



Effects of Health Education on Food Safety Attitudes and Behavioral Intentions Among Pregnant Mothers in Rivers State, Nigeria

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Abstract

This study investigated the effects of health education on attitudes and behavioural intentions towards food safety cognitions among pregnant mothers in Rivers State. A pre-test and post-test design was adopted with a population which consisted of 1,838,789 pregnant mothers attending primary healthcare institutions in Rivers State. A sample size of 270 was selected using a multistage sampling procedure. Data was collected using a structured test instrument with a reliability index of 0.78. Data collected were analyzed with the aid of the Statistical Product for Service Solution (SPSS V-23) using mean, standard deviation (SD) and One-Way Analysis of Covariance (ANCOVA) at 0.05 level of significance. The findings of the study revealed that health education had a positive effect on attitude towards food safety with a total mean difference of 1.13, and on behavioural intention with a total mean difference of 1.09. The result of the ANCOVA showed that the intervention had a significant effect [$F(1,49) = 2.15, p < 0.05$] on attitude towards food safety. It was concluded that health education is an effective strategy to influence pregnant mothers' food safety attitudes and behavioural intention, which is necessary to prevent them and their babies from food-borne diseases or food poisoning. It was recommended that every pregnant woman must ensure she closely monitors the food preparation process to ensure food hygiene practices are fully observed. Food monitoring officials should come-up with or set official regulations as well as food hygiene standards for pregnant mothers and ensure such regulations are enforced. The government should provide hand washing and other food safety materials to encourage the women with good intentions to practice food safety to do so with confidence.

Keywords: Attitude, Behavioural Intention, Food Safety, Health Education, Food Storage

Introduction

Food contamination is major as a result of unsafe food-handling practices (World Health Organization, 2014). The World Health Organization (WHO, 2022) gave five keys to safe food handling: wash hands before handling food and often during food preparation; wash hands after going to the toilet; wash and sanitize all surfaces and equipment used for food presentation, and protect kitchen areas and food from insects, pests and other animals; to prevent foodborne diseases. Each year, millions of people globally suffer from food-borne diseases and illnesses resulting from the consumption of contaminated food, which has become one of the most widespread public health problems in the contemporary world. According to the Centers for Disease Control and Prevention (CDC) (2017), each year about 50 million people die from food-based ailments, leading to the death of an estimated 3,000 people. In a more recent report by the World Health Organization, it was revealed that almost 1 in 10 people in the world – fall ill after eating contaminated/unsafe food and 420 000 die every year, resulting in the loss of 33 million healthy life years; and children under 5 years of age carry 40% of the foodborne disease burden, with 125 000 deaths every year. Chemical contamination can lead to acute poisoning or long-term diseases, such as cancer. Foodborne diseases may lead to long-lasting disability and death. Attitude is an important factor which ensures a downward trend of foodborne illnesses. Attitude refers to a person's disposition or readiness to engage in a given health practice, food safety in this respect. Mohlisi et al. (2015) reported that poor attitude towards food safety increases foodborne diseases. However, Iwu et al. (2017) reported a positive attitude of food vendors towards food safety but, the World Health Organization (2014) report showed that each year, millions of people globally suffer from food-borne diseases and illnesses resulting from the consumption of contaminated food, which has become one of the most widespread public health problems in the contemporary world.

Food safety can be influenced by several factors including food safety cognition, attitude and behavioural intention (Mullan & Wong, 2010). Approximately 61% of foodborne illness outbreaks were traced to the behaviour of the food handler (Angelone et al., 2017; CDC, 2017). Other reports have suggested that 97% of foodborne illness outbreaks can be traced back to food handler behaviours or errors (Wambui et al., 2017; Scallan, 2011). According to Cheng-Min (2023), behavioural intention is a person's perceived likelihood or subjective probability of an individual engaging in a given behaviour. Studies have reported dissonance in food safety behavioural intentions. Intention is a major factor influencing behaviour just as revealed in the theory of planned behaviour that, behaviour is preceded by intention. This is true because if pregnant mothers have good intentions about food safety, they will more likely handle food safely. In recent decades, food poisoning has become a growing public health problem worldwide, in both developed and developing countries (Quinlan, 2015). The incidence of foodborne illness depends on the hygienic measures implicated in food production and storage, but they could be ineffective if pregnant mothers have poor hygienic practices and food handling approaches (Mkhungo, 2018). Moreover, the Food and Drug Administration (2019) has identified food hygiene, and improper food handling as needing attention because low compliance to food safety was observed. While food safety is a shared responsibility, individual consumers and food handlers such as mothers, play a huge role in preventing foodborne diseases. Despite that the home is one of the primary locations where most foodborne illness cases occur, many pregnant mothers do not consider the home to be a risky place with regard to foodborne illness. Mothers have many more activities in the household including their children's care, showing them the correct way of food hygiene practices and performing many activities at a time. As well, mothers are primarily food handlers at home and their cognition, attitudes, and intentions about food safety cannot be undermined in the prevention of diarrhoea and other food-borne diseases among children (Mohlisi et al., 2018). Therefore, more than cognitions, pregnant mothers' attitudes and behavioural intentions toward food safety are essential in order to reduce food hazards related to food contamination (Zeeshan et al., 2017). However, household food safety practice, particularly for pregnant mothers, is rarely studied. According to Abdullai et al. (2016), mothers are the first contact with their little babies and they provide and prepare food eaten by these infants, who have underdeveloped immune systems. It is thus very important to understand and positively influence their food safety behaviour in reducing outbreaks of food-borne diseases among children.

Statement of the Problem

Pregnant mothers being the major handlers of infant food are a focal group which should be considered as they can be linked to food contamination arising from poor food preservation, unhygienic food handling practices, cross-contamination from food contact surfaces and human error during food handling. Unsafe practices during preparation and storage of food increase the chances of the proliferation and transmission of food-borne pathogens such as bacteria, and viruses among others. In addition, cases of food-borne diseases in families and the society at large have been attributed to the consumption of contaminated food at home, of which the mothers are the key food handlers hence, the need to focus on them in this study. Nevertheless, reports revealed that food safety education programmes have focused more on improving food safety among consumers, and food vendors; and only limited research focused on obtaining information on food safety at home. Therefore, the researcher deemed it necessary to carry out this study on the effects of health education on food safety attitudes and behavioural intentions among pregnant mothers in Rivers State. The study provided answers to the following research questions:

1. What is the effect of health education on attitude towards food storage and preservation among pregnant mothers in Rivers State?
2. What is the effect of health education on behavioural intentions towards food safety among pregnant mothers in Rivers State?

Hypotheses

1. Health education has no significant effect on attitude towards food storage and preservation among pregnant mothers in Rivers State.
2. Health education has no significant effect on behavioural intentions towards food safety among pregnant mothers in Rivers State.

Methodology

The study was carried out in Rivers State which is one of the 36 States of Nigeria, nicknamed the "Garden City of Nigeria." The State is also one of the nine States that make up the Niger Delta region. The pretest and post-test design was adopted with a study population which consisted of pregnant mothers in Rivers State which was estimated at 1,838,789. The sample size for this study was 270 which was determined using power analysis for sample size determination shown below: $n = Z^2 \times p(1-p) / d^2$. Where: n = minimum sample size; Z^2 = statistics for level of confidence = 1.96; p = proportion of the best guess given as 80% = 0.8; d = the degree of tolerance is 5%

= 0.05; $n = 1.96^2 \times 0.8(1-0.8) / 0.05^2$; $n = 246$. Adding 10% attrition, that is, $246 + 24 = 270$. The multistage sampling procedure was adopted for the study comprising stratified sampling, simple random cluster sampling, and simple random technique. In the first stage, a stratified sampling technique was adopted in which the State was grouped into three strata based on the three existing geopolitical zones, Rivers East, Rivers West and Rivers South-East. In the second stage, the simple random sampling technique was used to pick two Local Government Areas in each of the strata making it six LGAs selected. In the third stage, the cluster random sampling technique was used to group the six selected LGAs into two groups, control and intervention groups. In the fourth stage, one healthcare facility was randomly selected from each of the local government areas, and finally, in the fifth Stage, the simple random sampling technique was used to select 45 respondents from each of the selected health facilities for the study to give a total of 270. Data was collected using a structured test instrument titled: "Food Safety Attitude and Behavioural Intentions Test Instrument (FSABITI)". The instrument addressed the attitude towards food storage and preservation on a Likert Scale of strongly agree, agree, disagree and strongly disagree, as well as safety behavioural intentions also on a modified three-point Likert scale of 'Very likely, likely, Not likely'. The questions were carefully drafted to ensure the variables of the study were addressed adequately. Data collection was carried out in three phases -Pre-intervention, Intervention and Post-Intervention. Pre-intervention (pre-test) stage involved the collection of initial pre-test data from eligible participants who gave consent to be included in the study in both the control and intervention groups. The intervention phase comprised sessions of health education with the pregnant mothers chosen for this study, on food safety which lasted for six weeks. The teaching covered all areas of food safety. The health education was given once every week for 45 minutes with the use of lecture and discussion methods of health education, and participants were evaluated and given the opportunity to ask questions and clarify any misconception. The health education lasted for a period of six weeks, which included one week of revision on all the topics taught, and another week used for post-intervention (post-test). The post-intervention session which is the post-test test was conducted on the seventh week of the intervention programme. The researcher and research assistants re-administered the same set of test instruments for the pregnant mothers' use for this study. Data collected were entered and coded in the Statistical Product for Service Solution (SPSS) version 23.0. Data was analyzed using descriptive statistics of mean and standard deviation (SD) to answer research questions while all the hypotheses were tested with One-Way Analysis of Covariance (ANCOVA) at 0.05 level of significance.

Results

The results of the study are shown below:

Table 1: Mean and standard deviation of the effect of health education on attitude towards food storage and preservation among pregnant mothers in Rivers State

SN	Item	Pretest		Posttest		Mean difference	Remark
		\bar{X}	SD	\bar{X}	SD		
1	It is important to preserve food for future use	2.76	0.51	3.78	0.54	1.02	Positive effect
2	It is important to store food in a good storage equipment	2.84	0.37	3.74	0.48	0.90	

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Ibara, A. N., & Elechi, C. E. (2024). Effects of health education on food safety attitudes and behavioural intentions among pregnant mothers in Rivers State, Nigeria. *FNAS Journal of Health, Sports Science and Recreation*, 2(1), 60-67.

3	There is no need to store cooked food	2.74	0.52	3.66	0.62	0.92
4	It is not necessary to preserve well-cooked food either by freezing or drying	1.84	0.99	2.54	0.03	0.70
5	Preserving food by fermentation is not healthy at all	1.34	0.77	2.74	0.06	1.40
6	Storing food in cans can cause sicknesses so I will not eat food stored by canning	1.40	0.85	3.00	0.17	1.60
7	No need to bother about food preservation, 'dirty does not kill African man'	2.92	0.12	3.14	0.04	0.22
8	Washing utensils always to store food appropriately is a waste of resources	1.70	0.01	3.19	0.11	1.49
9	Separating raw food from cooked food during storage is good for preventing food contamination	1.54	0.95	3.94	0.09	2.40
10	Covering hair while storing or preserving food is not a food safety practice	2.32	0.15	3.32	0.03	1.00
11	Serving food to either adults or babies does not require proper food storage practices	2.96	0.19	3.88	0.47	0.92
12	Baby's feeding utensils or dishes should be separated from the general dishes to avoid food poisoning	2.82	0.38	3.84	0.37	1.02
13	No need to preserve food because it can be contaminated.	2.76	0.55	3.84	0.37	1.08
	Grand mean	2.30	0.48	3.43	0.26	1.13

Criterion mean = 2.50

Table 1 shows the mean and standard deviation on the effect of health education on attitude towards food storage and preservation among pregnant mothers in Rivers State. The result showed that the pretest scores have a grand mean of 2.30 ± 0.48 while the post-test grand mean score was 3.43 ± 0.26 (out of the highest possible score of 4) with a total mean difference of 1.13. Thus, health education had a positive effect on attitudes towards food storage and preservation among pregnant mothers in Rivers State.

Table 2: Mean and standard deviation of the effect of health education on behavioural intentions towards food safety among pregnant mothers in Rivers State

SN	Item	Pretest		Posttest		Mean difference	Remark
		\bar{X}	SD	\bar{X}	SD		
1	Washing of hand with soap and water before and after handling of food	2.82	0.43	3.86	0.62	1.04	Positive effect
2	Wearing of apron and hair cover while preparing food	2.90	0.30	3.90	0.03	1.00	
3	Washing of kitchen utensils before using it for food preparation	2.70	0.71	3.78	0.06	1.08	
4	Washing of kitchen utensils after using it for food preparation	2.96	0.14	3.44	0.17	0.48	
5	Covering of hair while preparing food	2.38	0.08	3.58	0.04	1.20	
6	Changing of water used for washing utensils	2.80	0.49	3.78	0.11	0.98	
7	Handling of food with polished fingernails	2.56	0.57	3.72	0.09	1.16	
8	Trimming and cleaning of fingernails	2.90	0.30	3.84	0.03	0.94	
9	Carrying out cleaning operations like sweeping or dusting before and after food preparation	2.56	0.78	3.86	0.47	1.30	
10	Making use of separate chopping boards for meats and vegetables	2.76	0.51	3.80	0.37	1.04	
11	Dishing food with clean spoon	2.66	0.82	3.82	0.37	1.16	
12	Sweeping kitchen before food preparation	2.48	0.86	3.74	0.62	1.26	
13	Dusting environment	2.14	0.14	3.96	0.03	1.82	
14	Disposing of wastes properly	2.76	0.74	3.66	0.06	0.90	
15	Disposes of water after each use, especially when it changes colour	2.76	0.55	3.84	0.17	1.08	
16	I wipe raw food substances with a rag	2.96	0.19	3.90	0.04	1.09	
17	I prepare the baby's food with extreme carefulness	2.56	0.14	3.84	0.11	1.04	
18	I separate the baby's feeding utensils from the general kitchen utensils	2.90	0.08	3.86	0.09	1.00	
19	I use special dishes for my baby	2.56	0.49	3.80	0.03	1.08	
	Grand mean	2.69	0.43	3.78	0.18	1.09	

Criterion mean = 2.50

Table 2 shows the mean and standard deviation of the effect of health education on behavioural intentions towards food safety among pregnant mothers in Rivers State. The result showed that the pretest scores have grand mean of 2.69 ± 0.43 while the post-test grand mean score was 3.78 ± 0.18 (out of the highest possible score of 4) with a total mean difference of 1.09. Thus, health education had a positive effect on behavioural intentions towards food safety among pregnant mothers in Rivers State.

Table 3: Analysis of Covariate (ANCOVA) on the effect of health education on attitude towards food storage and preservation among pregnant mothers in Rivers State.

Source	Type III Sum of Squares	df	Mean Square	F	p-value
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Corrected Model	6.950 ^a	2	3.475	2.787	0.063
Intercept	870.096	1	870.096	697.850	0.000
Treatment	1.489	1	1.489	1.194	0.276
Pretest	4.817	1	4.817	3.863	0.050
Error	332.902	267	1.247		
Total	63208.000	270			
Corrected Total	339.852	269			

The result from Table 3 shows the summary of ANCOVA on the effect of health education on the attitude towards food storage and preservation among pregnant mothers in Rivers State. The result shows that there is no significant mean difference in attitudes towards food storage and preservation between pregnant mothers who received health education through the discussion method and those who received it through the lecture method ($F(1, 267)=1.194$, p -value=0.276). Therefore, the null hypothesis that health education has no significant effect on attitudes towards food storage and preservation was retained at the .05 level of significance.

Table 4: Analysis of Covariate (ANCOVA) on the effect of health education on behavioural intentions towards food safety among pregnant mothers in Rivers State.

Source	Type III Sum of Squares	df	Mean Square	F	p-value
Corrected Model	125.464 ^a	2	62.732	29.033	0.000
Intercept	57.653	1	57.653	26.682	0.000
Treatment	11.727	1	11.727	5.427	0.021
Pretest	123.331	1	123.331	57.078	0.000
Error	576.921	267	2.161		
Total	50696.000	270			
Corrected Total	702.385	269			

The result from Table 4 shows the summary of ANCOVA on the effect of health education on behavioural intentions towards food safety among pregnant mothers in Rivers State. The result shows that there is a significant mean difference in behavioural intentions towards food safety between pregnant mothers who received health education through the discussion method and those who received it through the lecture method ($F(1, 267)=5.427$, p -value=0.021). Therefore, the null hypothesis that health education has no significant effect on behavioural intentions towards food safety was rejected at the .05 level of significance.

Discussion

The findings of the study are discussed below under sub-headings in accordance with the objectives of the study: The finding of the study revealed that health education had a positive effect on attitudes towards food storage and preservation among pregnant mothers in Rivers State. The result of the ANCOVA showed that the intervention had a significant effect [$F(1,49) = 2.15$, $p < 0.05$] on attitude towards food safety. However, only 4.3% ($\omega^2 = 0.043$) of the variance in the post-test attitude scores could be explained by the intervention. The finding of this study is akin to that of Onyeneho and Horsfall (2014) whose study on the effectiveness of food hygiene training interventions among food handlers in Nigeria revealed that health education had a significant effect on mothers' attitudes towards food storage and preservation. The homogeneity of the study population (pregnant mothers) and the intervention administered (health education) can be implicated in the similarity found between both studies. The finding of this study on the positive effect of health education on attitudes towards food storage and preservation is not surprising because health education influences attitudes. The finding of this study is in keeping with that of Abdulahi et al. (2020) whose study on the effect of health education on food safety among mothers attending an immunization clinic in Ilorin, Nigeria found that health education significantly improved mothers' attitude towards food storage and preservation. The finding of this study gives credence to that of Ibrahim et al. (2018) whose study on the effect of health education intervention on food safety knowledge and practices of mothers in Riyadh city of Saudi Arabia revealed that health education had a significant effect on mothers' attitude towards food storage and preservation. This similarity might be due to the homogeneity of the intervention

administered as they were both focused on equipping individuals with the information needed to influence their attitudes. The finding of this study is in tandem with that of Marzban et al. (2020) whose study on the effect of education on the knowledge, attitude, and practice of the catering staff about food hygiene and safety in Yazd City Arabia revealed that health education had a significant effect on the staff' attitude towards food storage and preservation. This similarity might be due to the homogeneity of the intervention administered as they were both focused on equipping individuals with information needed to enhance their attitudes.

The finding of the study revealed that health education had a positive effect on behavioural intentions towards food safety among pregnant mothers in Rivers State. The result of the ANCOVA showed that the intervention had a significant effect [$F(1,49) = 1.70, p < 0.05$] on behavioural intentions towards food safety. However, only 3.4% ($\omega^2 = 0.034$) of the variance in the post-test intention scores could be explained by the intervention. The finding of this study is in tandem with that of Sanaei et al. (2015) whose study on the effect of education on food hygiene in children under 5 years old revealed that health education had a significant effect on the behavioural cognition towards food safety. This similarity might be due to the homogeneity of the intervention administered as they were both focused on equipping individuals with information to influence their intentions. The finding of this study is in keeping with that of Abdulahi et al. (2020) whose study on the effect of health education on food safety among mothers attending an immunization clinic in Ilorin, Nigeria found that health education significantly improved mothers' behavioural intentions towards food safety. The finding of this study gives credence to that of Ibrahim et al. (2018) whose study on the effect of health education intervention on food safety knowledge and practices of mothers in Riyadh city of Saudi Arabia revealed that health education had a significant effect on mothers' behavioural intentions towards food safety. This similarity might be due to the homogeneity of the intervention administered as they were both focused on equipping individuals with the information needed to enhance their behavioural intentions.

Conclusion

Based on the findings of the study, it was concluded that health education is a veritable tool in influencing pregnant mothers' attitude and behavioural intention towards food safety, which is necessary to prevent them and their babies from food-borne diseases or food poisoning.

Recommendations

The following recommendations were made based on the findings of the study:

1. Every pregnant woman must ensure she closely monitors the food preparation process to ensure food hygiene practices are fully observed.
2. Food monitoring officials should come-up with or set official regulations as well as food hygiene standards for pregnant mothers and ensure such regulations are enforced. The government should provide hand washing and other food safety materials to encourage the women with good intention to practice food safety to do so with confidence.

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