

KNOWLEDGE AND PRACTICE OF SALMONELLOSIS PREVENTION AMONG FOOD HANDLERS IN RESTAURANTS IN UNIVERSITY OF NIGERIA NSUKKA

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Abstract

The study determined the knowledge and practice of salmonellosis prevention among food handlers in restaurants in University of Nigeria Nsukka. Two research questions and two null hypotheses guided the study. A descriptive research survey design was utilized for the study. The population for the study consisted of 104 food handlers comprising of cooks and waiters within the university campus. There was no sampling. The entire population was used because the number was manageable. Questionnaire served as instrument for data collection. The questionnaire was face validated and administered to the respondents. Data generated were analyzed using IBM SPSS version 20. Data analyzed were presented using descriptive statistics of frequency and percentages while the null hypotheses were verified using Chi-square statistics. Okafor (1997) criterion for describing level of knowledge was adopted to determine the level of knowledge and practice of salmonellosis prevention of food handlers in restaurants in University of Nigeria Nsukka. In this regard, a proportion of 20 per cent or less was considered 'very low knowledge of salmonellosis prevention', 21-39 per cent 'low'; 40-59 per cent 'moderate'; 60-79 per cent 'high'; and 80 per cent and above 'very high'. Results show that food handlers have moderate knowledge (57.3%) of salmonellosis prevention and exhibited low (33.4%) salmonellosis prevention practices in their restaurants. There were no significant differences in the level of knowledge and practice of salmonellosis prevention based on educational qualification. The study recommended among other things that a vigorous awareness campaign of food safety and salmonella prevention among the food handlers and the entire public should be mounted.

Keywords: Salmonellosis, Food Handlers, Knowledge, and Practice

Introduction

Food is a basic need for all human beings and animals. Some foods are eaten raw while some are processed. The processes between the transportation of food from the farms, markets or abattoirs to its processing can lead to food contamination. In spite of extensive teaching on food hygiene for the prevention of food borne disease, the incidence of outbreaks and sporadic cases continue to increase in various parts of the world (Hobbs & Roberts, 2003). Among the agents of food poisoning is *Salmonella* spp. *Salmonella* are germs (bacteria) that cause an infectious disease (salmonellosis) of the bowel in humans and animals. Although the disease is usually limited to the bowel, and most infected people do not have any serious medical complications, salmonella bacteria can spread to other systems of the body, such as the blood and bone. This may cause serious complications in infants and in people who are very old or are immunocompromised (Massachusetts Department of Public Health, 2013).

Etiologically, *Salmonella* are members of the family Enterobacteriaceae. They are Gram negative bacilli growing aerobically and anaerobically at an optimum temperature of 37°C (98.6°F), readily killed by temperatures above 55°C (131°F). *Salmonella* species are classified into serovars (serotypes) with more than 2500 known serovars globally (Spickler, 2005). These serovars are responsible for some specific symptoms.

The most common symptoms are stomach cramps, diarrhea, fever, nausea, and sometimes vomiting. The incubation period for Salmonellosis in humans is usually 12 hours to 24 hours (Lucas & Gilles, 2003) and can extend from 12 hours to 72 hours (Health Canada, 2013; Massachusetts Department of Public Health, 2013). Most people who get salmonellosis do not require treatment other than oral fluids. Some people with severe diarrhea may require intravenous fluids. Antibiotics are not usually given to people unless the infection spreads from their intestines to other area. People with diarrhea or vomiting need extra fluids. Some people with salmonellosis become sick enough to require hospitalization. In humans, salmonellosis ranges from a self-limiting gastroenteritis to septicemia. Whether the organism remains in the intestine or disseminates depends on host factors as well as the virulence of the strain. Asymptomatic infections can also be seen. All serovars can produce all forms

of salmonellosis, although a given serotype is often associated with a specific syndrome (e.g. *Salmonella choleraesuis* tends to cause septicemia). Salmonellosis acquired from reptiles is often severe, and may be fatal due to septicemia or meningitis (Bradley & Angulo, 2001). Most cases of reptile-associated salmonellosis are seen in children under 10 and people who are immunocompromised (Willis, Wilson, Greenwood & Ward, 2002). Salmonellosis is transmittable.

Salmonellosis is mainly transmitted by the fecal-oral route. The bacteria must be swallowed to cause disease. Usually this happens when someone eats food that has been contaminated with the bacteria and has not been properly handled, prepared or cooked. The bacteria can also spread when people do not wash their hands thoroughly with soap and water after using the toilet, changing diapers, or handling reptiles. They are carried asymptotically in the intestines or gall bladder of many animals, and are continuously or intermittently shed in the feces (Willis, Wilson, Greenwood & Ward, 2002). They can also be carried latently in the mesenteric lymph nodes or tonsils; these bacteria are not shed, but can become reactivated after stress or immunosuppression. Fomites and mechanical vectors can spread *Salmonella*. People are often infected when they eat contaminated foods of animal origin such as meat or eggs (Lucas & Gilles, 2003). They can also be infected by ingesting organisms in animal feces, directly or indirectly in contaminated food or water. *Salmonella* spp. can survive for long periods in the environment, particularly where it is wet and warm. They can be isolated from many sources including farm effluents, human sewage and water. To decrease the risk of salmonellosis, both knowledge and practice of food safety and the prevention of transmission from animals must be emphasized.

People who get the bacteria on their hands can infect themselves by eating, smoking, or touching their mouths. They can also spread the bacteria to anyone or anything they touch, especially food, which can then make others sick if not cooked enough to kill the organisms (Fisher, 1992). *Salmonella* bacteria are common in uncooked food products from animals, such as eggs, egg products, meat, meat products, poultry, unpasteurized milk and other unpasteurized dairy products (Hobbs & Roberts, 2003). However, thorough cooking and processing will destroy the bacteria. *Salmonella* are commonly spread from person to person in restaurants, eating café and other environments where hygiene may be poor (Jatau & Dangbin, 2013). A food handler with salmonella may get bacteria on the food if his or her hands are not washed thoroughly before preparing food. It is impossible to sterilize the hands, disinfection by heat is impracticable, but chemical disinfection may be used. Many particles picked up from raw foods, excreta and the environment can be removed from the hands by washing with soap and water. Consequently, it is very important for the food handler to wash his hands well, with plenty of soap and water, after toilet and before handling foods. Hand washing helps in the prevention of salmonellosis.

Prevention is the act of keeping salmonella from arising. Prevention typically consists of methods or activities that seek to reduce or deter specific or predictable problems or promote desired outcomes for behaviours. According to Salama (2011), successful prevention depends upon the knowledge of the causation, identification of the risk factors groups, availability of prophylactic or early detection and treatment measures, an organization for applying the appropriate measures to appropriate persons and continuous evaluation and development of procedures applied. Department of Mental Health and Addiction (2012) stated that prevention is creating conditions that promote good health and that is achieved by reducing those factors that are known to cause illness or problem (risk factors) and encourage those factors that buffer individual and promote good health (protective factors). Salmonellosis is 100 per cent preventable. Prevention is through separation of raw and cooked foods to avoid cross-contamination, care on part of the food handler, cleanliness of kitchen environment and cooking utensils, provision of refrigerators and freezers for storage, control of vermin, careful preparation, and adequate cooking of foods. Food handlers should usually be trained and certified on these practices. Training provides them with the necessary knowledge on how to practice good food handling practices to prevent the onset of salmonella infections.

Food handlers are persons that prepare and serve foods. Hobbs and Roberts (2003) defined food handlers as persons that are trained and certified on the knowledge and practices of food safety, food preparation and presentation in order to avoid contamination. The authors further stated that food handlers must understand the standards of food safety and be able to apply them. Food handlers should ensure that they prepare their food in line with FAO and WHO (1992) standards such as guidelines on: addition of essential nutrients to food; good kitchen and laboratory practices; risk analysis for food

safety; control of campylobacter and salmonella, among others. Knowledge of salmonellosis prevention can guide food handlers to process food under hygienic conditions. Moodley, Lushen and Rambiritch (2007) conceptualized knowledge as the sum of our conceptions, views and propositions, which has been established and tested as correct reflections as far as they are of objective reality. Knowledge is the key to health action. Jatau and Dangbin (2013) defined knowledge as the ability to comprehend, apply, analyze, and evaluate what are known facts, concepts, views and propositions about salmonellosis prevention. This entails that knowledge must encompass all areas of the concept before it could be upheld. Therefore, knowledge in this study refers to the ability to understand, relate, scrutinize and assess the meaning of salmonellosis, the causes, symptoms, transmission, complications and its prevention.

It takes knowledge of salmonellosis prevention for food handlers to process hygienic food for consumers. Food handlers who have knowledge of processing hygienic food play a major role in ensuring food safety throughout the chain of producing, processing, storage and preparation. Obstinate, mishandling and disregard for hygienic measures on the parts of the food handlers may result in food poisoning and its attendant consequences (Okojie, Wagbatsoma & Ighorogbe, 2005). Food handlers who have low knowledge of processing food in hygienic manner are more likely to engage in risky food handling practices that can predispose consumers to salmonellosis and other food borne diseases. Proper application of food safety knowledge by food handlers translates into positive food handling practices.

Practice is the actual performance or application of knowledge. Funk and Wagnalls (2003) defined practice as any customary action or proceeding regarded as individual's habit. The beginning of all knowledge lies in essence, on perceptions, the reliability of which is proved in human practice. Contextually, practice is the translating of knowledge of salmonellosis prevention into action through application of the prevention principles. Poor practice of salmonellosis prevention by food handlers precipitates the occurrence of food poisoning. Some food handlers put raw foods and cooked ones in the same place. This practice facilitates the contamination of the cooked foods. To this end, Fisher (1992) submitted that the hazard of cross contamination from raw to cooked food is a basic fault among food handlers. In outbreaks due to *Salmonella typhimurium* or *Salmonella enteritidis* multiple factors are frequently recorded with inadequate cooling and reheating of foods among food handlers playing important roles.

The food handler has an important part to play in the prevention of food poisoning and other food-borne diseases. The common concern is with the passage of organisms from persons to food, from the nose, skin of hands and other surfaces and from the bowel. More important still is the transmission of organisms from raw to cooked foods with the hands as means of transport as well as surfaces, utensils and cloths. It is the responsibility of the food handler to take scrupulous care that personal bacteria are not added to food (Hobbs & Roberts, 2003). Personal hygiene can break the chain of infection through keeping the hands in good condition and free from dirt. Careless handling during transport, manufacturing, preparation and service, may add and spread bacteria to foods. Hands can transfer food-poisoning bacteria from raw to cooked foods and to utensils. Personal bacteria from nose, mouth, skin, stool and hands can contaminate food (Health Canada, 2013).

Another factor which predisposes foods to vehicles of food poisoning is the slow cooling of cooked food and the time at room temperature at which the food stands before it is eaten or eventually refrigerated. Rapid cooling reduces the rate at which toxins are produced in the food (Fishers, 1992). Bulky foods may be placed in the refrigerator while still warm to plummet the microbial growth. The foods that encourage the growth of *Salmonella* include raw and cooked meat and poultry, foods with meat as a base, soups, stocks, gravies, made-up meat dishes; also eggs and egg products, milk and milk products (Hobbs & Roberts, 2003). Unclean kitchen surfaces, equipment and utensils can harbor bacteria and pass contamination to other foods, especially from raw to cooked foods which are other means by which salmonella reach foods (Boyce, 2011).

Collaborative efforts are necessary in the prevention of salmonellosis in restaurants in the campus. Restaurants are buildings where people go to eat. Some of the restaurants in the campus are poorly built in outskirts of the premises especially the ones in Franco Area. The restaurants in the boys' hostels are situated near the hostel sewages and dumps. Hobbs and Roberts (2003) asserted that premises that serve food for consumption by food handlers deserve special attention from a food safety view point. They stated that standards must be enforced at restaurants with stringency because if the

restaurant is contaminated, the corresponding effects on the consumers will be widespread. Although some restaurants inside the campus such as: Chitis, CEC restaurant, Senior Staff Club, former Student Union Building (SUB), and Frenzy have well planned buildings that are maintained. Pilot study by the researchers show that University of Nigeria, Nsukka is lagging behind when it comes to restaurants when compared to some other universities in Nigeria. Owing to the foregoing, this study seeks to determine the knowledge and practice of salmonellosis prevention among food handlers in restaurants in University of Nigeria Nsukka. This is the crux of the study.

Statement of the Problem

The principles of good hygiene practice in restaurants are basically the same as in any other food handling environment. Foods provide nourishment and vitality to the consumer. A hygienically processed, prepared and served food improves health. Good food handling practices, environmental and personal hygiene prevent foods from contamination. One of the microorganisms that contaminate food is *salmonella* causing salmonellosis. Salmonellosis is 100 per cent preventable. Prevention is through separation of raw and cooked foods to avoid cross-contamination, care on part of the food handler, cleanliness of kitchen environment and cooking utensils, provision of refrigerators and freezers for storage, control of vermin, careful preparation, and adequate cooking of foods. Food handlers should usually be trained and certified on these practices. Training provides them with the necessary knowledge on how to practice good food handling practices to prevent the onset of salmonella infections.

Nevertheless, some restaurants undermine the consequences of food complications, thereby establishing their businesses without first satisfying the prerequisite requirements according to FAO and WHO (1992). Some of the restaurants are situated in dirty places while majority of the restaurants serve foods that are not well stored or heated. These practices maybe because the food handlers are not informed or as a result of laxity on their parts. Intermittent shortage in water supply engenders the use of water in the reservoir to cook and wash the utensils. The reservoir is as old as the university and had no history of washing. Epileptic power supply also undermines the use of refrigerators and freezers for storage, although majority of the restaurants (80%) in campus do not have refrigerators for food storage.

Awareness campaign on food safety and salmonellosis prevention among the food handlers and the entire public is a probable prevention to the problem. This could be achieved by way of training or sensitization of food handlers on food hygiene and safety through seminars, workshops, and conferences. Education through this form will go a long way in curtailing the ignorance on salmonellosis prevention that beclouds the food handlers and food consumers' alertness on food safety.

Research Questions

1. What is the level of salmonellosis prevention knowledge of food handlers in restaurants in University of Nigeria Nsukka?
2. What are the salmonellosis prevention practices of food handlers in restaurants in University of Nigeria Nsukka?

Hypotheses

Ho₁: There is no significant difference on the level of knowledge of salmonellosis prevention among food handlers in the University of Nigeria, Nsukka based of educational qualifications at .05 level of significance.

Ho₂: There is no significant difference on the level of salmonellosis prevention practices among food handlers in the University of Nigeria, Nsukka based of educational qualifications at .05 level of significance.

Methods

This study adopted the descriptive survey research design. Leedy and Ormrod (2013) posited that descriptive design examines a situation as it is, and does not involve changing or modifying the situation under investigation, nor is it intended to determine cause-and-effect relationships. Population for the study consisted of the entire food handlers comprising of cooks and attendants within the Nsukka campus of the University estimated at 104 persons. There was no sampling because the number is manageable. This is consistent with the submission of Nwana (1990) which posited that where the

number in the target population is small, it is preferable to utilize all the respondents in order to ensure representativeness and generalizability of findings.

A seventeen item researchers structured salmonellosis prevention questionnaire was developed from literature reviewed, and used to collect data from the respondents. The questionnaire comprised of three sections (A, B & C). Section A comprised of personal information on the educational qualification obtained; section B was nine item statements on knowledge of salmonellosis prevention, while section C covered salmonellosis prevention practices. The questionnaire was face validated by three experts in the department of Health and Physical Education. In order to establish the internal consistency and reliability of the instrument, a pilot study was conducted. The pilot study was conducted in University of Nigeria, Enugu Campus on twenty food handlers. The draft copies of the questionnaire were administered on the randomly selected food handlers. The data thus collected was statistically analysed to determine the reliability coefficient of the item. The coefficient was found to be 0.92 using Guttman Split-Half methods and proved the questionnaire is reliable for the purpose of the study. The copies of questionnaire were administered on the respondents; some of the respondents that were busy at the time of administration were left with their copies to complete at their convenient time. The researchers called back at the places where the questionnaires were left for completion within 48 hours of the initial administration to collect the questionnaire copies. This yielded 93.3 per cent (97 copies) return rate. Among the returned copies of the questionnaire, 96.9 per cent (94 copies) were duly completed and used for the study. In all, 10 (9.6%) copies were invalidated and therefore not used for data analysis. The data generated from the instrument was analyzed using IBM SPSS version 20. Data answering the research questions were analyzed and presented using descriptive statistics of frequency and percentages, while the hypotheses were verified using the Chi-square statistics. Furthermore, percentages using Okafor (1997) criteria for describing level of knowledge was adopted to determine the level of knowledge and practice of salmonellosis prevention. In this regard, a proportion of 20 per cent or less was considered 'very low' knowledge or practice of salmonellosis prevention; 21-39 per cent 'low'; 40-59 per cent 'moderate'; 60-79 per cent 'high'; and 80 per cent and above 'very high' knowledge and practice of salmonellosis prevention.

Results

Table 1: Level of Salmonellosis Prevention Knowledge of Food Handlers (n=94)

S/N	Item statement	Correct responses		Incorrect responses		Decision
		f	%	f	%	
1	What is salmonellosis?	43	45.7	51	54.3	Moderate
2	Symptoms of salmonellosis?	66	70.2	28	29.8	Low
3	When does symptoms of salmonellosis manifest?	28	29.8	66	70.2	High
4	How is salmonella transmitted?	71	75.5	23	24.5	Low
5	When is salmonellosis likely to occur?	47	50.0	47	50.0	Moderate
6	What is the route of Salmonella transmission?	38	40.4	56	59.6	High
7	How can you prevent salmonellosis?	75	79.8	19	20.2	Very low
8	What is the most severe complication of salmonellosis?	33	35.1	61	64.9	High
9	What way is best to preserve meat to avoid salmonellosis?	84	89.4	10	10.6	Very high
	Overall (%)		57.3		42.7	Moderate

Findings in Table 1 show that more than half of the food handlers (57.3%) have moderate knowledge of salmonellosis prevention. The findings reveal that food handlers possessed very high knowledge on the best way to preserve meat to avoid salmonellosis (89.4%) and how salmonella is prevented (79.8%), with high knowledge on transmission of salmonellosis (75.5%) and symptoms of salmonellosis (70.2%). They had moderate knowledge (50%) on occurrence of salmonellosis.

Table 2: Salmonellosis Prevention Practices of Food Handlers (n=94)

S/N	Item statement	Correct practices		Incorrect practices		Decision
		f	%	f	%	
10	Do you prepare raw or undercooked foods like eggs, meat, hamburgers, and salad dressings ahead of customers demand in your restaurant?	33	35.1	61	64.9	Low
11	Do you wash your hand before handling food?	79	84.0	15	16.0	Very high
12	Do you keep meats and fresh fishes separate from fruits, vegetables, cooked foods and ready-to-eat foods when buying and storing from groceries?	37	39.4	57	60.6	Low
13	Do you refrigerate or freeze food immediately you return from the market?	24	25.5	70	74.5	Low
14	Do you defrost foods at room temperature?	10	10.6	84	89.4	Very low
15	Have you attended any clinic for salmonellosis diagnosis?	8	8.5	86	91.5	Very low
16	Do you wear face mask and hand gloves when preparing and serving food?	29	30.9	65	69.1	Low
Overall (%)		33.4		66.6		Low

Table 2 show that about one-third of the food handlers (33.4%) practice good salmonellosis prevention in their restaurants. Ninety-one and half per cent do not attend clinics for salmonella diagnosis, 89.4 per cent defrost foods at room temperature, 74.5 per cent do not refrigerate immediately they return from the market, 69.1 per cent do not wear masks during food preparation, 64.9 per cent serve raw foods (tapioca, salad dressing and hamburgers), while 60 per cent do not separate meat from other foods when they buy from groceries. The common good salmonella prevention practice by the food handlers was washing hands before handling food (84%).

Table 3

Summary of Chi-Square Analysis Testing the Null Hypothesis of no Significant Difference in the Level of Knowledge of Salmonellosis Prevention Possessed by Food Handlers based of Educational Qualifications (n=94)

Educational qualification	High	Moderate	Low	Total	df	α	χ^2 -cal	χ^2 -crit	Decision
Pre-secondary school	2(4.77)	6(6.26)	6(2.98)	14	4	.05	7.39	9.488	Accepted
Secondary school	17(16.68)	21(21.89)	11(10.43)	49					
Post-secondary school	13(10.55)	15(13.85)	3(6.6)	31					
	32	42	20	94					

Figures in parenthesis indicate expected frequency.

*df = degree of freedom

Data in Table 3 revealed that χ^2 -cal value (7.39) is less than the observed χ^2 -crit value of 9.488 at df 4 and at .05 level of significance. The hypothesis that there is no significant difference in the level knowledge of salmonellosis prevention possessed by food handlers based on educational qualifications is therefore accepted. This implies that educational qualification does not make any difference in knowledge of prevention of salmonellosis.

Table 4

Summary of Chi-Square Analysis Testing the Null Hypothesis of no Significant Difference in the Salmonellosis Prevention Practices of Food Handlers based of Educational Qualifications

Educational qualification	High	Moderate	Low	Total	df	α	χ^2-cal	χ^2-crit	Decision
Pre-secondary school	1(2.98)	4(6.11)	9(4.91)	14					
Secondary school	8(10.43)	23(21.37)	18(17.2)	49	4	.05	1.83	9.488	Accepted
Post-secondary school	11(6.6)	14(13.52)	6(10.88)	31					
	20	41	33	94					

#Figures in parenthesis indicate expected frequency *df = degree of freedom

Data in Table 4 revealed that χ^2 -cal value (1.83) is less than the observed χ^2 -crit value of 9.488 at df 4 and at .05 level of significance. The hypothesis that there is no significant difference in the salmonellosis prevention practices exhibited by food handlers based of their educational qualifications is therefore accepted. The acceptance means there is no significant difference in the practice of prevention of salmonellosis as a result of educational qualification.

Discussion

The overall results in Table 1 showed that food handlers possessed moderate knowledge of salmonella prevention. This finding is not surprising because it is expected that food handlers must be equipped with knowledge concerning food and food poisoning. This finding agrees with the findings of Nevin and Ece (2012), who found that food handlers that provide food for students possess good knowledge of safety and handling practices. This is because their customers frown at poor practices and tend to abhor restaurants where poor knowledge of prevention is sustained. This notwithstanding, the findings of this study is at variance with the findings of Okojie, Wagbatsoma and Ighoroge (2005) who found that there was a predominantly poor knowledge of food hygiene among food handlers. Jatau and Dangbin (2013) in their bid to determine the knowledge and practices of food hygiene among food handlers in Mazat district also found that food handlers possessed low knowledge on food hygiene and prevention of poisoning. The differences in this report and that of Okojie et al and Jatau and Dangbin may be due to setting. Food handlers may continue to dwell in ignorance of salmonella prevention if no one (customers or supervisors) deems it fit to inform and persuade them to have knowledge about salmonella and its prevention.

The overall result in Table 2 showed that food handlers in restaurants exhibited low prevention practices for salmonellosis. This result is shocking because it is capable of giving a huge number of the customers some health concerns. However, this finding was not expected because food handlers who processed, prepared and served food to consumers are not supposed to be ignorant of the hygiene of the food they processed, prepared and served to customers. This study lends credence to the study of Okojie et al (2005) who found that food handlers defrost food at room temperature and stores uncooked and ready to eat food together, but negates his finding that there was a low frequency of hand washing. On the other hand, the finding disagrees with the findings of Isara and Isah (2009) who found that there was good practice of food hygiene and safety among respondents, and that food handlers who had worked for longer years in the restaurants had better practice of food hygiene and safety (p=0.036).

The finding in Table 2 indicated that 75 per cent of the food handlers do not refrigerate or freeze food immediately they return from the market. This finding is in consonance with that of Jatau and Dangbin (2013) who found that 50.56 per cent of the food handlers allow long time lapse between storing and processing of foods like meat and fish without refrigerating. Although they associated their findings with lack of knowledge, the case of this study is different because the respondents have good knowledge (90%) of how to preserve meat to avoid salmonellosis. A further probe show that the reasons were because of lack of electricity and some micro-restaurants cannot afford alternative power supply. The restaurants that have alternative power supply use it only at night for seeing, not for preservation and storage.

Result of the study in table 3 revealed that there is no significant difference in the level of knowledge of salmonellosis prevention among the food handlers based on the educational qualification. This finding was shocking and unexpected. The finding is at variance with the submissions of Okojie et al (2005). According to Okojie and colleagues, food handlers who have low knowledge of processing food in hygienic manner are more likely to engage in risky food handling practices that can predispose consumers to food-borne diseases.

Result of the study in table 4 revealed that there is no significant difference in salmonellosis prevention practices among the food handlers based on the educational requirement. This finding was unexpected. Experience of work may be why educational qualification is not significant in salmonellosis prevention practices. Isara and Isah (2009) found that there was good practice of food hygiene and safety among his respondents, and that those food handlers who had worked for longer years in the fast food restaurants had better practice of food hygiene and safety.

Conclusion

Based on the findings of the study, the following conclusions were drawn:

1. Food handlers (57.3%) have moderate knowledge of salmonellosis prevention.
2. Food handlers (33.4%) exhibit low salmonellosis prevention practices in their restaurants.
3. There is no significant difference in the level of knowledge of salmonellosis prevention possessed by food handlers based on educational qualifications.
4. There is no significant difference in the salmonellosis prevention practices exhibited by food handlers based on their educational qualifications.

Recommendations

Based on the findings of the study, the following recommendations were proffered:

1. Awareness campaign on food safety and salmonella prevention among the food handlers and the entire public should be mounted.
2. Federal, State and local governments should reactivate and sustain the food law earlier enacted. This will go a long way in protecting the health of consumers against unwholesome, inferior, and dangerous food as well as reduce certain malpractices in food enterprises such as in restaurants and pubs.
3. Food handlers should be educated to wash their hands thoroughly with soap and water before eating or preparing food, after using the toilet, after changing diapers, after touching your pets or other animals (especially reptiles) and after using a handkerchief.

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