses Fact sheet no. 237. Available at http://www.who.int/mediacentre/factsheets/fs237/en/

WHO (2008). WHO initiative to estimate the global burden of foodborne diseases. *Geneva, Switzerland,* 1-11.

WHO (2017). Food safety fact sheet Reviewed October, 2017) Available at: www.who.int/mediacentre/factsheets/fs399/en/.