COVID – 19 PANDEMIC KNOWLEDGE AND PRACTICE OF FOOD HYGIENE AMONG FOOD HANDLERS IN UVWIE LOCAL GOVERNMENT AREA OF DELTA STATE

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Abstract
The, safety of food is determined by the way it is handled during preparation and distribution. The role of food handlers is paramount especially with regards to the global COVID19 pandemic. This study was designed to examine the impact of the COVID-19 pandemic on knowledge and practice of food hygiene among food handlers in Uvwie Local Government Area of Delta State. 100 food handlers were randomly selected, and food preparation and distribution points were recruited to participate in the study. Structured questionnaire contently validated was used as instrument for data collection. Data Analysis was done with percentage and mean. Findings from the study revealed that food handlers have weak knowledge of the potential sources of COVID-19 and factors to control the disease have fair knowledge of good food hygiene practice that can help to, minimized the spread of COVID-19 in the pandemic era. Conclusion was drawn based on the findings and it was recommended that food handlers should be given more training on the expected and likely sources of COVID-19 as related to food handling to help control the spread of the disease.

Key words: COVID-19, knowledge, practice, food hygiene.

Introduction

The COVID-19 pandemic that is currently wreaking havoc around the world has prompted a slew of public health initiative**.** COVID-19 is an airborne disease, spread via man-to-man contact and direct inhalation of droplets produced by an infected person's coughing and/or sneezing. Viruses can not be transmitted by touching food or food packaging according to current evidence. COVID-19 cannot multiply in food since it requires a host cell of an animal or human to multiply. According to WHO, the virus is spread through droplets created when coughing or sneezing, and can then spread the disease to other people. Because the droplets are heavy, they will rest on the surfaces of inanimate things, and these objects may transfer the disease and infect other persons. Shaking hands, contacting the nose, eyes and mouth and touching contaminated surface are means of contracting COVID-19.

SARS-Cov-2 virus is still altering people's life style and posing a threat their lives national and international scale. To minimized the transmission of SARS-Cov-2 virus, the World Health Organization (WHO) has enacted a slew of restriction requiring all countries to maintain to social distancing between persons and working from afar. Working from is impossible in food factories and food handlers must In group and specific locations, therefore keeping food handlers safe along the food chain is a major challenge (Wei, *et al.* 2020). All researches approved that SARS-CoV-2 affects directly the respiratory system and is transmitted easily through droplets when infected persons are coughing or sneezing (Tong, Z. *et al.* 2020). The contamination of the surfaces and objects with heavy droplets will occur, so these inanimate objects can be good vehicles to transfer the virus (Tong, et al. 2020).

It was found that the survival time for SARS-CoV-2 virus on plastic and stainless steel is up to 72 hours, on copper up to four hours and on cardboard up to 24 hours (Wei, *et al*, 2020). However, most viruses on the surface of common materials become inactive (noninfectious) after the first 24 hours (WHO, FAO. 2020). The knowledge of food handlers in many local food factories and their attitude to hygienic food practices need evaluation in the light of COVID-19 pandemic.

In order to eliminate the danger of contaminating food, food packaging, or other surfaces during processing, they need to brush up on the fundamentals of food hygiene (Sharif and Colleague, 2010). COVID-19 transmission amkng food handlers is a global issue, thus, numerous organizations around the world are working to stop the virus from spreading (FAO and WHO, 2020), written instructions should be given to staff members, handlers, and food safety training programs on how to prevent the spread of COVID-19 should be a component of any food safety management system. Although the training of food handlers will increase their knowledge about food safety this may not automatically be reflected in a more positive attitude (Mitchell, R. *et al.* 2007; Anaeto, *et al*, 2017). Many studies have been conducted conducted in Delta State to investigate the hygienic condition in many food factories prior to COVID-19 pandemic (Osaili, et al. 2011) but there is known study in the State that assessed the food handler's knowledge of potential COVID-19 sources, the potential factors for COVID-19 control among food handlers and participants' attitude and hygienic practices of food handlers. Therefore, this study was designed to investigate the COVID-19 pandemic knowledge and practice of food hygiene among food handlers in Uvwie Local Government Area of Delta State.

Research Questions

For the purpose of the study, the following research questions were formulated to guide the study.

1. What is the Food handler's knowledge on food safety during the COVID-19 era in Uvwie Local Government Area of Delta State?
2. What is the knowledge of food handlers on the potential Sources for COVID-19 in Uvwie Local Government Area of Delta State?
3. What is the knowledge level of food handlers on the potential factors for controlling COVID-19 during the pandemic era in Uvwie Local Government Area of Delta State?
4. What are the food hygiene practices of food handlers in the COVID-19 era in Uvwie Local Government Area of Delta State?

Methodology

A descriptive design was used in this study to evaluate the hygienic practices, food Safety knowledge during COVID-19 pandemic. Onsite questionnaire were used in the study, since all food handlers were accessible. The population of this study comprised of food handlers in Uvwie Local Government Area of Delta State which was estimated to one thousand (1000).The sample for the study consisted of one hundred (100) food handlers (local food handlers and factory workers) randomly selected across four areas in Uvwie Local Government Area of Delta State. The areas are Effurun, Ekpan, Ugborikoko and Enerhen Area respective;ly). The social-demographic properties of the participants includes gender, age, years of experience, education and food safety training are presented in Table 1

The sampling techniques used were purposive and simple random sampling. Male and female food handlers within the study area were randomly selected to avoid misrepresentation of population. The one hundred subjects were selected from the four selected areas through the use of the first contact method of the simple random sampling technique. The instrument used for data collection in this study was structured questionnaire. The questionnaire consisted of two sections "A & B". Section "A" sought information on respondents' demographic variables such as age, educational background, food safety training and working experience while section B sought information on knowledge of potential source and control measures of COVID-19 and good food hygiene practice among food handlers.

The questions was made up of likert modified 4-point scale of Strongly Agreed, Agree, Disagree and Strongly Disagree and four-point scale questions were used. Thirty item statements classified into three categories; food handler's knowledge for potential sources of COVID-19 (ten questions), food handler's knowledge for potential factors for controlling COVID-19 among food handlers in food factories (ten questions) and participant's hygienic practice (ten questions). The responses about knowledge and food safety attitudes were demonstrated as "agree and disagree" questions, these questions specifically designed to check their knowledge about cross contamination, temperature abuse, symptoms of food poisoning, sanitation and disinfectant processes. Ten questions were recorded on a

scale ranged from (0-10), food handlers who recorded ≤ 6 points were classified as" poor Knowledge" and need further training courses, food handlers who recorded ≥ 7 points were considered as " good knowledge".

Questions were specified for ‘’food handler’s knowledge for potential sources of COVID-19 ‘’dealt with common sources for COVID-19, as shaking hands, touching contaminated surfaces, touching food packaging and touching inanimate objects. Also questions were designed to evaluate the potential factors for controlling COVID-19 among food handlers and to evaluate the participants' attitude and hygienic practice among food handlers working in food factories in Delta State during pandemic crisis: COVID-19. These questions required options " Agreed, Strongly Agreed , Disagreed, Strongly Disagreed Food handlers who recorded ≤ 6 points were considered as food handlers with "poor Knowledge for sources of COVID-19 ", Food handlers who recorded ≥ 7 points were classified as " good Knowledge for sources of COVID-19 "(Afifi and Abushelaibi, 2012; Bolton, Meally, Blair, McDowell, & Cowan, 2008; Clayton and Griffith, 2004; Omemu & Aderoju, 2008).

Results and Discussion

Data was analyzed using SPSS Version 15.0 for analysis. The standard deviations and means were used as descriptive statistics. P-value < 0.05 were considered to be statistically significant.

Table 1: Demographic features

Variables	Option	Frequency	Percentage
Gender	Male	20	20
	Female	80	80
Age range	19- 23	10	10
	24 -29	5	5
	30 – 35	25	25
	36 -41	30	30
	42 – 50	10	10
	Above 50	20	20
Level of education	No formal education	23	23
	Primary school	32	32
	Secondary school	34	34
	University	11	11
Food safety training	Yes	31	31
	No	69	69
Year of Working Experience	0-1 year	21	21
	1-3 years	41	41
	3-5 years	24	24
	5-8 years	11	11
	Above 8 years	3	3

The demographic characteristics of 100 food handlers are summarized in Table 1above. The participants' age was ranged from 19-50 years. Around 10% between 19 and 23 years; most of the food handlers were female (80%). On educational levels, it was observed that majority (34% & 32%) attended secondary and primary school respectively, only 31% of food handlers had received food safety training courses. Around 62% of them had experience below 3 years while 38% had experience above 3 years.

Research 1: What is the food handler's knowledge on food safety during the COVID-19 era?

Table 2: Mean knowledge scores of food safety aspects for food handlers during COVID-19 era

Food safety aspects for food handlers during COVID-19.	**Mean knowledge scores**	**scores range**	**Percentage of correct responses (n)**
Knowledge of potential sources of COVID-19 among food handlers.	5.8	0-10	58% (58)
Knowledge of potential control measures for COVID-19 among food handlers.	6.1	1-10	61% (61)
Knowledge of good hygiene Practice of food handlers during COVID-19 pandemic	7.2	1-10	72% (72)
Total knowledge score of food safety	19.1	1-30	63.7 % (63)

In table 2, the Mean knowledge scores for the potential sources of COVID-19 was 5.8, which was considered as "poor Knowledge for potential sources of COVID-19. On preventive measure and hygienic practice, a mean knowledge value of 6.1 and 7.2 respectively were observed. This were considered adequate.

Research Question 2: What is the knowledge of food handlers on the potential sources for COVID-19 in Uvwie Local Government Area?

Table 3: Knowledge of potential sources of COVID-19 among food handlers during COVID-19 pandemic.
(n=100)

	Potential sources of COVID-19	**SA (%)**	**A (%)**	**D (%)**	SD **(%)**
1.	From Air	32 (32%)	29 (29%)	17 (17%)	22 (22%)
2.	Inhalation of large droplets during coughing and sneezing	56 (56%)	41 (41%)	3 (3%)	-
3.	Touching raw food	25 (25%)	32 (32%)	10 (10%)	33 (33%)
4.	Touching food packaging	16 (16%)	17 (17%)	18 (18%)	49 (49%)
5.	Touching contaminated surfaces	38 (38%)	30 (30%)	(13%)	19 (19%)
6.	Fecal contamination	16 (16%)	15 (15%)	56 (56%)	12 (12%)
7.	Hand shaking	50 (50%)	39 (39%)	12 (12%)	9 (9%)
8.	Touching nose, mouth and eyes	26 (26%)	29 (29%)	10 (10%)	35 (35%)
9.	Touching inanimate objects (door Knob, money ...)	14 (14%)	18 (18%)	229 (45.8)	112 (22.4)
10	From water	27 (27%)	23 (23%)	40 (40%)	10 (10%)

In table 3, around 97 % (SA + A) of food handlers believed that inhalation of large droplets during coughing and sneezing will play major rule for spreading COVID-19. It was noticed that 89% of food handlers knew that hand shaking between each other will facilitate spreading COVID-19. Also, it was demonstrated by the food handlers that touching contaminated surfaces (68%), touching nose mouth and eyes (55%) and touching raw food (52%) were sources of COVID-19. On the other hand, the food handlers showed weak knowledge about the other sources for COVID-19 such as; Touching raw food, touching food packaging (52%) and touching inanimate objects (door Knob, money...) (32%) (Table 3). It is highly unlike that people can contract COVID-19 from food or food packaging.

Research Question 3: What is the knowledge level of food handlers on the potential factors for controlling COVID-19 during the pandemic era?

Table 4. Responses of Food worker's knowledge of potential factors for controlling COVID-19; (n=100)

	Potential factors for controlling COVID-19	**SA (%)**	**A (%)**	**D (%)**	SD **(%)**
1.	Use Personal Protective Equipment (PPE) (disposable gloves, face masks, sleeves, clean apron).	37 (37%)	28 (28%)	19 (19%)	16 (16%)
2.	Check the temperature for the employees and other COVID19 symptoms.	34 (34%)	43 (43%)	23 (23%)	0 (0.0)
3.	Adhere with physical distancing at least (2-m) among the food handlers.	20 (20%)	37 (37%)	158.5 (31.4)	60 (12)
4.	Use spray disinfectants, hand sanitizers, surface sanitizers	31 (31%)	46 (46%)	12 (12%)	11 (11%)
5.	Use signs for wearing gloves and mask and use floor signs for physical distance.	36 (36%)	35 (35%)	14 (14%)	15 (15%)
6.	Use electronic reminders to warn self and other colleague to keep physical distancing and clean and sanitize their hands.	19 (19%)	13 (13%)	33 (33%)	35 (35%)
7.	Make a barriers between the staff and any guest at receiving area.	21 (21%)	24 (24%)	53 (53%)	3 (3%)
8.	Identify the most uses equipments and utensils (hand doors, scales, trolleys) and confirm their cleaning and disinfectants.	20 (20%)	26 (26%)	26 (25%)	28 (28%)
9.	Reduce and regulate the numbers of staff in working areas to prevent overcrowding.	13 (13%)	29 (29%)	22 (22%)	36 (36%)
10	Make working teams to reduce the interaction between the employees.	25 (25)	25 (25%)	10 (10%)	40 (40%)

The table below shows the response rate and awareness of food handlers on the factors for controlling COVID-19 in food sale area. Considering the mean score of

6.1 as a bench mark to be a fair knowledge, it was observed that the food handlers have a fair Knowledge about the importance of Personal Protective Equipments (PPE) to minimize the direct contact between food handlers and impair virus transmission as 65% of them believed that PPE will be used to control COVID-19, 77% conducted that using disinfectant and hand sanitizers are effective practices to control COVID-19. Only 42 % of food handlers demonstrated that reduction of the numbers of staff in working areas will prevent overcrowding in working area and will reduce viral infection. It was noticed that 57% of food handlers adhere with physical distancing (2-meter) in working area and with the use electronic reminders to keep physical distance among food handlers and clean and sanitize their hands.

Specifically, on the use of electronic reminders (32%), making of barriers between staff and any guest at receiving area (47%), identifying the most uses equipment and confirmation of their cleanliness and disinfection (46%) and reduction of the numbers of staff in working areas to prevent overcrowding to guide against the spread of COVID-19, the food handlers show poor knowledge of them.

Research Question 4: What are the food hygiene practices of food handlers in the COVID-19 era in Uvwie Local Government Area of Delta State?

Table 5. Responses of good hygiene Practice for food handlers in the COVID-19 era.

S/N	Questions on food poisoning During COVID-19	Percentage of Positive Answer (%)
1.	Do you wash and sanitize your hands before food preparation?	72%
2.	Do you check the temperature for food and refrigerator periodically?	77%
3.	Do you separate between finished and raw food?	75%
4.	Do you think food handlers are good source for pathogenic microbes?	66%
5.	Do you think wiping instead of washing is sufficient to keep food safe?	70%
6.	Do you think washing all vegetables and fruits can reduce food poisoning?	65%
7.	Do you think cleaning and sanitizing for all food contact surfaces is obligatory to reduce food poisoning?	55%
8.	Do you wear mouth mask, gloves and sleeves during food preparation?	75%
9.	Do you think color coding technique for cutting boards, boxes, knives inside kitchen will reduce cross contamination?	86%
10.	Do you think viruses can be killed by heat?	78%

Table 5 above shows the Food hygiene practice of food handlers during the COVID-19 era. It is believed that the food hygiene attitudes of food handlers have direct relationship with the incidence of food poisoning which may also be connected with the spread and prevention of COVID-19. Thus, negative attitudes for food handlers regarding food hygiene practice will increase the incidence of food poisoning (Belot & James, 2009, Centers for Disease Control and Prevention, 2002). From the data presented in the table above, it was found that the mean knowledge scores for good hygiene practice for food handlers during COVID-19 pandemic is 7.0, which is considered as good. 72 % of food handlers thought that washing and sanitizing their hands before food preparation will reduce food poisoning. It was found that 77% believed that checking the temperature for food and refrigerator periodically is important to control food poisoning. 75% of food handlers agree to wear mouth mask, gloves and sleeves during food preparation, 70% of food handlers declared that wiping instead of washing is sufficient to keep food safe. Most of food handlers were aware about using color coding is good technique to rprevent cross contamination.

In a previous study in South Africa it was found that the average correct answers for food handlers' knowledge (n = 159) was 46.0% (McSwane, et al. 2003). In Ankara, Turkey, it was found that the percentage of food safety knowledge score for 764 food handlers, 43.4% ± 16.3% show positive attitude to food hygiene practice during COVID-19 (Bas, et al. 2006). In a similar study in Portugal that consisted of 124 food handlers in 32 school canteens, it was found that the food handlers had good knowledge about personal hygiene and cross contamination (Campos, *et al.* 2009). On the other hand, many studies indicated that food handlers had low level of food hygiene knowledge (Belot, & James, 2009; Clayton, D and Griffith, C. J. 2004).

There is currently no much information about the impact of the COVID-19 pandemic on food hygienic knowledge of food handlers particularly in Delta State. Food handlers in this study however show good knowledge of food hygiene and safety when compared to previous studies conducted in the United Kingdom, Turkey, Slovenia, Italy, and Portugal. Food handlers in those countries were found to have a low degree of food safety awareness (Afifi & Abushelaibi, 2012, Almanza, et al, 2007, Ansari-Lari, et al. 2010; Herztman, & Barrash, 2007, Hilton, 2002, Ko, 2010).

Conclusion and recommendations

The knowledge of food handlers on food hygiene to a large extent determines the level of their food hygiene practices which in turn affect healthy food consumption of consumers and as well as the spread of the highly contageous COVID-19 disease ravenging the world at large. Food handlers therefore, are key factor in the spread and prevention of the COVID-19 pandemic since every individual depend on food consumption for survival. This study has shown that food handlers COVID-19

knowledge in terms of its potential sources and mode of spread is poor in spite of their fair knowledge of food hygiene practice. Therefore, the necessity to create awareness of the potential sources of COVID-19 spread and prevention with regard to food handling is undeniable as it will help to improve their food safety practices with its effect on reduction of spread of the COVID-19 pandemic threatening the world. Based on the findings of this study, it is hereby recommended that:

6. Food handle should be given more training on the expected and likely sources of COVID-19 as related to food handling to help control COVID-19.
7. New data about the fact food related risk factors of COVID-19 should also be made available to help increase the food handlers awareness and food hygiene practices.
8. Food handlers' comprehension of proper hygiene standards should be strengthened by expanding the number of food safety training courses available.
9. Governmental agencies should provide written COVID-19 instructions and resources to food establishments.

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