



DETERMINANTS OF SAFETY PRACTICES IN FOOD PROCESSING INDUSTRIES IN RIVERS STATE

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Abstract:

This study investigated the determinants of safety practices among workers of food processing industries in Rivers State. The research design adopted for this study was a descriptive survey research design with a population consisting of 15,500 workers in food processing industries in Rivers State. A multistage sampling procedure was used to select a sample size of 950. The instrument for data collection in this study was a structured questionnaire titled, 'Questionnaire on determinants of occupational hazards and safety practices (QDSP)' with a reliability coefficient of 0.95. Data analysis was done with the aid of the statistical product for service solution (SPSS) version 23.0 using simple regression at 0.05 level of significance. The finding of this study showed that there was a very high relationship between safety practices and other variables such as attitude towards safety ($r = 0.95$, $R^2 = 0.92$, $p < 0.05$), availability of safety materials ($r = 0.84$, $R^2 = 0.71$, $p < 0.05$), years of work experience ($r = 0.92$, $R^2 = 0.85$, $p < 0.05$), and training ($r = 0.93$, $R^2 = 0.87$, $p < 0.05$). It was concluded that the determinants of safety practices included attitude towards safety, availability of safety materials, training and job specification. It was recommended among others that, the managers in the food processing industries should ensure adequate procurement of safety equipment to avoid any lapses in safety practices brought about due to unavailability of safety materials.

Keywords: Food, Safety, Processing industry, Practices, Rivers State

Introduction

Food processing industries constitute one of the largest sectors of any country, state, or locality because it holds one of the basic needs for survival. This has in turn made it a key sector in the economic force. However, this area has not been without challenges especially to worker safety practices, environmental hazards, as well as management practices. According to Lindsay (2019), food processing is the action of making food and food products more readily available for storage, transporting, or immediate consumption. Just as the name implies, food processing is the process or any method employed to turn fresh foods into food products. This includes one or more combination of various processes including washing, chopping, pasteurizing, freezing, fermenting, packaging, and cooking.

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especially the ready-to-eat foods by the tertiary food processing industries such as the local food vendors, interaction with friends with years of experience in the health sector makes it obvious that lab results for over 50% percent of patients tested for typhoid in the usual Widal test comes out as positive indicating the presence of the bacterium *Salmonella typhi*, which has been found to be related to the bacteria that cause salmonella food poisoning. It is reported by the National Health Service (NHS) UK (2021) that if someone else eats foods or drinks water that has been contaminated with a small amount of infected poo or pee, they can become infected with the bacteria and develop typhoid fever. NHS (2021) further states that typhoid fever is most common in parts of the world that have poor sanitation and limited access to clean water.

Safety is also beneficial for all organizations since, in addition to avoiding costly fines, it ensures increased productivity, better morale, and fewer lost work days. National Institute of Public Health Quebec (2021) defines the concept of safety as a state in which hazards and conditions leading to physical, psychological or material harm are controlled in order to preserve the health and wellbeing of individuals and the community. It is an essential resource for everyday life, needed by individuals and communities to realize their aspirations. Safety practice is therefore an important part of the food processing industry as every member of the society depends directly or indirectly on the sector for survival. Safety practices as regards the food processing industries on this work covers the activities relating to safety of workers of the food processing industries (primary, secondary, or tertiary) as well as safety of the environment as regards the activities of the food processing industries and the safety practices put in place to make processed food fit for public consumption without qualms. Safety practice could be determined by attitude of the workers towards safety practice.

Attitude towards safety measures could determine its practice. Attitude can be referred to as a person's disposition or readiness to engage in a particular health practice. Aluh and Aluh (2017) showed positive attitude of the workers towards safety which was translated to their safety practices. Recognition and taking into consideration an adequate account and control of determinants or risk factors of occupational hazards may be regarded as a primary step to mitigation or complete prevention of hazard in any industrial setting. Similarly, regarding health status of foods especially the ready-to-eat foods by the tertiary food processing industries such as the local food vendors, interaction with friends with years of experience in the health sector makes it obvious that lab results for over 50% percent of patients tested for typhoid in the usual Widal test comes out as positive indicating the presence of the bacterium *Salmonella typhi*, which has been found to be related to the bacteria that cause salmonella food poisoning. It is reported by the National Health Service (NHS) UK (2021) that if someone else eats foods or drinks water that has been contaminated with a small amount of infected poo or pee, they can become infected with the bacteria and develop typhoid fever. NHS (2021) further states that typhoid fever is most common in parts of the world that have poor sanitation and limited access to clean water. Although food processing is often done in industrial settings, individuals use a variety of at-home food processing methods as well. Food processing is categorized into three. These are; primary food processing, secondary food processing, and tertiary food processing. The primary food processing involves the conversion of raw materials to food commodities. Lindsay (2019) defined primary food processing as the process of turning raw agricultural products into foods that can be consumed and that in some cases, the food is ready to be consumed once primary processing is finished. An example is jerky made from smoked meat. In other cases, primary processing turns the agricultural product into

an ingredient that can then be made into a consumable food, an example of this is the milling of grain to flour which is used to make variety of consumable food. Secondary food processing is the process of using ingredients produced through primary food processing to create ready-to-eat foods. An example of this using flour to make dough and then baking the dough to create bread. Other examples include fermenting grape juice with wine yeast to create wine and using ground meat to make sausages (Lindsay, 2019). Secondary food processing mainly is the changing of ingredients into edible products. This process comprises of the mixing or combining of ingredients to make a whole edible product. Baking using different ingredients is an example of secondary food processing. Tertiary food processing is the large-scale manufacturing of ready-to-eat foods, like frozen pizzas and packaged snacks. The term “processed food” typically refers to food products manufactured through tertiary food processing (Lindsay, 2019).

Poor safety practices among workers in food processing industries increases their exposure to occupational hazards, which are detrimental to the health of the worker and that of the food consumer. Occupational hazards not well controlled had led to unintended contamination of food with subsequent outbreak of food-borne disease which had posed danger to the health of the family. According to the Centers for Disease Control and Prevention (CDC) (2017), each year about 50 million people yield to food-based ailments, leading to the death of an estimated 3,000 people. The World Health Organization (2010) report showed that, each year, millions of people globally suffer from food-borne diseases and illnesses resulting from the consumption of contaminated food, which has become one of the most widespread public health problems in the contemporary world. Food poisoning could even be more because of lack of monitoring lack of NAFDAC approval and non-registration of some of the food processing industries. Food contamination is majorly as a result of unsafe food handling practice and hazardous conditions.

Where there is no safety, humans as well as animals, function less and in some cases migrate or flee from such environment leading to less development or poor output in terms of services. Safeopedia (2018) stated that safety is a concept that includes all measures and practices taken to preserve life, health, and bodily integrity of individual. Hazards left unchecked through appropriate safety measure, could also lead to amputation, low output, loss of man power, loss of man hour, or even loss of life. Though hazards are inherent in all occupation, some are unique to certain work processes. Some of the many hazards faced by workers of the food processing industries include extreme noise emanating from the use of machines, slips and falls due to repetitive movement, chemical accidents; as most food processing and manufacturing facilities makes use of chemicals such as anhydrous ammonia which is a popular refrigerant which has corrosive, flammable as well as explosive properties which may result in fire outbreak among others. Unsafe practices during food processing increases the chances of the proliferation and transmission of food borne pathogens such as bacteria, and viruses among others.

In Rivers State, there are several food processing industries both registered and unregistered carrying out food procession without proper monitoring from the government and other agencies, thus carryout their operations unchecked; this must have contributed to the cases of food-borne diseases in families and the society at large, that have been attributed to the consumption of contaminated food which were as a result of hazardous conditions. A visit to some food processing industries in Rivers State revealed that most of the workers did not adhere to the set standards in food processing industries, they do not put on the required protective gadgets like ear plug or ear muffs, nose mask, hand gloves, cover-all,

helmet, safety boots, and eye protective goggles. This has exposed them to various degrees of occupational hazards which in turn reduces their productivity and also lead to food poisoning. Furthermore, there is the need to unravel the factors that are linked to the occupational hazards and safety practices in the food processing industries in order to give a pointer to the right action to be taken to alleviate the problem. Yet, several occupational and safety research are focused on workers in other industries rather than those in food processing industry. Hence, this study investigated the determinants of safety practices among workers of food processing industries in Rivers State, Nigeria. The study provided answers to the following research questions:

1. What is the relationship between attitude towards safety and safety practices among workers in food processing industries in Rivers State?
2. What is the relationship between availability of safety materials and safety practices among workers in food processing industries in Rivers State?
3. What is the relationship between years of work experience and safety practices among workers in food processing industries in Rivers State?
4. What is the relationship between training and safety practices among workers in food processing industries in Rivers State?

Hypotheses

The following hypotheses were tested at 0.05 level of significance:

H₀₁: There is no significant relationship between attitude towards safety and safety practices among workers in food processing industries in Rivers State.

H₀₂: There is no significant relationship between availability of safety resources and safety practices among workers in food processing industries in Rivers State.

H₀₃: There is no significant relationship between years of work experience and safety practices among workers in food processing industries in Rivers State.

H₀₄: There is no significant relationship between training and safety practices among workers in food processing industries in Rivers State.

Methodology

The research design adopted for this study was a descriptive survey research design with a population consisting of 15,500 workers in food processing industries in Rivers State. A multistage sampling procedure was used to select a sample size of 950. The first stage was stratification of the State based on the senatorial districts which are: Rivers East, Rivers West, Rivers SouthEast senatorial districts. At the second stage, the simple random sampling technique was used to select two Local Government Areas (LGAs) from each of the stratum. At the third stage, a simple random sampling was used to select ten food processing industries from the selected areas. At the final stage, a simple random sampling was used to select the determined number of respondents from the food processing industries. The instrument for data collection in this study was a structured questionnaire titled, 'Questionnaire on Determinants of Safety Practice (QDSP)' with a reliability coefficient of 0.95. Data analysis was done with the aid of the statistical product for service solution (SPSS) version 23.0 using simple regression at 0.05 level of significance.

Results

The results of the study are present below:

Table 1: Regression analysis on relationship between attitude towards safety and safety practices among workers in food processing industries in Rivers State

Model	R	R	Adjusted R	Std. Error of	Durbin-	Decision
Square	Square		the Estimate	Watson		
1	0.95	.92	.86	2.48	Very High relationship	

Table 1 showed the relationship between attitude towards safety and safety practices among workers in food processing industries. The result of the study showed that there was a very high positive relationship between attitude towards safety and safety practices ($r = 0.95$). The result further showed that attitude towards safety contributed 92% of the variance in occupational hazards exposure ($R^2 = 0.92$). Therefore, the extent to which attitude towards safety determine safety practices among workers in food processing industries in Rivers State was very high.

Table 2: Regression analysis on relationship between availability of safety materials and safety practices among workers in food processing industries in Rivers State

Model	R	R	Adjusted R	Std. Error of	Durbin-	Decision
Square	Square		the Estimate	Watson		
1	0.84	.71	1.61	1.53	Very High relationship	

Table 2 showed the relationship between availability of safety materials and safety practices among workers in food processing industries. The result of the study showed that there was a very high positive relationship between availability of safety materials and safety practices ($r = 0.84$). The result further showed that availability of safety materials contributed 71% of the variance in safety practices ($R^2 = 0.71$). Therefore, the extent to which availability of safety materials determine safety practices among workers in food processing industries in Rivers State was very high.

Table 3: Regression analysis on relationship between years of work experience and safety practices among workers in food processing industries in Rivers State

Model	R	R	Adjusted R	Std. Error of	Durbin-	Decision
Square	Square		the Estimate	Watson		
1	0.92	.85	1.13	1.57	Very High relationship	

Table 3 showed the relationship between years of work experience and safety practices among workers in food processing industries. The result of the study showed that there was a very high positive relationship between years of work experience and safety practices ($r = 0.92$). The result further showed that years of work experience contributed 85% of the variance in safety practices ($R^2 = 0.85$). Therefore, the extent to which years of work experience determine safety practices among workers in food processing industries in Rivers State was very high.

Table 4: Regression analysis on relationship between training and safety practices among workers in food processing industries in Rivers State

Model	R	R	Adjusted R	Std. Error of	Durbin-	Decision
Square	Square		the Estimate	Watson		
1	0.93	.87	1.07	1.75	Very High	

relationship

Table 4 showed the relationship between training and safety practices among workers in food processing industries. The result of the study showed that there was a very high positive relationship between training and safety practices ($r = 0.93$). The result further showed that training contributed 87% of the variance in safety practices ($R^2 = 0.87$). Therefore, the extent to which training determine safety practices among workers in food processing industries in Rivers State was very high.

Table 5: Regression analysis on significant relationship between attitude towards safety and safety practices

Model		Sum Squares	ofDf	Mean Square	F	Sig.	Decision
1	Regression	7474.791	1	7474.791	10061.27	.00*	Rejected
	Residual	666.406	897	.743			
	Total	8141.196 ^d	898				

***Significant, $p < 0.05$**

Table 5 revealed the regression analysis on relationship between attitude towards safety and safety practices among workers in food processing industries. The findings of the study revealed that there was a significant relationship between attitude towards safety and safety practices [$f(1,897) = 10061.27$, $p < 0.05$]. Therefore, the null hypothesis which stated that there is no significant relationship attitude towards safety and safety practices among workers in food processing industries in Rivers State was rejected.

Table 6: Regression analysis on significant relationship between availability of safety resources and safety practices

Model		Sum Squares	ofDf	Mean Square	F	Sig.	Decision
1	Regression	5820.504	1	5820.50	2249.75	.00*	Rejected
	Residual	2320.692	897	2.58			
	Total	8141.196 ^d	898				

***Significant, $p < 0.05$**

Table 6 revealed the regression analysis on relationship between availability of safety resources and safety practices among workers in food processing industries. The findings of the study revealed that there was a significant relationship between availability of safety resources and safety practices [$f(1,897) = 2249.75$, $p < 0.05$]. Therefore, the null hypothesis which stated that there is no significant relationship availability of safety resources and safety practices among workers in food processing industries in Rivers State was rejected.

Table 7: Regression analysis on significant relationship between years of work experience and safety practices

Model		Sum of Squares	Df	Mean Square	F	Sig.	Decision
1	Regression	6986.857	1	6986.857	5462.32	.00*	Rejected
	Residual	1146.073	897	1.279			
	Total	8132.931 ^d	898				

***Significant, $p < 0.05$**

Table 7 revealed the regression analysis on relationship between years of work experience and safety practices among workers in food processing industries. The findings of the study revealed that there was a significant relationship between years of work experience and safety practices [$f(1,897) = 5462.32, p < 0.05$]. Therefore, the null hypothesis which stated that there is no significant relationship years of work experience and safety practices among workers in food processing industries in Rivers State was rejected.

Table 8: Regression analysis on significant relationship between training and safety practices

Model		Sum of	Df	Mean Square	F	Sig.	Decision	Squares
1	Regression	2069.237	1	2069.237	4985.79	.00*	Rejected	
	Residual	372.278	897	.415				
	Total	2441.515 ^d	898					

***Significant, $p < 0.05$**

Table 8 revealed the regression analysis on relationship between training and safety practices among workers in food processing industries. The findings of the study revealed that there was a significant relationship between training and safety practices [$f(1,897) = 4985.79, p < 0.05$]. Therefore, the null hypothesis which stated that there is no significant relationship training and safety practices among workers in food processing industries in Rivers State was rejected

Discussion of findings

The result of the study showed that there was a very high positive relationship between attitude towards safety and safety practices ($r = 0.95$). The result further showed that attitude towards safety contributed 92% of the variance in occupational hazards exposure ($R^2 = 0.92$). This finding is not surprising because attitude which is an individual's predisposition towards a given behaviour, is a leading step to the practice of any health behaviour, including safety. This finding corroborates several other studies. The finding of this study is in keeping with that of Manjula and De-Silva et al. (2014) whose research on the among workers in Sri-Lankan showed that workers attitude constituted a significant determinant to occupational safety practice. The similarity between the present study and previous ones might be due to the homogeneity of the study respondents and the close range between the sample sizes in the

different studies. The finding of this study is in consonance with that of Diwe et al. (2016) whose workers in South Eastern States of Nigeria and found that attitude can lead to hazard and damage, hence safety measures must be applied in work places but, negative attitude could serve as a barrier to safety practices. The similarity between the present study and previous ones might be due to the homogeneity of the study respondents and the close range between the sample sizes in the different studies.

The result of the study showed that there was a very high positive relationship between availability of safety materials and safety practices ($r = 0.84$). The result further showed that availability of safety materials contributed 71% of the variance in safety practices ($R^2 = 0.71$). The finding of this study corroborates that of Ostry et al. (2017) whose study in Western Canada found that availability of PPE result to compliance of safety measures. It revealed that if there is low availability of PPE, it reduces safety practice of workers. The finding of this study is in line with the report of Sabitu et al. (2014) from a study on the availability of safety equipment among workers in Kaduna metropolis in northern Nigeria which showed that the level of availability of personal protective was high with sub-optimal practice of safety measures against the hazards. The finding of this study is similar to other studies including those of Manjula and De-Silva (2014) whose research on the factors influencing safety behaviours among workers in Sri-Lankan showed that unavailability of personal protective devices were factors which constitute a determinant. The similarity between the present study and previous ones might be due to the homogeneity of the study respondents and the close range between the sample sizes in the different studies. The finding of this study is in consonance with Girard et al. (2015) whose research work on Personal Protective Equipment (PPE) as a preventive measure accident among workers in Ilorin, Nigeria revealed that availability of safety equipment among workers constituted a determinant to safety practice. The similarity between the present study and previous ones might be due to the homogeneity of the study respondents and the close range between the sample sizes in the different studies.

The result of the study showed that there was a very high positive relationship between years of work experience and safety practices ($r = 0.92$). The result further showed that years of work experience contributed 85% of the variance in safety practices ($R^2 = 0.85$). The finding of this study is in line with that of Owumi (2002) observed that the more years a worker spends in an organization the less attention they pay to observance of precautionary measures even in the face of hazards. It was also noted that most workers with 10 years and above experience in an organization are experienced workers and tend to ignore routine details of protection. The result of this study is in credence with studies of Ali et al. (2020) that younger, less experienced workers reported more stress levels compared to older, senior-level workers and have suggested that many workers fail to perceive protective measures as an effective coping strategy. This is possible because most people who are older learnt from experience and are mature with taking positive decision in regards to safety practice or compliance. Dabholkar et al, (2020) buttressed that workers with less experience or newly employed does not see the need for not compromising safety at work place as compared with the older the staff. Olum et al. (2020) added that experienced workers are more likely to comply with safety measure. The similarity between the present study and previous ones might be due to the homogeneity of the study respondents and the close range between the sample sizes in the different studies.

The result of the study showed that there was a very high positive relationship between training and safety practices ($r = 0.93$). The result further showed that training contributed 87% of the variance in safety practices ($R^2 = 0.87$). The finding of this study is in keeping with that of Adebola (2014) which showed that having higher training increases occupational safety practices and that there was a statistical significant relationship between training and practice of safety to prevent hazards exposure. This similarity might be due to the homogeneity of the study respondents. The similarity found in the present study and the previous ones might be due to the fact that training is helping to fill the gap in knowledge and the subsequent practice found among the respondents. Also, the finding of this study is in line with that of Abuga (2012) which showed that training had a positive and significant correlation with employee performance and occupational safety practice. The difference in the study location and sample sizes might be implicated for the variations found between the both studies.

Conclusion

Based on the findings of the study, it was concluded that the exposure to occupational hazards was determined by several factors but specifically among workers in food processing industries in Rivers State, the following factors determined exposure to occupational hazards to a very high extent: knowledge of hazards, years of work experience, training and job specification while factors such as attitude towards safety, availability of safety materials, training and job specification determined safety practices to a very high extent. **Recommendations**

The following recommendations were put forward based on the findings of the study:

1. The managers in the food processing industries should ensure adequate procurement of safety equipment to avoid any lapses in safety practices brought about due to unavailability of safety materials.
2. Environment agencies should extent the discharge of their duties to the food processing industries to constantly supervise the safety practices of the workers.
3. The managers in the food processing industries should ensure all personal protective devices are provided for all workers and such are also used always during work to ensure are not exposed to hazards during their work.
4. Professional organizations such as the National Industrial Safety Council of Nigeria (NISCN), the Institute of Safety Professionals of Nigeria (ISPON) and trade unions should organize periodic workshops and training programmes on occupational hazards and safety for the workers.

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