



## Knowledge and Practice of Food Hygiene among Women Accommodated in Flood Displaced Person's Camps in Bayelsa State

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### Abstract

The 2022 flood caused a massive destruction of property worth millions of naira, loss of human lives, and displaced millions of persons who mostly stayed in flood displaced person's camps (FDP) that do not have basic amenities. The insanitary condition of these camps make them a perfect avenue for the spread of water-borne and food-borne diseases. To curtail the spread of these infectious diseases in any community, basic food hygiene principles must be understood and observed by individuals and families in the population. The study assessed knowledge and practice of food hygiene among women accommodated in flood displaced person's camps in Bayelsa State. The study adopted cross-sectional survey design. All the 275 women that were accommodated in the three FDP camps in Bayelsa State formed the population of the study. This instrument for data collection was a self-developed questionnaire titled Knowledge and Practice of Food Hygiene among Women accommodated in Flood Displaced Person's Camps questionnaire (KPFHWAFDPC) with three sections. A reliability coefficient of 0.84 was established through the split-half method. Data obtained were coded into software package for social science (SPSS-IBM) and analyzed using frequency and percentage for the research questions and chi-square the hypothesis. The hypothesis was tested using chi-square, set at 0.05 level of significance. The results revealed that, majority of the respondents had both poor knowledge (77.5) and practice (84.2) of food hygiene. There was a significant difference in the practice of food hygiene among flood displaced women in Bayelsa State in relation to education level. The author recommended that relevant stakeholders in the health sector should carry out intensive public awareness programmes on food hygiene principles at the grassroots level using appropriate channels of communication.

**Keywords:** Food, Food-borne diseases, Food hygiene, Flood, Flood displaced persons

### Introduction

Food hygiene is a fundamental public health intervention that can significantly promote and maintain good health status among individuals and families in a given community by preventing the prevalence of several food borne diseases that have the capacity to course epidemics of great fatality. According to Odeyemi (2016), the consumption of wholesome and hygienic food can also improve the individual's immune system to resist various health challenges. However the community stands the risk of series of public health challenges, especially foodborne infections if unsafe foods are consumed or access to safe food is restricted. Food-borne diseases are important cause of morbidity and mortality globally with great public health impact. Food-borne disease is one of the most wide spread health problem in the world today with a burden of 600 million cases and The burden of food borne diseases is more among children under 5 years constituting about 40% of global diseases burden and



commonly affect individuals in the low-income group in society (Center for Disease Control & Prevention 2021). Although food hygiene is an essential public health measure aimed at curtailing the spread of foodborne diseases, but can only be efficient in controlling these infections in the community if majority of the population are practicing these principles routinely. The practice of food hygiene can be affected by various factors or situations in the community. One of these situations that could possibly affect the practice of food hygiene in our environment is natural disaster especially flood.

Flood is natural phenomenon that can sometimes be disastrous, affecting the health and well-being of man in his natural environment. It is an overflow of water that submerges an area of land that is usually dry (Oguntola, 2022). According to Maclean (2022), floods often cause damages to individual property and homes if situated along the natural flood plains of rivers. It often causes massive devastation, leading to loss of human lives and destruction of individual property and critical health infrastructures. Extreme weather events associated with change in climate are creating rainfall much more than in the past. As affirmed by Barbara et al., (2015), some floods occur abruptly and recede quickly, while others can stay for several days or months to form and recede gradually in accordance with size, duration, and the affected area. Flood can occur nearly everywhere in the world, especially in regions where rainfall is more. Flood is not exclusively caused by rainfall, because other events, such as tsunamis, hurricanes, and tornadoes can also cause flood.

The 2022 flood that was widely described as the highest and worst flooding in the history of Nigeria was a humanitarian disaster, as it displaced millions of people with more than 600 fatalities recorded as at 18<sup>th</sup> October, 2022. More than 200,000 houses were partly or entirely submerged, and vast areas of farmland with infrastructures worth millions of naira being destroyed by the flood (Khardid & Marshman, 2022). The 2022 flood disaster affected 27 out of the 36 States of Nigeria including Bayelsa State. Like other flood prone States of Nigeria, Bayelsa State is used to seasonal flooding, but the 2022 flood has been unprecedentedly worse than the usual. Flooding in Nigeria is often blamed to heavy rainfall resulting from climate change. Another significant factor caused the devastating flooding in Nigeria was the emergency release of excess water from the Kanji Dam of Nigeria and Lagdo Dam located in Northern Cameroon (Baya, 2022). As explained by Baya (2022), the excess volume of water released from the Lagdo Dam was cascaded down to into Nigeria, through River Benue and its various tributaries thereby causing flooding along the coastal communities.

In addition to the devastation of property and loss of human lives, flood can also lead to secondary consequences, such as sustained displacement of residents and increased spread of water-borne, food-borne, and vector-borne diseases (United Nations Environmental Programme, 2020; World Health Organization, 2017). To curtail the spread of these infectious diseases in the community especially the food-borne diseases, basic food hygiene principles must be understood and practiced by individuals and families in the population. Food is a basic physiological need of man that significantly determines his existence and well-being at any moment in time (Onyeneho & Hedberg, 2013). Although food is very fundamental in maintaining and promoting good health among individuals and families, it can also serve as a vehicle of transmission for several infectious diseases that can negatively affect the health of man (Odeyemi, 2016; Parikh et al., 2022). When food is not well prepared and preserved, it will lead to food poisoning. In locations where personal hygiene and environmental sanitation are lacking, parasitic and foodborne diseases will remain a serious public health concern (Barbara et al., 2015).

According to Princewill and Madowa (2022), food safety comprised of all important practices that an individual or food business entity must follow to ensure food is fit for human consumption. Food safety is the process of handling, preparation, and storage of food in ways that prevent food-borne what? (Okoje & Isah, 2014). It is referred to as the whole system of



managing risk associated with food handling, preparation, and storage in order to prevent food-borne disease (Isara et al., 2010). Food safety is a broad concept that encompasses different dimensions of which food hygiene is one. Food hygiene is a sub category of food safety. These are basic guidelines that ensure food are properly stored, prepared, and cooked for human consumption without being exposed to infectious pathogens and toxins (Majowiz & Dubin, 2016). Food hygiene is described as all sanitary measures, principles and procedure that are in place to ensure that food prepared for human consumption is not contaminated with pathogenic agents (Adane et al., 2018). These are practical standards and framework that ensure food consumed by an individual are safe and free from possible contamination which will lead to food poisoning. As averred by Vuksanovic et al., (2022), food hygiene encapsulates the various conditions and measures necessary for the production, processing, storage and distribution of food that are safe, sound, wholesome, and fit for human consumption. Ensuring the food consumed by individuals and families in the community is safe remain a top priority of public health authorities in both developed and developing countries. Considering the potential threat posed by unsafe food to public health, the World Health Organization established the five food hygiene principles that could serve as guide for individuals and families in the community to practice food hygiene (Wiatrowski et al., 2021). These five food hygiene principles if properly consciously practiced are very fundamental in curtailing the risk of spread of food-borne diseases. They are often referred to as the golden rules of food hygiene which include; (1) keep a clean food preparation and serving utensil and environment clean, (2) separate raw from cooked food thoroughly, (3) keep food at safe temperatures (4) hand washing at all times and (5) use of safe water and raw materials. The practice of food hygiene principles among members of the communities especially the women can significantly control the spread of food borne infections (Zenbaba et al., 2022). It is very pertinent to note the fact that the practice of food safety principles is very low among women in many rural communities in the South-South region. The 2022 flood displaced thousands of individuals including women and children in Bayelsa State, forcing them to temporarily live in internally displaced person's camp. According to Bayelsa State Emergency Management Agency, about 1,344,014 persons were directly affected by the 2022 flood with 96 fatalities as at 4<sup>th</sup> November, 2022. The flood affected various communities in the eight Local Government Areas of the State. Reports from government agencies affirmed that Bayelsa State was the most flood affected among the States in Nigeria, with the State being totally cut off from other parts of the country within the period of the flood.

The level of knowledge of food hygiene is generally low among the rural women in Nigeria as reported by Bamidele et al. (2015). As several women and children were displaced by the devastating 2022 flood, they stayed in camps that are not hygienic and lack adequate sanitary conditions. These conditions could greatly exacerbate the transmission of food-borne diseases. As explained by Adane et al. (2018); Wallace et al. (2022), if the level of knowledge of food hygiene principles is profusely low among women in a given community, the possibility of outbreak of food borne infections may be high. As suggested by Okoje and Isah (2014), one very fundamental strategy that can curtail the outbreak of food-borne infections in the community is to improve the health knowledge of women concerning food safety or hygiene. Supporting their view, Green and Knechtges, (2005), explained that, since majority of the foods consume by members of the community are cooked by women, hence empowering them with food safety knowledge will help to control the spread of food borne diseases. As explained by Vuksanovic et al. (2022), individuals with a good level of knowledge of food safety principles will also have good attitude towards compliance, which will result to good practice of food safety that will serve as measure to control food related diseases. As thousands of women and children in Bayelsa State, were displaced forcing them to dwell temporarily in internally displaced person's camp, two pertinent question comes to



mind. One, are all these individuals practicing food hygiene principles in these camps that are not equipped with basic sanitary amenities? The second question is, about their level of knowledge about the basic food hygiene principles?

During the flood, outbreaks, of gastroenteritis were reported in some flood devastating communities across the eight Local Government Areas with few fatalities. This according to ( ) could be attributed to non-compliance to basic food hygiene standards by individuals in the community as a result of the flood. As the 2022 flood displaced thousands of persons especially women and children to live temporarily in internally displaced person's camps that were not well equipped with basic sanitary amenities, the possibility of outbreaks of various water and food borne diseases was very high in these camps. Since the State was not prepared for the flood, the various camps provided for displaced persons were not well planned with basic amenities that could promote and maintain good health. This situation gave room for improvisation. Women have to improvise in order to meet their basic needs without considering the basic safety and sanitation implications. The situations become so critical because flooding in Bayelsa State is always associated with outbreak of infectious diseases especially gastroenteritis. The low level of personal hygiene and the lack of proper sanitary measure make these camps good sources of diseases transmission especially food and water-borne diseases. Breaking the chain of infections of food-borne diseases in the communities requires full compliance to food hygiene practices by individuals who are primarily responsible for preparing foods for human consumption, especially the women (Derso et al., 2017). Hence it became pertinent to assess the knowledge and practice of food hygiene among women accommodated in the flood displaced person's camps in Bayelsa State. Three research questions were posed to guide the study; what is the knowledge of food hygiene among flood displaced women in Bayelsa State? What is the level of practice of food hygiene among flood displaced women in Bayelsa State? What is the level of personal/environmental hygiene in the flood displaced persons' camps in Bayelsa State? The study hypothesized that there is no significant association between level of education and practice of food hygiene among women accommodated in flood displaced person's camps in Bayelsa State.

## Methods

This cross-sectional survey was carried out at the peak of the 2022 flood from 4<sup>th</sup> of October to 30<sup>th</sup> October 2022 in Bayelsa State. The study was conducted in three flood displaced person's camps in Bayelsa State. They are Igbogene in Yenagoa LGA, Kalama in Kolokuma/Opokuma and Sagbama in Sagbama LGA. The researcher's choice of selecting these three camps was based on factors like convenience, accessibility and proximity. The population of the study comprised all the women that were accommodated in the three selected (Flood Displaced Persons') FDP camps in Bayelsa State. According to records obtained directly from the camp commandants, Igbogene had 200 women; Kalama camp had 25 women; while Sagbama camp had 50 women. Hence the total number of women involved in the study was 275

The instrument for data collection was a self-administered questionnaire, structured in line with the WHO five golden rules for food hygiene and was in three sections. Section one was on socio-demographic characteristics of the respondents, while section two and three dealt with knowledge and practice of food hygiene principle respectively. An observational checklist was used in assessing the personal/environmental hygiene levels in the selected FDP camps that were used. The reliability of the instrument was ascertained using split-half method. The instrument was administered to 20 women in a flood displaced people's camp in another location outside the study area; specifically Ox-bow Lake Displaced People Camp and retrieved immediately after filling out the form. The instrument was split into two halves (even-numbers and odd-numbers) after which split-half was used to determine the reliability



of the instrument. The result was stepped-up using Spearman-Brown prophesy formula and a reliability coefficient of 0.84 was established. Ten of the questionnaire items were designed to assess respondent’s knowledge on food hygiene principles. One mark was awarded to every correct answer and incorrect answer was awarded zero. Respondents’ knowledge level was graded as good for score between 7 and 10, fair for score between 3 and 6 and poor when the score is below 3.

The level of practice was determined by scoring questionnaire items that assess practice of food hygiene. One mark was allocated to appropriate practice and inappropriate practice was allocated with zero. A maximum score for all appropriate practices was 10. Level of practice was graded as good, when score is between 7 and 10, fair when score is between 3 and 6 and poor when score is below 3. Two hundred and seventy five copies of the questionnaire were administered and 260 were retrieved. Data were sorted and coded into the statistical package for social science (SPSS-IBM), and were analyzed using frequency and percentage for the research questions and the hypothesis tested with chi-square set at 0.05 level of significance.

## Results

A total of 275 copies of the questionnaire were administered out of which, 260 copies were returned, with a return rate of 95%. Seven copies were filled incorrectly and were rejected therefore 253 copies were used for the final data analysis.

**Table 1: Socio-demographic distribution of the Respondents (n=253)**

Socio-demographic	Frequency	Percentage
<b>Age</b>		
16 – 35 years	99	39.1
36 – 55 years	106	41.9
56 + years	48	19.0
Total	<b>253</b>	<b>100.0</b>
<b>Educational attainment</b>		
Primary education	81	32.1
Secondary education	103	40.7
Tertiary education	36	14.2
No formal certificate	33	13.0
Total	<b>253</b>	<b>100.0</b>
<b>Marital Status</b>		
Married	136	53.8
Single	117	46.2
Total	<b>253</b>	<b>100.0</b>
<b>Parity</b>		
1 – 3	176	69.6
4 and above	77	30.4
Total	<b>253</b>	<b>100.0</b>

Majority of the respondents (41.9%) were aged between 36 and 55 years. Women with secondary education were more (40.7%) among the respondents. About 53.8 per cent of the respondents were married women. A vast majority (69.6%) of the respondents had party of 1-3.



**Table 2 Summary of respondents' knowledge on food hygiene**

(n=253)

	Frequency	Percentage
Good	21	8.3
Fair	36	14.2
Poor	196	77.5
<b>Total</b>	<b>253</b>	<b>100.0</b>

Most of the respondents (77.5%) had poor knowledge of food hygiene as shown in table 2 above. Only very few respondents (8.3%) had good knowledge of food hygiene principles. The table further revealed that, 14.2 per cent of the respondents had fair knowledge of food hygiene principle.

**Table 3 Summary of respondent's practice of food safety hygiene**

(n=253)

Practice	Responses	
	Frequency	Percentage
Good	9	3.5
Fair	31	12.3
Poor	213	84.2
	<b>253</b>	<b>100.0</b>

As revealed in the table 3, the practice level of food safety principles was very poor among the respondents. Only few respondents (3.5%) had good level of practice of food hygiene while majority (84.2%) poor level of practice.

**Table 4: Observational checklist of respondents' personal/Environmental Hygiene.**

(n=253)

Variable	Category			
	Yes		No	
	Freq	Percent	Freq	Percent
<b>Personal Hygiene</b>				
Finger nail well-trimmed	113	44.7	140	55.3
Neatly dressed with clean cloth	74	29.2	179	70.8
Neat hair Style	89	35.2	164	64.8
Washing of hand	165	65.2	88	34.8
Took a birth this morning	136	53.8	117	46.4
<b>Environmental Hygiene</b>				
Protect food from flies and rodent	82	34.4	171	67.6
Adequate water supply	219	86.6	34	13.4
Provision of clean wash hand basin	14	5.5	239	95.5
Uncooked food items on floor	201	79.4	52	20.6
Evident waste dumped around the surrounding	181	71.5	72	28.5

During the inspection of personal hygiene majority (55.3%) 140 respondent had no well-trimmed finger nails, (70.8%) 179 of respondents were not well dressed with clean cloth,



(64.8%) 164 of the respondent's hairdo neat. It was observed that majority (65.2%) 165 of respondents washed hand with soap and water and (53.8%) 136 take their bath regularly as against (46.4%) 117 that do not.

On further observation of the environment, the researcher observed that, majority of the respondent (67.6%) 171 did not protect foods from flies and rodents, adequate water supply was observed among majority (86.6%) 219 of the respondents. It was also observed that, majority (95.5%) 239 of respondent do not have clean basin with soap and water for hand washing, uncooked food items were kept on the floor of majority (79.4%) 201 of the respondents, and waste (refuse and sewage) were disposed in the surrounding of majority (71.5%) 181 of the respondents.

**Table 5: Chi-Square ( $\chi^2$ ) Summary on practice of food hygiene among women accommodated in flood displaced person's camps in relation to level of education.**

(n=253)					
Educational Level	N	Df	X <sup>2</sup> Cal	P-value	Decision
Primary education	81	6	11.513	0.019*	Rejected
Secondary education	103				
Tertiary education	36				
No formal education	33				

**$\chi^2$ = chi-square, df= degree of freedom, \*significant**

Table 5 shows the Chi-Square ( $\chi^2$ ) Summary on practice of food hygiene among women accommodated in flood displaced person's camps in relation to level of education. The table shows that, the calculated chi-square value of 11.513 with corresponding p-value of 0.019 which is less than 0.05 level of significance at 6 degree of freedom. The hypothesis of no significant association between level of education and practice of food hygiene among women accommodated in flood displaced person's camps in Bayelsa State was therefore rejected. This means, there is significant association in the practice of food hygiene among flood displaced women in Bayelsa State in relation to education level. This result corroborate the fact that, the higher the educational level an individual attained, the more likely he will practice food hygiene.

### Discussion

The study assessed the knowledge and level of practice of food hygiene among women accommodated in flood displaced person's camps in Bayelsa State. The study revealed that, knowledge of food hygiene among flood displaced women in Bayelsa State was poor as showed in the table 2. This result was surprising, considering the fact that majority of the respondents have some levels of education attainment. According to Bamidele et al. (2015), educational attainment influence general knowledge, this should have also influence greatly their knowledge of food hygiene principles. This result might be attributed to the erroneous



belief that germ does not kill Africans and that, whatever way the individuals prepare their food; the possibility of developing food-borne infection is very low. And as a result, people don't generally place desired attention to food safety measures. This result was supported by the findings of study done by Courtney et al. (2016), Adane et al. (2018), who reported poor knowledge of food hygiene among university undergraduate students and street food vendors. The same poor level of knowledge was also reported in studies previously carried out in Nigeria by Chukwuocha et al. (2009); Isara et al. (2010); Okoje, and Isah, (2014). However, the finding of studies conducted by Green, and Knechtges, (2005); Vuksanovic et al. (2022) were in contradiction to this result. In their separate studies, they observed that majority of the respondents investigated which were young adults and university students had good knowledge of food hygiene. The good knowledge observed in these studies may be related to the population and the location of these studies. The study by Vuksanovic et al. (2022) was carried out among food sellers in organized educational institutions where established laws regulate their operations.

The result still revealed that, the practice level of food hygiene among women accommodated in flood displaced person's camp in Bayelsa State was poor, as showed in table 3. This result was not surprising and was expected, because these women were living temporarily in displaced person's camps that are not well structured with basic amenities like regular water supply, electricity, toilets and other sanitation facilities. The absence of these basic facilities will create room for improvising, which may not be embraced by all persons. The poor practice may also be attributed to the poor knowledge of food hygiene principles among these respondents as averred by Okoje, and Isah, (2014). This finding is in accordance with the finding of Derso et al. (2017), who carried out study concerning availability of food safety laws and hygiene practice of food handlers in Balir Dar Town, North West Ethiopia and observed poor level of practice among these respondents. Other studies whose findings supported this finding include Ma et al. (2019); Maratha, and Chelude, (2020), who recorded poor compliance to food safety principles in their separate studies. In variance with this finding are the results of the findings of Nizamem et al.(2019); Nkosi, and Tabit (2021); Mbombo-Dweba et al. (2022), who observed a good level of food hygiene practice in majority of the respondents in their studies. The findings of Wiatrowski et al. (2021), also gave credence this finding. They reported that more than 50% of the respondents in their study had a good level of food hygiene practices.

The result from the observational check list on personal hygiene showed that 70.8% (179) of the women were not dressed neatly with clean cloth, 64.8% (9164) of the women had not neat hairdo, and 55.3% (140) had no well-trimmed finger nails. This result further corroborates the poor knowledge of food hygiene and practice observed earlier in the study. On the other hand, respondents were good 65.2% (165) in washing their hand with soap and water as observed in the study. Despite the low level of food hygiene practice observed, hand washing was still observed in more than 50% of respondents. This is an indication that the massive public enlightenment and awareness campaigns carried out during the COVID-19 Pandemic on hands hygiene has caused a sustenance behvaiour change among members of the community. Also about 67.6% (171) of respondents did not protect their food from flies and rodents, 86.6% (219) of respondents did not get adequate water supply, uncooked foods were observed on the floors and majority of the respondents 71.5% (181) disposed their waste generated in the immediate surroundings. These findings revealed a very poor standard of environmental hygiene in the flood displaced person's camps in the state. The poor state of environmental hygiene in these camps raised a serious concern for public health. According to Maratha, and Chelude, (2020), it can easily serve as a conducive platform for the spread of





food and water borne infections. The observations on the level of personal and environmental hygiene in this study were similar to other study carried out by Onyeneho and Hedberg (2013), who further attributed the poor personal and environmental hygiene in their study to lack of awareness on the dangers associated with poor environment.

The study further revealed that food hygiene practice among women accommodated in flood displaced person's camps in Bayelsa State significantly associated with educational level. This indicates that, the higher the educational attainment, the more an individual will likely practice food hygiene. This corroborates the significant influence of educational attainment on practice. This was consistent with the studies carried out by Czarimiecka-Slubina, et al. (2018); Zenbaba et al. (2022), who reported in their study, among food handlers that educational level and knowledge were significantly associated with practice. On the contrary the studies of Vuksanovic et al. (2022); Wallace et al. (2022), disagreed with this finding. In their studies, they reported that, educational background was not significantly associated with practice. These contradicting results might be attributed to factor like socio-cultural context already existing among the population in the area of study

### Conclusions

The study results showed poor level of knowledge and practice of food hygiene among women accommodated in flood displaced person's camps in Bayelsa State. The level of personal and environmental hygiene among the women investigated in the flood displaced person's was also poor as.

### Recommendations

The following recommendations were made based on the conclusions drawn from the study findings.

1. The primary health care department in collaboration with other health authorities should carry out intensive public awareness programmes on food hygiene principles in the communities especially at the flood displaced person's camps using appropriate
2. The provision and enforcement of rules and regulations that are related to food safety and hygiene in these flood displaced person's camps can also encourage the practice of food hygiene among those individuals in these camps.
3. Basic sanitation and hygiene materials be provided in all the displaced person's camps in the state. This will encourage the individuals in these camps to imbibe the culture of personal and environmental hygiene.

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