Research

Practice of Food Hygiene among Nursing Mothers attending Under-Five Clinics in a Rural Community in Edo State, Nigeria

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Article history: Received 19 July 2023, Reviewed 5 September 2023, Accepted for publication 18 September 2023

How to cite this article:
Alenoghena OI, Asalu OB, Aigbiremolen OA. Practice of Food Hygiene among Nursing Mothers attending Under-Five Clinics in a Rural Community in Edo State, Nigeria. The Nigerian Health Journal 2023; 23(3): 799 – 809..

Abstract

Background: Children under the age of five are prone to foodborne diseases, resulting from poor food hygiene because of their less effective immune systems. This study aimed to assess the knowledge, attitude and practice of food hygiene among nursing mothers attending under-five clinics.
Method: This study was a descriptive cross-sectional study, involving 330 nursing mothers attending the under-five clinic in health care facilities. Data were collected using interviewer-administered questionnaires and analyzed using Statistical Package for Social Sciences (SPSS) version 21. A p-value < 0.05 at 95% confidence interval was considered statistically significant.
Result: Eighty-two percent of the respondents had good knowledge of food hygiene; 95.2% had a good attitude and 82.7% demonstrated good practice. Knowledge on food hygiene was significantly associated with the age of the respondents (P=0.008) and their educational status (P=0.001), those with tertiary education doing better. Similarly, respondents with tertiary education had significantly better attitude (P=0.001 and practice (P=0.001). The predictors of knowledge on food hygiene were education status (odds ratio [OR] =0.249, 95% confidence interval [CI]: 0.126, 0.492) and occupation of the respondents (OR = 2.158, 95% CI: 1.156, 4.026). Educational status was also the predictor for positive attitude (OR =0.143, 95% CI: 0.031, 0.667) and practice of food hygiene (OR =0.394, 95% CI: 0.210, 0.738).
Conclusion: The knowledge, attitude and practice of food hygiene among the respondents was good. Predictors of knowledge included level of education and occupation. Government at the State and Local Government levels should organize regular health promotion on food hygiene.
Keywords: Food, Hygiene, Education, Children, Mothers.

Print ISSN: 0189-9287 Online ISSN: 2992-345X

Introduction

Food hygiene can be defined as handling, preparing and storing food or drinks in a way that best reduces the risk of consumers becoming sick from the food-borne disease. Food borne disease, which results from any deficiency in any of this chain of processes is becoming a widespread public health problem; mostly affecting children, under the age of five. This is particularly because of the less effective immune systems of these children.[1] Most foodborne diseases among the under-five are facilitated by poor food hygiene of their parents, especially nursing mothers.[2, 3] Moreover, diarrhoea related deaths have been documented to make up a major proportion of food borne diseases among the under-five.[1, 4]

The World Health Organization (WHO) reveals that an estimated 600 million (almost 1 in 10 people in the world) fall ill after eating contaminated food and 420,000 die every year; resulting in the loss of 33 million healthy life years. A large percentage of these cases occur in developing countries. Furthermore, poor food hygiene practices results in approximately 1.5 billion episodes of diarrhoea annually in developing countries, and this figure has remained more or less constant over the last 20 years.[5, 6,7]

Contamination of food occurs predominantly in homes, especially at kitchen where food preparation take place. It may be associated with the temperature at which food was stored, how it was stored, the period of time it was stored for and the utensils it was stored with.[6] Food borne disease may occur at any of these points when there is contamination with pathogens.[8] Some of these pathogens include *Salmonella* bacteria, *Escherichia coli, Listeria, Campylobacter, Staphylococcus aureus, Shigella,* and Noroviruses.[8, 9]

In most developing countries, especially Nigeria, food born illnesses, especially diarrhoea diseases in under-five contribute significantly to childhood morbidity and mortality. But this has been under-reported because of difficulty in establishing causal ties between food contamination and subsequent illness or death.[10] The World Bank's 2018 report on the economic burden of foodborne diseases reported that the overall loss of foodborne disease-related production in low- and middle-income countries are projected to cost US$ 95.2 billion annually and that the annual cost of managing foodborne diseases is estimated to be US$ 15 billion.[3] Each year worldwide, unsafe food causes 600 million cases of foodborne diseases and 420 000 deaths. And 30% of these food-borne deaths occur among children under 5 years of age.[11]

Overall, food borne illnesses and diarrhoea accounts for 24% of the causes of under-five morbidity and 15% of under-five mortality worldwide.[11] Therefore the prevention of food borne diseases is a major step towards improving the health and general well-being of the under-five globally. Some of the challenges nursing mothers face during food preparation, handling and consumption at homes include: Lack of proper knowledge in handling food and food materials, inappropriate utensils and inadequate equipment for storing food, inadequate initial cooking of food and reheating of food, widespread low socioeconomic status, etc.[11,12]

Never-the-less food hygiene practices among mothers have been reported to be affected by age, educational status, nature of place of residence (urban or rural).[12-14] This study was aimed at ascertaining the knowledge, attitude and practice of food hygiene among nursing mothers attending under-five clinics in Esan Central Local Government Area, Edo State, Nigeria.

Method

Study Area: This descriptive cross-sectional study was carried out in Esan Central Local Government Area (LGA) of Edo State, Nigeria. The LGA is divided into 10 wards; with its administrative headquarter in Irrua. It has a population of 105,310, based on the 2006 census. It is located at latitude 8.35°E and 8.30° N and longitude 8.21° E and 8.35° N. Esan central is predominantly an agrarian area but has a few industries, hotels, hospitals, and factories. Sources of natural water include Agualake, Ohiel Streams, Oza Stream Idumoza, Ujabhole Streams Eko-Iribhude, Oraje and Omobo rivers at Ewu. The study was carried out in Idumebo, Iduwele-Ewu, Eguare- Opoji and Ebudin rural communities located in Esan central local government area of Edo state. In terms of public health facilities, the most notable is Irrua Specialist teaching hospital situated on the Ishan plateau. There is also the General hospital at Usugbenu and a total of sixteen public primary health care facilities.

Study Population: The respondents included nursing mothers attending the under-five clinic in health care facilities situated at Esan Central Local Government Area of Edo State.

Sample Size: The sample size was estimated using Cochran's formula for cross-sectional study;[15] with a p-value of 79.3% [9] and d of 0.05; a minimum sample size of 330 was calculated.

Sampling Technique: Five public primary health care facilities were selected out of the 18 public health centers, using a simple random sampling technique. The respondents were equally allocated to these facilities and were selected consecutively.

Data Collection: The data were collected using an interviewer-administered questionnaire. The

Print ISSN: 0189-9287 Online ISSN: 2992-345X

questionnaire was divided into four sections; which included the socio-demographic section, knowledge on food hygiene; attitude towards food hygiene and the practice of food hygiene.

In terms of scoring, 10 questions assessed the knowledge of food hygiene with a score of 1 awarded to each correct answer and no score for the wrong answer and "I don't know". With the highest score being 10, a score of 0-5 indicates "Poor knowledge" and a score of 6-10 indicates "Good knowledge". Seven questions assessed attitude towards food hygiene, with a score of 2 awarded to the right answer from either of 'Agree' and 'disagree'. A score of 1 is awarded to a response of 'Not sure' and no mark for wrong responses. With a maximum score of 14, a score of 0-7 is indicated as "Bad attitude" and a score of 8-14 is indicated as "Good attitude". Also, 7 questions assessed the practice of food hygiene, with a score 2, 1, or zero awarded to right answers from either; 'Always', 'Sometimes' or 'Never'. With a maximum score of 14, a score of 0-7 is indicated as "Bad practice" and a score of 8-14 is indicated as "Good practice".

Data Analysis: Data analysis was carried out using the IBM SPSS version 21.0. Univariate analysis was done to assess distribution of the variables and ensure completeness of data while bivariate analysis was done to determine the association between respondents' socio-demographic variables and knowledge, attitude and practice of food hygiene using Chi square test. Binary logistic regression using the "enter approach" was done to identify the significant predictors of Knowledge, attitude and practice. A p-value < 0.05 at 95% confidence interval (CI) was considered statistically significant.

Ethical Consideration: Ethical approval (ISTH/HREC/20213108/221) for the study was obtained from the Health Research Ethics Committee of Irrua Specialist Teaching Hospital, Irrua, Edo State, Nigeria on the 14th of September, 2021. In addition, verbal informed and written consent were obtained from respondents after a community entry and permission was obtained from the community head, quarter leaders and respondents.

Results

Most of the respondents were within the 21-25 age group 105 (32.7%) with a mean age of 28.46 ± 10.746. A greater proportion were single 164 (49.7%), with 196 (59.4%) being unskilled. There were more Christians 267 (80.9%) than other religions with a majority 171 (51.8%) with a tertiary level of education.

In table 2, majority of responses were positive regarding food hygiene; the least positive response was found in "consuming freshly purchased food before older ones" with only 168 (50.9%) correctly disagreeing that freshly purchased food should not be consumed first. As for the general knowledge of food hygiene among the respondents, most of the respondents, 272 (82.4%) demonstrated good knowledge of food hygiene and a smaller proportion, 58 (17.6%) had poor knowledge.

Most of the respondents showed a positive attitude toward food hygiene. However, 224 (67.9%) of them wrongly agreed that "cooked food should be left at room temperature until it cools down. Generally, a good attitude towards food hygiene was demonstrated by the majority of the respondents 314 (95.2%) while 16 (4.8%) demonstrated a bad attitude towards food hygiene. As shown in table 3.

Table 4 reveals that 188 (57.0%) of nursing mothers "always" washed their hands after using the toilet with 133(40.3%) washing their hands "sometimes". Fifty-three (16.1%) "always" served leftover food for their children and 110 (33.3%) "always" carried out operations like sweeping and cleaning while preparing food. In terms of the practice of food hygiene generally, two hundred and seventy-three (82.7%) respondents demonstrated good practice of food hygiene and 57(17.3%) demonstrated bad practice of food hygiene.

Table 5 shows that a greater proportion of older mothers compared to their younger counterparts (26% versus 13.9%) had good knowledge of hand hygiene and this association was statistically significant (P=0.008). Similarly, there was a statistically significant association between women with tertiary education and knowledge of food hygiene compared to those with at most secondary education (P= 0.001).

In terms of attitude: Good attitude towards food hygiene was more among respondents who were older than 30 years, 7 (7.0%) compared to those who were 30 years or less 9 (3.9%); although this was not statistically significant (P=0.245).

Also, there was a statistically significant association between attitude towards food hygiene and respondents who had tertiary education compared to those with at most secondary education (P=0.001). A good attitude towards food hygiene was almost similar amongst skilled (97.0%) and unskilled (93.9%) respondents, no statistically significant relationship was found.

As for the Practice of food hygiene: Good practice of food hygiene was more among respondents who were 30 years or less compared to those older than 30 years, although this was not statistically significant (P=0.687). There was a statistically significant association between the practice of food hygiene and the educational status of the participants; with those with tertiary education showing better practice (P = 0.001).

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Table 6 reveals that, overall, respondents with good knowledge generally of food hygiene demonstrated statistically significant good practice of food hygiene (P=0.001), Also, a greater proportion of the respondents, 270 (99.3%) who demonstrated a good knowledge of food hygiene had a good attitude towards it. Furthermore, 75.9% of those with a bad knowledge of food hygiene demonstrated a good attitude towards it. There was a statistically significant association between knowledge of food hygiene and attitude towards food hygiene. (P= 0.001)

Table 7 shows the logistic regression model for factors influencing the knowledge of respondents on food hygiene and safety. The significant predictors of knowledge on food hygiene among the respondents were level of education (odds ratio [OR] =0.249, 95% confidence interval [CI]: 0.126, 0.492) and occupation of the respondents (OR = 2.158, 95% CI: 1.156, 4.026), Also, Table 4 shows the logistic regression model for factors influencing the attitude of respondents on food hygiene and safety. The significant predictors of attitude towards food hygiene among the respondents were level of education (OR =0.143, 95% CI: 0.031, 0.667) and occupation of the respondents (OR = 1.793, 95% CI: 0.625, 5.142), Furthermore, Table 4 shows the logistic regression model for factors influencing the practice of food hygiene and safety by the respondents. The significant predictor of the practice of food hygiene was the level of education (OR =0.394, 95% CI: 0.210, 0.738).

Table 1: Sociodemographic Characteristics of Respondents

Variable	Frequency (N=330)	Percent (%)
Age group (Years)		
15 to 20	35	10.6
21 to 25	105	32.7
26 to 30	87	26.4
31 to 35	46	13.9
36 to 40	23	7.0
41 to 45	8	2.4
46 to 50	23	7.0
Mean ± Standard Deviation	*28.46 ± 10.764*	
Marital Status		
Single	164	49.7
Married	130	39.4
Divorced	11	3.3
Separated	18	5.5
Widowed	7	2.1
Occupation		
Skilled	51	15.5
Unskilled	196	59.4
Professional	83	25.2
Religion		
Christian	267	80.9
Muslim	56	17.0
ATR	7	2.1
Level of education		
None	14	4.2
Primary	30	9.1
Secondary	115	34.8
Tertiary	171	51.8

Table 2: Knowledge of Food Hygiene

Variable	Frequency (N=330)	Percent (%)
Washing of hand gloves is good hygiene practice		
Yes	199	60.3
No	72	21.8
I don't know	59	17.9
Hand washing before preparing food is necessary		
Yes	272	82.4
No	27	8.2

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I don't know	31	9.4
Freshly purchased foods should be consumed first before older ones		
Yes	106	32.1
No	168	50.9
I don't know	56	17.0
Opened milk should be stored in a refrigerator		
Yes	243	73.6
No	45	13.6
I don't know	42	12.7
Fruits and vegetables should be washed before consumption		
Yes	305	92.4
No	11	3.3
I don't know	14	4.2
It is important to wash hands with soap and water after using the toilet		
Yes	306	92.7
No	12	3.6
I don't know	12	3.6
Covering of refuse bins and cleaning the cooking surrounding is important		
Yes	281	85.2
No	21	6.4
I don't know	28	8.5
Pipe borne water is safer than water from tankers for cooking		
Yes	244	73.9
No	24	7.3
I don't know	62	18.8
General knowledge of Food hygiene		
Good	272	82.4
Poor	58	17.6

Table 3: Attitude towards Food Hygiene

Variable	Frequency (N=330)	Percent (%)
The conditions of the places where food is cooked are very important		
Agree	301	91.2
Not sure	20	6.1
Disagree	9	2.7
Cooked food should be left in room temperature until it cools down		
Agree	224	67.9
Not sure	70	21.2
Disagree	36	10.9
Techniques for washing hands properly are important in food preparation		
Agree	287	87.0
Not sure	29	8.8
Disagree	14	4.2
Nursing mothers must clean their nails regularly		
Agree	300	90.9
Not sure	28	8.5
Disagree	2	0.6
Keeping kitchen surfaces clean reduce the risk of illness		
Agree	300	90.9

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Not sure	28	8.5
Disagree	2	0.6
It is unsafe to leave cooked food or milk out of the refrigerator for more than two hours		
Agree	238	72.1
Not sure	74	22.4
Disagree	18	5.5
It is important to throw away food after the expiry date		
Agree	239	88.8
Not sure	23	7.0
Disagree	14	4.2
General attitude towards food hygiene		
Good	314	95.2
Poor	16	4.8

Table 4: Practice of Food Hygiene

Variable	Frequency (N=330)	Percent (%)
I wash my hands after using the toilet		
Always	188	57.0
Sometimes	133	40.3
Never	9	2.7
I wash my hands with soap before feeding my child/children		
Always	188	57.0
Sometimes	117	35.5
Never	25	7.6
Washing of utensils used for cooking		
Always	233	70.6
Sometimes	88	26.7
Never	9	2.7
You serve leftover food for your children		
Always	53	16.1
Sometimes	116	35.2
Never	161	48.8
Using of separate utensils for your child		
Always	98	29.7
Sometimes	141	42.7
Never	91	27.6
Covering of refuse and cleaning cooking environment		
Always	229	69.4
Sometimes	88	26.7
Never	13	3.9
You carry out operations like sweeping and cleaning while preparing food		
Always	110	33.3
Sometimes	158	47.9
Never	62	18.8
General Practice		
Good	273	**82.7**
Bad	57	**17.3**

Table 5: Association between Socio-Demographic Characteristics and Knowledge of Food Hygiene

Variable	Knowledge of food hygiene (N= 330)		Statistics
	Good Frequency (%)	Poor Frequency (%)	
Age group			

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Younger (≤30 years)	32 (13.9)	198 (86.1)	X^2= 7.029, p= 0.008
Older (>30 years)	26 (26.0)	74 (74.0)	
Marital status			
Married	26 (20.0)	104 (80.0)	X^2= 0.870, p= 0.351
Unmarried	32 (16.0)	168 (74.0)	
Occupational class			
Skilled	20 (14.9)	114 (85.1)	X^2= 1.094, p= 0.296
Unskilled	38 (19.4)	158 (80.6)	
Educational attainment			
At most secondary	44 (27.7)	115 (72.3)	X^2= 13.550, p< 0.001
Tertiary	14(8.2)	157 (91.8)	
Variable	**Attitude towards food hygiene (N= 330)**		
Age group			
Younger (≤30 years)	9 (3.9)	221 (96.1)	X^2= 1.353, p= 0.245
Older (>30 years)	7 (7.0)	93 (93.0)	
Marital status			
Married	7 (5.4)	123 (94.6)	X^2= 0.132, p= 0.716
Unmarried	9 (4.5)	191 (95.5)	
Occupational class			
Skilled	4 (3.0)	130 (97.0)	X^2= 1.801, p= 0.810
Unskilled	12 (6.1)	184 (93.9)	
Educational attainment			
At least secondary	14 (8.8)	145 (91.2)	X^2= 6.737 p< 0.009
Tertiary	2 (1.2)	169 (98.8)	
Variable	**Practice of food hygiene (N= 330)**		
Age group			
Younger (≤30 years)	41 (17.8)	189 (82.2)	X^2= 0.163, p= 0.687
Older (>30 years)	16 (16.0)	84 (84.0)	
Marital status			
Married	20 (15.4)	110 (84.6)	X^2= 0.535, p= 0.464
Unmarried	37 (18.5)	160 (81.5)	
Occupational class			
Skilled	16 (11.9)	118 (88.1)	X^2= 4.490, p= 0.034
Unskilled	41 (20.9)	155 (79.1)	
Educational attainment			
At least secondary	39 (24.5)	120(75.5)	X^2 = 6.945, p = 0.008
Tertiary	18 (10.5)	153(89.5)	

Table 6: Association between Knowledge of Food Hygiene and Attitude and Practice of Food Hygiene

	Knowledge of food hygiene			
	Good	Poor	Test statistic (X^2)	P-value
Attitude toward food hygiene				
Good	270 (99.3)	44 (75.9)	56.8	0.001
Bad	2 (0.7)	14 (24.1)		
Practice of Food Hygiene				
Good	243 (89.3)	30 (51.7)	47.3	0.001
Bad	29 (10.7)	28 (48.3)		

Table 7: Logistic Regression Model for Sociodemographic Factors Influencing the Knowledge, Attitude and Practice of Food Hygiene and Safety

Print ISSN: 0189-9287 Online ISSN: 2992-345X

Factors	Percentage	OR (95%CI)	P
Factors influencing knowledge			
Age group			
Younger (≤30Years)	230 (69.7)	1.163 (0.600-2.256)	0.654
Older (>30 years)	100 (30.3)		
Level of Education			
At least Secondary	159 (48.2)	0.249 (0.126-0.492)	0.001
Tertiary education	171 (51.8)		
Occupation			
Skilled	134 (40.6)	2.158 (1.156-4.026)	0.016
Unskilled	196 (59.4)		
Factors influencing attitude			
Age group			
Younger (≤30Years)	230 (69.7)	1.561 (0.464-5.250)	0.472
Older (>30 years)	100 (30.3)		
Level of Education			
At least Secondary	159 (48.2)	0.143 (0.031-0.667)	0.013
Tertiary education	171 (51.8)		
Occupation			
Skilled	134 (40.6)	1.793 (0.625-5.142)	0.277
Unskilled	196 (59.4)		
Factors influencing practice			
Age group			
Younger (≤30Years)	230 (69.7)	1.542 (0.794-2.995)	0.201
Older (>30 years)	100 (30.3)		
Level of Education			
At least Secondary	159 (48.2)	0.394 (0.210-0.738)	0.004
Tertiary education	171 (51.8)		
Occupation			
Skilled	134 (40.6)	0.901 (0.462-1.755)	0.754
Unskilled	196 (59.4)		

Discussion

The objective of this study was to assess the knowledge, attitude and practice of food hygiene among nursing mothers attending under-five clinics in Esan Central Local Government Area of Edo State. A total of 330 nursing mothers across five centers were selected. From the socio-demographic characteristics, age ranged from 19 to 48 years, with most respondents between the 21 to 25 age group; with a mean age of 28.46 years and a standard deviation of 10.764. The age range of the women in this study is generally consistent with the average reproductive ages of women globally; which is from 15-49 years.[10] But it is inconsistent with the range from another study done in Sudan,[12] in terms of the modal age group. Most of the nursing mothers were above the age of 30 years. Two-fifth of the nursing mothers were married, with more than half unskilled, four-fifth were Christians with half having a tertiary level of education.

Good knowledge of food hygiene by nursing mothers attending under-five clinics in this study was found in about four-fifths of the study population, indicating a very high knowledge of food hygiene. This is very much expected as these mothers may have been exposed to health education/counselling on sanitation and food hygiene by health personnel from Irrua Specialist Teaching Hospital, Irrua (which is the tertiary health institution in the study area). This is relatively higher than the result of a study carried out in Sudan,[12] but in keeping with another report from India,[16] where a similar proportion of women demonstrated good knowledge.

There was generally a good attitude towards food hygiene amongst the nursing mothers. Almost all the respondents demonstrated a good attitude; with less than one-fifth demonstrating a bad attitude towards food hygiene. This implies that most of the respondents were willing to adopt practical measures towards the reduction of food and water contamination for the under-five and the entire household. The result of this study is similar to those done in India[16] and Lebanon.[17] Good practice of food hygiene was found in four-fifth of nursing mothers. This is consistent with results from Karnataka[18] and Egypt.[19] It is a particularly important finding because it reflects the practical streps adopted by the respondents during food preparation and consumption. But the finding is not in sync with the persistently high rates of diarrhoea and food borne

Print ISSN: 0189-9287 Online ISSN: 2992-345X

illnesses among under-five in the State.[20, 21] It raises further questions on possibility of the deficiencies in other factors that could contribute to the improvement of hygiene in households. Some of these factors include availability of clean sources of water, refuse disposal methods and others complementary efforts from government at all levels for the improvement of the health of the under-five.[22]

Better knowledge of food hygiene had a statistically significant association with the respondents' level of education as well as their age. This is in keeping with the report of a study carried out in Ghana. Although the comparison in this study was between formal and non-formal education.[23] In addition, knowledge of food hygiene was significantly associated with attitude towards food hygiene; the better the knowledge, the better the attitude. This was also found in a study in Karnataka.[18] Furthermore, knowledge of food hygiene showed a statistically significant association with the practice of food hygiene. The better the knowledge of the nursing mothers, the better the practice of food hygiene. Similar findings were found in Karnataka[18] and Ethiopia.[23, 24] But contrary reports have also been documented in Bangladesh,[25] in which better knowledge did not translate to better practice of food hygiene. Again, it was observed in this study that a higher level of education showed a statistically significant association with better attitude and practice of food hygiene. This is in keeping with findings from Sudan,[12] India.[16] The occupation of the respondents in this study also determined their attitude towards food hygiene practices. This was particularly not surprising because of the opportunities provided in some occupation towards exposure to basic health practices. All in all, the predictors of knowledge and positive attitude towards food hygiene that were identified in this study included the level of education and occupation of the respondents. Respondents with at least tertiary education and those with relatively better jobs may probably have had more opportunities and exposures on health and hygiene related education training generally. This is in keeping with previous reports.[23] Furthermore, education was identified as the determinant of good practice of food hygiene in this study. This was not unexpected; as education has been reported as one of the strongest determinants of positive behavioral change.[23]

Strengths and Limitations of the study: The validity of data collected is strengthened by the fact that over half of the respondents had tertiary education. Triangulating this study with a Focus Group Discussion (FGD) may have improved the findings.

Conclusion

The knowledge, attitude and practice of food hygiene among nursing mothers attending under-five clinics in this study was good, with a positive association between knowledge of food hygiene and the education as well as occupational skill of the respondents. The determinants of knowledge on food hygiene included level of education and occupation of the respondents Education was also a significant determinant for positive attitude and practice towards food hygiene. Government at all levels should urgently organize regular health promotion on food hygiene and provide clean water and adequate waste disposal methods across Edo state.

Declarations

Ethical consideration: Ethical approval (ISTH/HREC/20213108/221) for the study was obtained from the Health Research Ethics Committee of Irrua Specialist Teaching Hospital, Irrua, Edo State, Nigeria on the 14th of September, 2021.

Authors' contribution: Alenoghena IO (Development of concept, introduction, methodology and discussion), Asalu OB (Methodology and data collection), Aigbiremolen OA (Data analysis and results)

Conflict of interest: No conflict of interest

Funding: Self-funded

Acknowledgement: - Authors are grateful to Mrs. Tracy Ediare and Staff of Community Health Department, Ambrose Alli University, Ekpoma.

Print ISSN: 0189-9287 Online ISSN: 2992-345X

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