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Food Hygiene Knowledge and Practice among Undergraduates: A Case Study of Enugu State University of Science and Technology (ESUT) Enugu

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Abstract

The study investigated issues relating to food hygiene among undergraduates in Enugu State University of Science and Technology (ESUT). Specifically, it determined: proportion of undergraduates in ESUT who possess knowledge of food hygiene and food hygiene practices adopted by the undergraduates. Two research questions and two null hypotheses guided the study. The study adopted a descriptive cross-sectional survey research design. Population for the study consisted of 44,201 undergraduates in ESUT. The sample was 480 undergraduates drawn using multi-staged sampling procedures. Questionnaire was used for data collection. Frequency, percentages and Chi-square statistics were used for data analysis. Findings reveal that overall, the proportion of undergraduates in ESUT who possess knowledge of food hygiene was high (61.6%). Specifically, a high proportion of undergraduates knew the meaning of food hygiene (74.6%), throwing away food when in doubt is a preventive measure for food poisoning (67.1%), food hygiene practice (66.5%), and risk factors for food poisoning (65.8%). Overall, majority of undergraduates (89.5%) adopted good food hygiene practices such as; buying clean and fresh foods for cooking (92.3%), covering of the hair while cooking (84.2%), not wearing accessories like rings, bracelets when cooking food (78.6%) and washing of fruits and vegetables before eating (75.9%). There was no significant difference in the level of knowledge of food hygiene among undergraduates based on age ($X^2 = .679$, $p = .712 < .05$) and gender ($X^2 = .004$, $p = .947 < .05$). There is a significant difference in the food hygiene practices adopted by undergraduates based on age ($X^2 = 25.978$, $p = .000 < .05$) and gender ($X^2 = 40.983$, $p = .000 < .05$). it was recommended that Health educators, Home Economists, teachers, and other relevant stakeholders should enlighten the undergraduates of ESUT and general public on the importance of adopting good food hygiene practices irrespective of age and gender.

Keywords: Food, Food-borne, Illnesses, Hygiene, Knowledge, Practice, Undergraduates

Introduction

Food hygiene is a significant public health issue in prevention and control of food-borne illnesses. World Health Organization (WHO, 2020), estimated that 600 million, almost one 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. The incidence of food-borne diseases is rising in developing countries, including Africa. In African, food-borne illnesses continue to be a subject of great concern. Monney, Agyei, and Owusu (2013), reported that about 65,000 persons died yearly due to food-borne illnesses in Ghana. According to WHO (2020), consuming unsafe foods pose a significant public health threat in the African Region. The case is also worrisome in Nigeria.

In Nigeria, there has been disturbing reports of food-borne illnesses due to the adoption of poor food hygiene. Emmanuel et al. (2015) reported that knowledge and practice of food hygiene and safety was low among food vendors and a significant proportion of them were not trained in food handling and preparation. Reports indicate that as much as 70 per cent of diarrhoeal diseases in developing countries are believed to be of food-borne origin (Emmanuel et al., 2015). It is therefore, important, to adhere to food hygiene principles.

Food is any substance liquid, solid or powdered which when eaten and digested provides the body with energy, enhances growth, replaces worn-out tissue and regulates the body processes. Food is also any healthy substance consumed to provide nutritional support for the body (Sadler et al. 2021). Everybody's state of health is determined by the food required by the body (Dimassi, Haddad, Awada, Mattar, & Hassan, 2021). According to the Food and Agricultural Organization (FAO) and WHO (2009), food is important for the nutrients it provides. The nutrients in food provide energy for activity, growth, and all functions of the body such as breathing, digesting food, and keeping warm, growth and repair of the body, and for keeping the immune system healthy (FAO & WHO, 2009). Food is usually of plant or animal origin, and contains essential nutrients, such as fats, proteins, vitamins, or minerals. Food has to meet physiological requirements in terms of quantity, quality, and not to form food borne diseases to be socially and culturally acceptable (Islam et al., 2022). Hence, food hygiene becomes important.

Food hygiene is one of the three aspects of hygiene, with the others being environmental and personal hygiene. Food hygiene is a conscious effort to keep food safe from potential contamination and protect the health of consumers. Food and Agricultural Organization (FAO) and WHO (2009) defined food hygiene as all the practical measures involved in keeping food safe and wholesome through all the stages of production to the point of sale and consumption. Tuglo et al. (2021) defined food hygiene as handling, preparing and storing food or drink in a way that best reduces the risk of

consumers becoming sick from the food-borne disease. Food should be protected from spoilage and harmful microorganisms, harmful bacteria in the food should be destroyed by thorough cooking or processing, and that food should be safe, sound and wholesome when it reaches the consumer (White, 2006). Unsafe food creates a vicious cycle of disease and malnutrition, particularly affecting infants, young children, elderly and the sick (WHO, 2020). Food-borne diseases impede socioeconomic development by straining health care systems, and harming national economies, tourism and trade.

Knowledge enhances ones judgment necessary for good choice. Hence, knowledge can be crucial in adopting adequate food hygiene practices. Practice involves doing a particular thing habitually. Practice is the actual performance or application of knowledge (Miller, 2018). Bamidele et al. (2015) defined food hygiene practice as all actions taken with regards to prevention of contamination of food stuffs at all stages of production, collection, transportation, storage, preparation, sale and consumption. Adequate food hygiene practices may include; buying clean and fresh foods for cooking, hand washing before and after cooking, washing of fruits and vegetables before eating, not wearing accessories like rings, bracelets when cooking food, use of neat apron when cooking, among others (Stratev et al., 2017; Lema et al., 2020). It is therefore necessary to investigate the knowledge and practice of food hygiene among undergraduates.

Undergraduates are mostly carefree and so engage in behaviours that could expose them to different health disorders including adopting inadequate food hygiene practices (Samuel, 2006). They are prone to preparing and storing food haphazardly due to the nature of their environment and the activities they engage in which is usually stress related. The knowledge and practice of food hygiene among undergraduates may be influenced by certain factors including age, gender, year of study, marital status, family type, study programme, place of residence and others (Farahat et al., 2015; Odonkor et al., 2020; Okugn & Woldeyohannes, 2018; Tuglo et al. 2021). However, the factors of interest in this study are age and gender.

Age is one of the factors associated with food hygiene knowledge and practice among undergraduates. Farahat, El-Shafie and Waly (2015) reported that age was significantly associated with food hygiene practices among Saudi women. Odonkor, Kurantin, and Sallar (2020) reported that the odds of performing good food handling practice among respondents within the age group of 36-45 years were five times higher compared to those within the age group of 18-25 years. On the part of gender, Stratev, Odeyemi, Pavlov, Kyuchukova, Fatehi, and Bamidele (2017) reported that gender did not affect food safety knowledge, attitudes and practices among veterinary medicine students at Trakia University, Bulgaria.

Investigating these factors will help to shed light on the knowledge and practice of food hygiene among undergraduates in Enugu State University of Science and Technology (ESUT).

Enugu State University of Science and Technology (ESUT) is a university in Nigeria that was founded on 30 July 1980. There are ten faculties and 49 departments in the university with over 40,000 students. It has been observed that undergraduates in ESUT adopt poor food hygiene practices such as not washing hands before eating, not washing vegetables and fruits, storing of both cooked and raw food in the same place, buying food from vendors who have not been approved by the school authority, and others. These practices may be due to low level of knowledge of food hygiene and is importance. Over the years, the university authority has made efforts to regulate the activities of food vendors in the school and ensure that food sold to students within the university is of hygienic standards. However, the university has no control over what undergraduates eat and how they prepare their own food. Hence, undergraduates of ESUT seem to be vulnerable to food related illnesses due to the inability to organize time, stress of examination and deadlines, irregular sleeping patterns, new peer's relationships, and inability to acclimatise to the new surroundings. All of which affect the type, procedure and hygiene with which they prepare their own food.

Food hygiene has become an issue of global attention particularly due to its significant link to public health and the need to minimise foodborne diseases. This study therefore aimed to tackle the problems of food hygiene by investigating the knowledge and practice of food hygiene among undergraduates in ESUT. Findings from this study may be beneficial in enabling health educators, Home Economists, teachers, and other relevant stakeholders identify areas where food hygiene can be improved in terms of knowledge and practice.

Objectives of the Study

The major objective of the study was to investigate knowledge and practice of selected indicators of food hygiene among undergraduates in ESUT. Specifically, the study determined:

1. proportion of undergraduates in ESUT who possess knowledge of food hygiene;
2. food hygiene practices adopted by undergraduates in ESUT.

Research Questions

Two research questions guided the study.

1. What is the proportion of undergraduates in ESUT who possess knowledge of food hygiene?
2. What are the food hygiene practices adopted by undergraduates in ESUT?

Hypotheses (HOs)

HO_1: There is no significant difference in the proportion of undergraduates in ESUT who possess knowledge of food hygiene based on socio-demographic factors (age and gender)

HO_2: There is no significant difference in the food hygiene practices adopted by undergraduates in ESUT based on socio-demographic factors (age and gender).

Methodology

***Design of the Study*:** This study adopted a descriptive cross-sectional survey research design.

***Area of the Study*:** The area of the study was ESUT, in Enugu, Enugu state. Enugu State University of Science and Technology (ESUT) was founded on July 30, 1980. It the time of the study, it had ten faculties and 49 departments.

***Population for the Study*:** The study population comprised of undergraduates in ESUT. The number of undergraduates in ESUT was 44,201 students at the time of the study (Information Communication Technology unit, ESUT, 2022).

***Sample for the Study*:** The sample size was 480 respondents. This was determined using Cohen, Manion, and Morrison (2011) Standardized Table for Sample Size, Confidence Levels and Confidence Intervals for Random Samples. A multi-stage sampling procedure was used to select the respondents. Six faculties were randomly selected out of ten faculties in ESUT. Then four departments from each of the six faculties were also randomly selected. This gave a total of 24 departments. Convenience sampling technique was then used to select 20 undergraduate students consisting of 10 males and 10 females, each from the twenty four departments selected in stage two, which gave a total of 480 undergraduates. Convenience in the sense that undergraduates in the different departments, who had time and expressed their consent in responding to the questionnaires, were used.

***Instrument for Data Collection*:** Questionnaire was used for data collection. It consisted of 22 items divided into parts A, B, and C. Part A consisted of two socio-demographic variables (age and gender). Part B consisted of 15 items on knowledge of food hygiene. Part C consisted of 10 items on food hygiene practices. It was developed based on literature review and specific objectives of the study. The questionnaire was validated by five experts from Public health education. A reliability index of .753 was obtained for the instrument as a whole, while a reliability index of .767 for Section B and .788 for section C of the instrument were obtained using split half (Spearman's Rank Order Correlation). These were adjudged reliable for the study.

***Data Collection Technique*:** A total number of 480 copies of the questionnaire were distributed to the undergraduates by hand. Out of 480 copies administered, 468 copies were returned. This gave a return rate of 97.5 percent.

***Data Analysis Technique*:** Frequency count and percentage were used to answer the research questions. Chi-square statistic was used to test HOs at .05 level of significance.

RESULTS

Table 1: Frequency and Percentage Responses on Level of Knowledge of Food Hygiene possessed by the Undergraduates of ESUT

S/N	Knowledge of food hygiene	Knowledge "Yes" F(%)	Knowledge "No" F(%)
1.	Food hygiene is concerned with all types of hazards and how to achieve safe preparation of food	349(74.6)	119(25.4)
2.	There are seven classes of food	264(56.4)	204(43.6)
3.	Not wearing of jewellery during cooking is part of food hygiene	306(65.4)	162(34.6)
4.	Food poisoning is caused by eating contaminated food and water.	242(51.7)	226(48.3)
5.	Viruses and parasites are the most common causes of food poisoning	289(61.8)	179(38.2)
6.	Symptoms of food poisoning include vomiting, fever, abdominal pain and cramps.	277(59.2)	191(40.8)
7.	Leaving the hair open while cooking is a risk factor for food poisoning	308(65.8)	160(34.2)
8.	Throwing away food when in doubt is a preventive measure for food poisoning	314(67.1)	154(32.9)
9.	Washing of hands, utensils and food surfaces before and after use is one of the preventive measures of food poisoning	275(58.8)	193(41.2)
10	Laboratory screening can diagnose food poisoning	281(60.0)	187(40.0)
11	Chilling or freezing eliminates harmful germs from food	150(32.1)	318(67.9)
12	To prevent food poisoning, leftover foods should be heated until they are boiling hot	303(64.8)	165(35.2)
13	Bacteria is the microorganisms that causes most food-borne illnesses	261(55.8)	207(44.2)
14	Washing dishes immediately after meal is an important food hygiene practice	311(66.5)	157(33.5)
15	Leftover foods should be stored in the refrigerator for a maximum of four days	223(47.6)	245(52.4)
	Cluster %	**61.6**	**38.4**

Key: *below 20% = very low knowledge, 20-39% = low knowledge, 40-59% = average/moderate knowledge, 60-80% = high knowledge, 80% and above = very high knowledge.*

Table 1 shows that overall, the proportion of undergraduates in ESUT who possess knowledge of food hygiene was high (61.6%). Specifically, a high proportion of undergraduates knew that food hygiene is concerned with all types of hazards and how to achieve safe preparation of food (74.6%), throwing away food when in doubt is a preventive measure for food poisoning (67.1%), washing dishes immediately after meal is an important food hygiene practice (66.5%), leaving the hair open while cooking is a risk factor for food poisoning (65.8%), and not wearing of jewellery during cooking is part of food hygiene (65.4%).

Table 2: Frequency and Percentage Responses on Food Hygiene Practices Adopted by Undergraduates of ESUT

S/N	Food Hygiene Practices	Practice Adopted	
		"Yes" F(%)	"No F(%)
1	Buying clean and fresh foods for cooking	432(92.3)	36(7.7)
2	Washing of hands before and after cooking	189(40.4)	279(59.6)
3	Washing of fruits and vegetables before eating	355(75.9)	113(24.1)
4	Reading labels to identify the expiry date of packaged food before purchasing	341(72.9)	127(27.1)
5	Washing and rinsing cutting boards, knives and plates used for raw meat before using them for other food items	310(66.2)	158(33.8)
6	Not wearing accessories like rings, bracelets when cooking food	368(78.6)	100(21.4)
7	Use of apron when cooking	237(50.6)	231(49.4)
8	Protecting raw food from insects and rodents	241(51.5)	227(48.5)
9	protecting cooked food from insects and rodents	327(69.9)	141(30.1)
10	Covering of the hair while cooking	394(84.2)	74(15.8)
	Cluster %	**89.5**	**10.5**

Table 2 shows that overall, majority of undergraduates (89.5%) adopted good food hygiene practices. Specifically, food hygiene practices among undergraduates in ESUT include; buying clean and fresh foods for cooking (92.3%), covering of the hair while cooking (84.2%), not wearing accessories like rings, bracelets when cooking food (78.6%) and washing of fruits and vegetables before eating (75.9%).

Table 3: Chi-Square Analysis of Proportion of Undergraduates in ESUT Who Possess Knowledge of Food Hygiene Based on Socio-demographic factors

Factors	N	True O(E)	False O(E)	X^2	df	p-value
Age						
16 – 19 years	212	136(136.8)	78(75.2)			
20 – 24 years	142	89(91.6)	53(50.4)	.679	2	.712
25 years and above	114	77(73.6)	37(40.4)			
Gender						
Male	126	81(81.3)	45(44.7)	.004	1	.947
Female	342	221(220.7)	121(121.3)			

Table 3 shows the Chi-square value with the corresponding p-value for hypothesis of no significant difference in the proportion of undergraduates in ESUT who possess knowledge of food hygiene based on age (X^2 = .679, p = .712< .05) and gender (X^2 = .004, p = .947< .05). Since the p-value was greater than .05 level of significance, the null hypothesis was therefore not rejected. This implies that there is no significant difference in proportion of undergraduates in ESUT who possess knowledge of food hygiene based on

socio-demographic factors (age and gender).

Table 4: Chi-Square Analysis of Food Hygiene Practices Adopted by Undergraduates Based on Socio-demographic factors

Factors	N	YesO(E)	NoO(E)	X^2	df	p-value
Age						
16 – 19 years	212	205(189.8)	7(22.2)			
20 – 24 years	142	124(127.1)	18(14.9)	25.978	2	.000
25 years and above	114	90(102.1)	24(11.9)			
Gender						
Male	126	94(112.8)	32(13.2)			
Female	342	325(306.2)	17(35.8)	40.983	1	.000

Table 4 shows the Chi-square value with the corresponding p-value for hypothesis of no significant difference in the food hygiene practices adopted by undergraduates based on socio-demographic factors of age (X^2 = 25.978, p = .000< .05) and gender (X^2 = 40.983, p = .000< .05). Since the p-value was less than .05 level of significance, the null hypothesis was therefore rejected. This implies that there is a significant difference in the practices adopted by undergraduates in a Nigerian university based on socio-demographic factors (age and gender).

Discussion

Table 1 reveals that overall, the proportion of undergraduates in ESUT who possess knowledge of food hygiene was high. Also, the Table shows that a high proportion of undergraduates knew that food hygiene is concerned with all types of hazards and how to achieve safe preparation of food, throwing away food when in doubt is a preventive measure for food poisoning, washing dishes immediately after meal is an important food hygiene practice, leaving the hair open while cooking is a risk factor for food poisoning, and not wearing of jewellery during cooking is part of food hygiene. The finding was expected and agrees with the finding of Mendagudali et al. (2016) that women of Khaza bazar had consistently good knowledge of food safety. The finding is also in consonant with the finding of Elechi and Allison (2018) that 80.5 per cent of food handlers in Port Harcourt LGA of Rivers State had good knowledge of food hygiene. However, the findings disagree with Islam et al. (2022) who found that only 41.8 per cent of university students in Bangladesh had knowledge of food handling and safety. Although the respondents from these studies are different, the similarity in findings cannot be over looked because all the respondents are exposed to similar environmental condition which exposes them to foodborne diseases and the need for proper food hygiene.

Findings in Table 2 showed that overall, majority of undergraduates

adopted good food hygiene practices. Food hygiene practices among undergraduates in ESUT included buying clean and fresh foods for cooking (92.3%), covering of the hair while cooking (84.2%), not wearing accessories like rings, bracelets when cooking food (78.6%) and washing of fruits and vegetables before eating. The findings are expected because undergraduates usually handle food for their personal consumption and so may have their health and wellbeing at heart when handling food. The findings are in line with the findings of Faremi, Olatubi and Nnabuife (2018) that 78.2 per cent of food vendors in Obafemi University Ile-Ife, South Western Nigeria had satisfactory food safety hygiene practices. The finding however, disagrees with the finding of Azanaw, Gebrehiwot, and Dagne (2019) that only 49.0 per cent of food handlers in Gondar city had good food handling practice. The disparity in findings maybe because Azanaw, Gebrehiwot, and Dagne (2019) investigated food handlers who are handling food for commercial reasons while the current study dealt with only undergraduates who prepare food for personal consumption.

Table 3 showed that there is no significant difference in proportion of undergraduates in ESUT who possess knowledge of food hygiene based on socio-demographic factors of age. This is surprising as older age is expected to come with more knowledge and exposure. The findings agree with the finding of Stratev et al. (2017) that age and gender did not significantly affect food safety knowledge among veterinary medicine students at Trakia University, Bulgaria. However, the findings disagree with the finding of Farahat, El-Shafie and Waly (2015) that Saudi women with higher age groups showed higher mean knowledge in food safety than those in low age groups. Also, Table 3 showed that there is no significant difference in the proportion of undergraduates in ESUT who possess knowledge of food hygiene based on socio-demographic factors of gender. This finding is not expected because in the Nigerian culture, it is assumed that the woman's place is in the kitchen and the female is expected to be conversant with food handling than the male who is glorified for being a man. The findings disagree with the finding of Johnson (2019) that good food hygiene knowledge was significantly associated with female gender among food vendors in Uyo, Nigeria. The outcome of this finding, however, maybe because with the struggle to achieve gender equality, both the gender now take up similar responsibilities, including food handling, especially as it regards to their personal health and wellbeing.

Findings in Table 4 that there is a significant difference in the food hygiene practices adopted by undergraduates based on socio-demographic factors of age and gender. The findings on age disagree with the findings of Stratev et al. (2017) that age did not affect food safety practices among veterinary medicine students at Trakia University, Bulgaria. The findings on age are also in contrast with the findings of Odonkor,

Kurantin, and Sallar (2020) that the odds of performing good handling practice among postnatal mothers within the age group of 36-45 years were five times higher compared to those within the age group of 18-25 years in Western Ghana. The disparity in findings may be because undergraduates aged 20 years and above may be in their final year and so are faced with tedious academic requirements making it difficult for them to adopt proper food hygiene practices when handling their food. On the part of gender, females are trained by their mothers at very young age on how best to handle food. These trainings are usually not provided to the male child. The findings are in line with the findings of Okugn and Woldeyohannes (2018) that sex of household head was a factor associated with food handling practices in Abobo district, south-western Ethiopia. The findings however, disagree with the findings of Lema et al. (2020) that being male was an independent predictor of food safety practice of food handlers at University of Gondar, Northwest Ethiopia.

The limitations of this study include that, this study did not include characteristics of the respondents such as their socio-economic status, background, cultural beliefs and values which may have also affected some of the food hygiene practices in the study. Therefore care must be taken while drawing sharp conclusions on the findings of this study.

Conclusion

The finding of this study shows that the proportion of undergraduates in ESUT who possess knowledge of food hygiene was high and that majority of undergraduates adopted good food hygiene practices. The study also shows that no significant difference in the proportion of undergraduates in ESUT who possess knowledge of food hygiene based on socio-demographic factors (age and gender) and a significant difference in the food hygiene practices adopted by undergraduates based on socio-demographic factors (age and gender).

Recommendations

1. Health educators, teachers, and other relevant stakeholders should enlighten undergraduates on the importance of adopting good food hygiene practices.
2. Undergraduates should read up and gather information on food hygiene and also practice proper hygiene for preparing and handling their own food.
3. Government and non-government agencies should sponsor programmes in the universities to teach undergraduates ways to handle their food.
4. Further studies should consider using a larger, randomized and more representative population, considering other factors associated with the knowledge and practice of food hygiene in a larger study area.

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