



Food Hygiene Knowledge, Practice and Safety Training Intervention among Food Handlers in Abakaliki, Nigeria

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Authors' contributions

Author BII contributed to literature search, data collection, data analysis and write-up of the manuscript. Authors COA and OI contributed to study design, data collection and write-up of the manuscript.

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ABSTRACT

Background: Food hygiene and safety are significant public health issues in both developed and developing nations. The objective of this study was to determine the effect of training on knowledge and practice of food hygiene and safety among food handlers in restaurants in Abakaliki, Nigeria.

Methodology: This study was quasi-experimental in design. The intervention and control groups were selected by simple random sampling method. A total of 170 food handlers were recruited into this study. The study phases were a baseline survey in both groups, a training programme in the intervention group and post-intervention survey in both groups. Statistical package for social sciences (IBM-SPSS) version 20 was used for data analysis.

Results: After the intervention, the proportion of respondents who had very good knowledge of food hygiene and safety increased significantly by 46.9% in the intervention group ($p < 0.01$). A slight increase (1.1%) was observed in the control group but this was not significant ($p = 0.40$). The proportion of food handlers in the intervention group who had very good practice of food hygiene and safety also increased significantly by 28.4% ($p < 0.01$). However, in the control group, there was no increase in the proportion of food handlers who had very good practice.

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Conclusion: Training significantly increased the knowledge and practice of food hygiene and safety among food handlers. Periodic training should be provided for the food handlers. Further research is recommended to assess sustained changes in practice of food hygiene and safety over time.

Keywords: Food handlers; hygiene; knowledge; practice; intervention.

1. INTRODUCTION

Food hygiene and safety are “all conditions and measures that are essential during production, processing, storage, distribution and preparation of food to ensure that it is safe, sound, wholesome and fit for human consumption” [1]. The high demand for fast food by the consumers may put pressure on food handlers to deliver such that proper safety and sanitation in food management could be compromised [2-5]. Food handlers have a prime role to play in ensuring that meals served through their businesses are hygienic for human consumption. Conscious or inadvertent contamination of food, places consumers at risk of suffering food-borne illnesses [6,7].

Several studies that have reported poor knowledge and practice of food hygiene and safety measures among food handlers recommend training in hygiene matters as a means of improving food handling practices and ensuring the safety of food [8-10]. It has been estimated that each year about 1.8 million people die of diarrhoeal diseases worldwide and most of these cases can be attributed to contaminated food and water [1,11-14].

Training of food handlers to improve their knowledge and practice of food sanitation is of paramount importance in prevention and control of food borne diseases. The World Health Organisation (WHO) has stressed on the same for reducing chances of food contamination [1]. They developed five keys to safer food for food handlers. These are specific behaviours which if practiced adequately would likely reduce food borne diseases/illnesses. They include the following: keep clean, separate raw and cooked food, cook thoroughly, keep food at safer temperatures, use of safe water and raw materials [1,15,16].

This study is therefore aimed at assessing the effect of training on knowledge and practice of food hygiene and safety among food handlers in restaurants in Abakaliki Nigeria in order to make

necessary recommendations on ways of improvement.

2. METHODOLOGY

2.1 Study Area

This study was carried out among food handlers in Abakaliki (intervention site) and Afikpo (control site), both in Ebonyi State Nigeria. The two sites are more than 100 kilometres apart. The population of Ebonyi State is approximated to about 3million people (based on 2006 population census data) [17].

2.2 Study Population

The study population comprise of all food handlers operating in fast food and other restaurants.

2.3 Sample Size Estimation

The minimum sample size was determined using the formula for comparison of two independent group [18]. This gave a total of 67 from each group. This figure was increased by 20% to minimise the effect of attrition giving approximately 85 and therefore a total of 170 respondents in both groups.

2.4 Study Design/Sampling Technique

This study was quasi-experimental in design. Simple random sampling method was used to select the study participants in both intervention and control groups. Two comprehensive lists of food handlers, one in Abakaliki (intervention site) and another one in Afikpo (control site) were prepared. Each list formed a sampling frame in each site. The study participants in each site were selected using a table of random numbers.

2.5 Selection Criteria

All food handlers (managers, cook, servers) that worked in fast food and other restaurants. Exclusion: Street vendors.

2.6 Data Collection/Analysis

A semi-structured interviewer-administered questionnaire adopted/modified from previous studies was used to obtain information on the socio-demographic characteristics, knowledge and practice of food hygiene and safety. Four trained interviewers were used in data collection. The questionnaire was pretested for validity among food handlers in Onueke, Ezza North Local Government of Ebonyi State, outside the study area.

There were 3 phases in the study namely the pre-intervention, intervention and post-intervention phases. The pre-intervention phase comprised a baseline questionnaire survey in the intervention and control groups. The intervention for the participants in Abakaliki was training (2-day workshop) which was provided in five sessions. The participants were the respondents in the baseline survey.

The following topics were covered during the training sessions. Background information: General knowledge of disease transmission, microbial and chemical contamination of food, symptoms of food borne diseases/illnesses and role of food handlers in preventing food borne disease. WHO five keys to safer food: Keep clean, separate raw and cooked food, cook thoroughly, keep food at safe temperatures, use safe and raw materials. Hand washing practice: importance of hand washing, when to wash hands and how to wash hand (the procedure). Personal hygiene: Importance of keeping clean, daily bathing, oral hygiene, use of apron, head tie/cap, care of finger nails etc.

The post-intervention phase comprised of a questionnaire survey in both intervention and control groups six months after the intervention. Outcome indicators used in this study were the degree of change in the knowledge and practice of food hygiene and safety among food handlers.

Data analysis was done using statistical package for social sciences (IBM-SPSS) version 20. Ten questions with 65 response options were used to assess respondents' knowledge of food hygiene and safety. Respondents were required to choose from among 3 options: Yes, No, I don't know to reduce response bias. Respondents' answer was graded as correct (score of 1) or incorrect (score of 0) and a total score of correct answers were used to categorise respondents as follows: poor knowledge = 0-37 response options

answered correctly, good knowledge = 38-55 response options answered correctly and very good knowledge = 56-65 response options answered correctly [19].

Twenty questions with 3 options of "always done", "sometimes done", "not done" were used to determine the practice of food hygiene and safety among food handlers. Respondents were asked to indicate their level of practice to the statements. Correct practice of food hygiene and safety was "always done" or "not done" depending on the question. Respondent's answer was graded as correct (score of 1) or incorrect (score of 0) and the total score of correct answers were used to categorise respondents as follows: poor practice = 0-9 questions answered correctly, good practice = 10-16 questions answered correctly and very good practice = 17-20 questions answered correctly [19].

Analysis was done in the following categories: within group comparison of the intervention group before and after intervention; within group comparison of the control group before and after intervention and post-intervention comparison of the intervention and control groups. Pearson's chi-square test was used to evaluate the differences between groups. The level of significance, $p < 0.05$ was considered significant.

2.7 Ethical Considerations

Approval for the study was obtained from Research and Ethics committee of Federal Teaching Hospital Abakaliki, Ebonyi State Nigeria. Permission to carry out the study was also obtained from Ebonyi State Environmental Protection Agency (EBSEPA) and from Local Government Authorities of both intervention and control site. Informed consent was obtained from the respondents before the administration of questionnaire.

3. RESULTS

A total of 170 food handlers, 85 in the intervention group and 85 in the control group participated in the baseline questionnaire survey. One hundred and fifty eight of the food handlers (80 in the intervention group and 78 in the control group) participated in the follow-up survey giving an attrition rate of 5.9% in the intervention group and 8.2% in the control group. The mean age of the respondents was 30.6 years in the

intervention group and 32.1 years in the control group. The level of education in both groups had similar distribution (p=0.45) and the proportion that had secondary education were approximately the same (54.1% in intervention group and 51.7% in the control group) [Table 1].

Those respondents with very good knowledge of food hygiene and safety are those who answered 56-65 response option on knowledge questions correctly. Slightly above half of the respondents in both intervention 43(50.6%) and control 47(55.3%) groups had very good knowledge of food hygiene and safety pre-intervention [Table 2].

Percentage of respondents who had very good practice of food hygiene and safety is the percentage of respondents who answered correctly 17 – 20 response options on practice questions. Before the intervention, only 29 (34.1%) of respondents in the intervention group and 18 (21.2%) in the control group had very

good practice of food hygiene and safety [Table 3].

The proportion of respondents who had very good knowledge of food hygiene and safety increased significantly by 46.9% in the intervention group (p<0.01). The increase (1.1%) observed in the control group was not statistically significant (p=0.40) [Table 2].

There was a statistically significant increase in the proportion of respondents who had very good practice of food hygiene and safety among food handlers in intervention group (p<0.01). In the control group however, there was no increase in the proportion of respondents with very good practice of food hygiene and safety. The difference between both group post-intervention was statistically significant (p<0.01) [Table 3].

Pre-intervention, there was no statistically significant difference in knowledge and practice of participants in the intervention and control groups (p=0.54 and p=0.06 respectively).

Table 1. Socio-demographic characteristics and work profile of respondents

Variable	Intervention group n=85, freq. (%)	Control group n = 85, freq. (%)	X ² (p-value)
Age group (in years)			
<20	8 (9.4)	7 (8.2)	1.5 (0.83)
20 – 29	35 (41.2)	34 (40.0)	
30 – 39	23 (27.1)	21 (24.7)	
40 – 49	15 (17.6)	15 (17.7)	
>49	4 (4.7)	8 9.4)	
Sex			
Male	20 (23.5)	21 (24.7)	0.03 (0.86)
Female	65 (76.5)	64 (75.3)	
Marital Status			
Single	40 (47.1)	34 (40.0)	0.86 (0.35)
Married	45 (52.9)	51 (60.0)	
Level of Education			
None	1 (1.2)	2 (2.4)	2.62 (0.45)
Primary	20 (23.5)	27 (31.8)	
Secondary	46 (54.1)	44 (51.7)	
Tertiary	18 (21.2)	12 (14.1)	
Previous Training			
Yes	28 (32.9)	20 (23.5)	1.86 (0.17)
No	57 (67.1)	65 (76.5)	
Duration of service (in years)			
Less than 1	23 (27.1)	17 (20.0)	4.56 (0.21)
1 – 3	35 (41.1)	30 (35.3)	
4 – 6	14 (16.5)	14 (16.5)	
Above 6	13 (15.3)	24 (28.2)	

Table 2. Effect of training on knowledge of food hygiene and safety

Knowledge of food hygiene and safety	Intervention group			Control group		
	Pre interv. n= 85 freq. (%)	Post interv. n= 80 freq. (%)	% change	Pre interv. n= 85 freq. (%)	Post interv. n= 78 freq. (%)	% change
Good knowledge	42 (49.4)	2(2.5)	-46.9	38(44.7)	34(43.6)	- 1.1
Very good knowledge	43(50.6)	78(97.5)	46.9	47(55.3)	44(56.4)	1.1

Within group comparison, intervention group, $X^2 = 46.38, p < 0.01$; control group $X^2 = 1.86, p = 0.40$ between group comparison, pre – intervention $X^2 = 0.38, p = 0.54$, post- intervention $X^2 = 37.90, p < 0.01$

Table 3. Effect of training on practice of food hygiene and safety

Practice of food hygiene and safety	Intervention group			Control group		
	Pre interv. n= 85 freq. (%)	Post interv. n= 80 freq. (%)	% change	Pre interv. n= 85 freq. (%)	Post interv. n= 78 freq. (%)	% change
Good practice	56 (65.9)	30(37.5)	-28.4	67(78.8)	64(82.1)	3.3
Very good practice	29(34.1)	50(62.5)	28.4	18(21.2)	14(17.9)	-3.3

Within group comparison, intervention group, $X^2 = 13.30, p < 0.01$; control group $X^2 = 0.27, p = 0.87$ between group comparison, pre – intervention $X^2 = 3.56, p = 0.06$, post- intervention $X^2 = 32.53, p < 0.01$

4. DISCUSSION

There was no significant difference in terms of socio-demographic characteristics and work profile (gender, age, marital status, level of education, duration of service and previous training course attended) ($p > 0.05$). This shows that the intervention and control groups had similar characteristics and are therefore comparable group for the study parameters – knowledge and practice of food hygiene and safety.

Only 32.9% of respondents in the intervention group and 23.5% of participants in the control group had received formal training in food hygiene and safety prior to this study. A study conducted by Ifeadike et al in Federal Capital Territory Nigeria also showed that only 32.1% of the food handlers had undergone regular food hygiene training/health education prior to the study [20]. Assessment of knowledge and practice of food hygiene and safety in fast food restaurants in Benin City Nigeria by Isara and Isah showed that only 47.4% of the respondents had previous training of food hygiene and safety [19,21]. In a study conducted, in a medical college Delhi, only 27.8% of the respondents had previous training course [10]. These lack of training could be the result of laxity on the part of government/management of restaurants which should ensure training and certification of individuals working in food service establishments. Such lack of training has been reported to increase the likelihood of food contamination [21].

A study carried out by Okojie et al. [8] in a Nigerian university showed poor food hygiene was linked to the fact that barely half of the respondents had received any form of health education on food hygiene and safety. Isara et al. [19] also showed that knowledge and practice of food hygiene and safety were influenced by previous training ($p = 0.002$) These findings emphasised the place of training and health education on good food hygiene practices among food handlers. Food handlers, therefore, need to be educated or trained on basic principles of food safety [22-25].

Training is known to improve knowledge and practice of food hygiene and safety and would likely reduce food borne disease/illnesses [1]. The training session provided an opportunity for the food handlers to acquire comprehensive knowledge of food hygiene and safety.

The proportion of respondents who had very good knowledge of food hygiene and safety increased by 46.9% in the intervention group and 1.1% in the control group. The increase was statistically significant in the intervention group ($p < 0.01$) but not in the control group ($p = 0.40$). There was also a statistically significant difference in respondents' knowledge between intervention and control group post-intervention. Thus improvement in knowledge of food hygiene and safety observed in the intervention group was associated with training of food handlers.

The difference between the knowledge in intervention and control groups post-intervention

is also attributed to the effect of training. Application of the WHO five keys to safer food to improve food handling practices of food handlers in a poor resource community in Ghana also showed improvement in their knowledge after intervention (training) [28]. Studies by Malhatora et al in a medical college in Delhi India also showed significant increase in respondents' knowledge of food hygiene and safety after a health education intervention programme [22]. A study conducted by Robert et al on food safety and food service employees' knowledge and behaviour showed overall knowledge ($p \leq 0.05$) and compliance with standard behavior ($p < 0.01$) improved significantly pre-and post-training [26]. Training of food handlers on basic principles of food hygiene and safety are therefore necessary to improve their knowledge [22-25].

The practice of food hygiene and safety did not differ between the intervention and control group before intervention ($p = 0.06$). There was no significant difference in practice of food hygiene and safety in the control group between pre-intervention and post-intervention ($p = 0.87$). The proportion of respondents who had very good practice of food hygiene increased significantly in the intervention group post-intervention ($p < 0.01$). The difference between the groups post-intervention was also statistically significant ($p < 0.01$). This shows there is a positive relationship between training received by respondents in the intervention group and practice of food sanitation. It therefore implies that training in the intervention group was associated with improvement in their practice of food hygiene. A study carried out in Accra, Ghana also showed that following training, respondents acquired some knowledge and were putting it into practice [9]. A study on food safety training and food service employee's knowledge and behaviour also showed that the overall mean compliance with standard behavior (practice) score improved significantly between pre-training and post-training [26].

5. CONCLUSION

The intervention programme was effective because it significantly increased the knowledge and practice of food hygiene and safety among food handlers in intervention group compared to those in the control group. Regulatory agencies and government should provide training/re-training (health education programmes) to food handlers as well as incorporating the same into the existing strategies for food service establishment. This study did not assess

sustained changes in practice of food hygiene and safety over time, therefore further research to assess this is recommended.

CONSENT

As per international standard or university standard, patient's written consent has been collected and preserved by the authors.

ETHICAL APPROVAL

As per international standard or university standard, written approval of Ethics committee has been collected and preserved by the authors.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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