

# Predicting Relationship between Food-Borne Disease Information-Adequacy and Food Handling Practices among Food-Handlers in Selected Restaurants in Ggaba Kampala, Makindye Division Uganda

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## Abstract

**Introduction:** Ministry of Health in Uganda reported in 2019 that about 1.3 million Ugandans are diagnosed with food-borne diseases annually, while 14 per cent of all diseases treated every year are due to food contamination. Out of these, children under five years of age account for 40% of the food-borne disease. This study assessed the information-adequacy on food-borne disease and food-handling Practices among food-handlers in selected Restaurants in Ggaba Kampala, Makindye Division Uganda.

**Methodology:** The study was a descriptive cross-sectional research design with quantitative method of data collection on food-borne disease information-adequacy and food-handling practices measured on reference point scale of 11 and 18 respectively. A sample size of 286 randomly selected respondents who were food handlers was used in the study. Data was analyzed using SPSS version 25 where simple descriptive statistics such as means, standard deviation and prevalence were used to describe the data.

**Results:** Our study reported that 70.6% of the respondents were females of which majority (71.3%) were between the age of 31 and 40, while more than half of them (71%) had primary education. Level of information-adequacy in terms of knowledge about nature of food-borne disease, comprehension of information on its causes, transmission and prevention had a mean score of 8.10, SD of 2.09 and prevalence rate of 73.7%, with majority of the respondents (78.3%) responding correctly to the item requiring whether food consumed by customers can have germs in it that make customers to be sick, while (78%) also identified that hand-washing protects one from disease caused by contaminated food. Food-handling practices among respondents in the study had a mean score of 6.62 and SD of 2.45 which constitute a prevalence of 36.7% where around 4 in every 10 participants (40.9%) responded to wash their hands before handling food most of the time, 38.5% of them washes their plates most of the time

before serving food and 38.1% the respondent do not always put on hand gloves while handling food.

**Conclusions:** Findings from our study demonstrated that most of the food-handlers are adequately informed about food-borne disease but majority displayed an unsatisfactory low level of food-handling practices however this acceptable level of information-adequacy leaves a gap for further research on some intermediate variables between good knowledge and appropriate practices for good knowledge alone does not always translate to good practices as demonstrated in this study. Only with this can the focused point of intervention be highlighted to the regulatory agencies for effective actions towards micro-elimination of food-borne diseases in the region.

**Keywords:-** Information-Adequacy, Food-Handlers, Hygiene, Food-Handling Practices, Food-Borne Diseases.

## I. INTRODUCTION

Infection is more usual when there is a shortage of adequate sanitation and hygiene, safe water for drinking, cooking and cleaning. It also spread from person-to-person, food is said to be another major cause of diarrhea when it is prepared or stored in an unhygienic conditions, (WHO, 2017). Globally, food borne illness has been reported to affect an estimated 30% of individuals annually. Meals prepared outside of the home are a risk factor for acquiring food borne illness and have been implicated in up to 70% of traced outbreaks (WHO, 2015). Sub Saharan African was estimated to have the highest burden of food borne diseases per population (WHO, 2015), where more than 91 million peoples fall ill and 13700 die each year (WHO, 2017). In East Africa, Kenya reported 317 cases and 125 deaths and another outbreak reported a further 74 reported cases and 28 deaths in 2009. It should be well known that the outbreak cases only show us the tip of the iceberg and many more sporadic cases go unrecorded (WHO/FAO, 2009). A study by the Ministry of Health in 2019 indicated that about 1.3 million Ugandans are diagnosed with food-borne diseases

annually, while 14 per cent of all diseases treated every year are due to food contamination. Out of these, children under five years of age account for 40% of the food-borne disease burden (MOHU, 2019).

Hazardous pathogens and physical hazards like hand wash may cause life threatening health problems if they come in contact with food, (Chekol *et al.*, 2019). Such Contaminants get access to contaminate food mainly due to food handler's poor knowledge and negligence during handling activities. Moreover, low financial resources, inadequacy food safety law, in availability of food establishment guideline and standards, as well as poor monitoring and evaluation system of food establishments play an important role in food handling practice, (Chekol *et al.*, 2019). Food contamination in developing countries is caused by many factors including traditional food processing methods, inappropriate handling of food, holding temperatures, and poor personal hygiene of food handlers, the safety of food handlers is therefore one of the most important health and safety issues facing most developing countries since it leads to both public health and social Problems, (Legesse *et al.*, 2017).

One of the most effective way to reduce the risk of food-borne diseases in many jurisdictions across the world has been food safety training through food handlers' training and certification programs implemented with some jurisdictions requiring mandatory training, while training in other jurisdictions is voluntary (Averett *et al.*, 2011). In the past one year and a half, restaurants have emerged in Ggaba Kampala District following demands of the ever-growing population in these two areas especially increasing number of University students. However it was revealed that there are poor hygienic conditions at sites of food preparation near roads, breeding of flies which invaded up to the serving tables, serving in an open place, shortage of water, poor waste management and a lot of sewage near by the restaurants. Owing to all these, food-borne diseases to be a challenge for both developed and developing countries (Da Cunha *et al.*, 2012), and are leading cause of illness and mortality in developing countries (Hassan *et al.*, 2010). Despite concerted efforts for several decades, foodborne diseases remain a major global public health issue with substantial morbidity and mortality associated with the consumption of contaminated foodstuffs (Havelaar *et al.*, 2010). However, Outbreaks of foodborne illness have been linked to improper food handling practices at food serving establishment (Da Cunha *et al.*, 2012).

Community, Kampala Capital City Authority (KCCA) and other shareholders have initiated so many interventions such as awareness, health education and seminars towards tackling the issue but food borne diseases are still prevalent. Could these gaps be associated with the community's lack of awareness on food safety laws and practices including food handling? for this matter therefore, our study aimed at assessing the level of information adequacy about food-borne infection and safe food handling practices among food-handlers in selected restaurants in Ggaba Kampala, Makindye division Uganda so as to contribute to the focused

strategies that will be directed towards the reduction in food borne diseases and thus improve the general health of the community.

## II. METHOD

### Study design

This study was a descriptive cross-sectional research design with a quantitative method of data collection on the level of food-borne disease information-adequacy and food-handling practices measured on reference point scale of 11 and 18 respectively which involves 286 randomly selected food handlers in different restaurants located in Ggaba-Kampala Makindye Division Uganda recruited in the study.

### Sample size estimation

The sample size was estimated using Kish Leslie formula (1965) based on 21.6% prevalence of intestinal parasitic infections among food venders in a previous study conducted by Ayeh-kumi *et al.*, (2009) as shown below:

$$N = \frac{Z\alpha^2 P (1 - P)/D^2}{0.05^2}$$

$$= \frac{1.96^2 \times 0.216 (1-0.216)}{0.05^2}$$

$$N = 260 + 10\% \text{ for response bias} = 260 + 26 = 286$$

Where; N = required sample size, Z = Value corresponding to 95% confidence interval, P = prevalence of intestinal parasitic infection (21.6%), Q = (1-P), D = the required precision of the estimate (which is 5% accuracy).

### Sampling procedures

A systemic random sampling method was adopted, where every three restaurant along the study area was selected with every restaurant in the population having an equal chance of being selected in the sample. Food handlers in the selected restaurants were being enrolled consecutively into this study until the desired sample size was reached.

### Inclusion criteria and Exclusion criteria

The study included every consenting food handlers in the selected restaurants in Ggaba- Kampala Makindye Division. Some restaurants that doubled as bars at night were also included, since most of them are bars at night. The study excluded all food handlers in the selected restaurants who will not consent to participate in the study. It also excluded restaurants that serve food in Ggaba- Kampala Makindye Division but were not selected in the sampling procedure.

### Data collection, Processing and Analysis

Quantitative data was collected using a researcher administered questionnaire designed to suit the objectives of the study and analyzed using (SPSS) version 25 where the categorical responses of "Yes /No" measuring the information-adequacy were coded with "0- for wrong answer and 1- for correct answer", then computed together to a maximum reference score point of 11, while the responses of "None of the time", "Some of the time", "Most of the time" and "All of the time" on a 4-point likert scale to

measure the frequency of the respondents safe food-handling practices were merged together to a total of 18 point maximum score scale of reference, simple descriptive statistics such as means, standard deviations, and proportions were used to describe the data all in 95% confidence interval, regression analysis was conducted to reveal the statistical relationship between food-borne disease information-adequacy and safe food handling practices among the respondents.

### Quality control

Research assistants recruited underwent a 2-day training on the study specific procedures, facts about food-borne diseases, food handling practices, interviewing techniques, informed consent issues and data documentation. The questionnaires were pretested among restaurants that would not be used for data collection and the tool was redefined based on recommendation from the pilot study prior to the actual data collection.

### Ethical consideration

An introductory letter was obtained from the office of the Dean of the postgraduate school, Cavendish University, Uganda. This was done prior to data collection so as to seek

permission to conduct the study in different restaurants in Ggaba-Kampala Makindye Division Uganda. Consent was as well obtained from the food handlers who had to sign a consent form prior to the administration of the questionnaire. The data collected were treated with utmost confidentiality ensuring that it was not any way exposed to the members of the general public except to the research team.

## III. RESULTS

The study revealed that majority 71% of the respondents were between the age of 31 and 40 and the least age group 2.8% being 61years and above. Females respondents constitute the majority 71% with males being just around 29%, Almost 48% of the respondents reported to be Catholic and 4.1% from other religious groups not stated, in terms of language spoken, 84% speaks Luganda while just 2.1% reported to speak Acholi, many of the respondents 81% were from central region with only 2.1% from the Northern region, 83% were married and just 1.4% of the respondent reported to be widows, majority 71% had at least primary education with just 2 out of 286 respondent (0.7%) having tertiary education as shown in (Table 1 below).

**Table 1: Frequency Distributions on demographic variables**

Variables	Respondents in this study N=286	
	Frequency (N)	Percentage (%)
<b>Age(years):</b>		
• 18-30 years	40	14.1
• 31-40 years	204	71.3
• 41-50 years	19	6.6
• 51-60 years	15	5.2
• 61 years and above	8	2.8
<b>Sex:</b>		
• Male	84	29.4
• Female	202	70.6
<b>Religions:</b>		
• Islam	56	19.6
• Protestant	66	23.1
• Catholic	136	47.6
• Pentecost	16	5.6
• Others	12	4.1
<b>Languages:</b>		
• Luganda	240	83.9
• Lunyankoli	20	7.0
• Acholi	10	3.5
• Iteso	6	2.1
• Others	10	3.5
<b>Place of origin:</b>		
• Central region	232	81.1
• southern central region	16	5.6
• western region	8	2.8
• Northern region	6	2.1
• Eastern region	24	8.4
<b>Marital Status:</b>		
• single	24	8.4
	236	82.5

<ul style="list-style-type: none"> <li>• married</li> </ul>	22	7.7
<ul style="list-style-type: none"> <li>• divorced/separated</li> <li>• widows/widowers</li> </ul>	4	1.4
<b>Level of Education:</b> <ul style="list-style-type: none"> <li>• No formal education</li> <li>• Primary education</li> <li>• Secondary education</li> <li>• Tertiary education</li> <li>• Others</li> </ul>	50	17.5
	204	71.3
	16	5.6
	14	4.9
	2	0.7

**Table 2: Findings on the Information-adequacy**

Statement for consideration	Respondents in this study N=286	
	Frequency (N)	Percentage (%)
<b>Food consumed by customers that have germs in it make customers to be sick:</b> <ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>	224	78.3
	62	21.7
<b>Diseases caused by food can be as a result of the spoilage of food through present of germs in the food:</b> <ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>	226	79.0
	60	21.0
<b>Disease caused by food is because one has taken contaminated food/water:</b> <ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>	177	61.9
	109	38.1
<b>Washing hands protects one from disease caused by contaminated food:</b> <ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>	224	78.3
	62	21.7
<b>The nature of food borne illnesses produces stomach pain as an important symptom:</b> <ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>	16	56.0
	3	44.0
<b>Untreated Food borne can destroy the body immunity system:</b> <ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>	171	59.8
	115	40.2
<b>The body fluid of someone with food borne is usually poor:</b> <ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>	175	61.2
	111	38.8
<b>A community needs to be protected from having disease caused by food:</b> <ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>	224	78.3
	62	21.7
<b>Diseases caused by food kill people easily:</b> <ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>	224	78.3
	62	21.7
<b>A disease caused by food transmission is more in places noted for having unhygienic food:</b> <ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>	226	79.0
	60	21.0
<b>A disease caused by food transmission is more in places noted for having poor sanitation and hygienic practices:</b> <ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>	177	61.9
	109	38.1

This study reported the level of information-adequacy in terms of in terms of knowledge about nature of food-borne disease, comprehension of information on its causes, transmission and prevention among food-handlers to have the mean of 8.10, SD of 2.09 and prevalence rate of 73.7% as shown in (Table 3 below) with majority of the respondents (78.3%) responding correctly to the item requiring whether food consumed by customers can have germs in it that make customers to be sick, majority (79%) also responded correctly that diseases caused by food can be as a result of the spoilage of food through presence of germs in them and

almost (62%) of them were able to identify that diseases caused by food is because one has consumed contaminated food/water, while (78%) identified that hand-washings protects from disease caused by contaminated food. Similarly, majority (79%) reported that diseases caused by food transmission is more common in places noted for having unhygienic food while (62%) agreed that disease caused by food transmission is more common in places noted for having contamination food/water (*See Table 2 above*).

**Table 3: Descriptive statistics computed for Information-Adequacy and Food-Handling Practices**

Variables*	Max. Score on Reference scale	$\bar{x}$ (SE)	$\pm$ SD	Variance	Prevalence
Level of information-Adequacy	11	8.10(0.12)	2.09	4.37	73.7%
Level of Safe Food-Handling Practice of Food-Handlers	18	6.62(0.15)	2.45	6.00	36.7%

It was found out that the safe food handling practices among respondents in the study had a prevalence of 36.7% with a mean score of 6.62 and SD of 2.45 (see table 3 above) where 4 in every 10 (40.9%) participants responded to wash their hands before handling food most of the time, 38.5% of them washes their plates most of the time before serving food, almost 38.8% sometimes put on head gears while handling food, while 38.1% the respondent sometimes put on hand gloves while handling food, more than two-third of the respondents (71.7%) none of the time put on a face masks while handling food and majority 75.9% responded that none of the time they put on aprons while handling food as shown in (*Refer to table 4 below*).

**Table 4: Findings on safe food handling practices**

Statement for consideration	Respondents in this study N=286		
	Frequency (N)	Percentage (%)	
<b>Frequency of hand washing before handling food:</b>	• None of the time	10	3.5
	• Some of the time	97	33.9
	• Most of the time	117	40.9
	• All of the time	62	21.7
<b>Frequency of washing plates before serving food:</b>	• None of the time	5	1.7
	• Some of the time	70	24.5
	• Most of the time	110	38.5
	• All of the time	101	35.3
<b>Frequency of putting on head gears while handling food:</b>	• None of the time		
	• Some of the time	66	23.1
	• Most of the time	111	38.8
	• All of the time	86	30.1
<b>Frequency of putting on a hand gloves while handling food:</b>	• None of the time	23	8.0
	• Some of the time	133	46.5
	• Most of the time	109	38.1
	• All of the time	36	12.6
<b>Frequency of putting on a face masks while handling food:</b>	• None of the time	8	2.8
	• Some of the time	205	71.7
	• Most of the time	57	19.9
	• All of the time	20	7.0
	4	1.4	

Frequency of putting on Aprons while handling food:		
• None of the time	217	75.9
• Some of the time	26	9.1
• Most of the time	39	13.6
• All of the time	4	1.4

The finding on the relationship between information-adequacy and the food-handling practices showed that the beta-coefficient B of 0.072 for the information-adequacy is statistically not significant given the  $R^2 = 0.004$ , F-value of 1.067 and P-value of 0.303 which means that information-adequacy and food-handling practices are not covariant (See table 5)

**Table 5: Relationship between information-adequacy and the safe food-handling practices**

Variables	B	$R^2$	F-value	p-value
<b>Level of behavior</b>				
		0.004	1.067	
<b>Information-Adequacy</b>	0.072			0.303

#### IV. DISCUSSION

Two hundred and eighty-six food handlers participated in our study with more than half (71.3%) of the respondents being within the age group of 31-40. This was nearly coherent with the findings from the studies conducted in managed food service facilities in Uganda by Baluka *et al.*, (2014) and the one to evaluate food hygiene knowledge attitudes and practices of food handlers in Food business in Accra, Ghana by (Annor and Baiden, 2011). Female constitutes the majority among the food handlers that participated in our study and this is similar to the study conducted in Nigeria by (Faremi *et al.*, 2018). More than half (71.3%) of the participant had a primary education. This is slightly lower than what had been reported in similar studies about food handlers in Uganda and other places like Nigeria (Baluka *et al.*, 2014; Faremi *et al.*, 2018) despite being connected to university environment like the cited studies.

Findings from our study regarding level of information-adequacy with 73.6% prevalence showed that the respondents demonstrated a good level of knowledge about the nature of food-borne diseases where most of the food-handlers are well and adequately informed about the process of food spoilage, about how consumers can be at risk of getting disease caused by food, how food-borne diseases occur and often transmitted, moreover they are well acquainted to the fact that hand-washing is the best preventive measure, they also have knowledge that the body immunity system can be destroyed by diseases caused by food and finally they are aware that disease caused by food easily kills. This report is almost in accordance with what many researchers have reported in their studies like (Mulugeta *et al.*, 2012; Akabanda *et al.*, 2017; Nora *et al.*, 2017) all reporting satisfactory level of knowledge among food handlers. The study report also contradicts with report from some studies like that of Tessema *et al.*, (2014) where only 34.2% of the respondents had a good knowledge despite 88.9% of them claiming to have heard about food-borne diseases.

The report from our study is also not in line with the report from a study conducted by Faremi *et al.*, (2018) where less than half of the respondents demonstrated good knowledge about transmission of food-borne diseases. The high prevalence of information-adequacy about the predictors of food handling practices to reduce food-borne diseases in our study is very important as handlers need to know that food must be clean and safe with similar previous studies from (Ceserani *et al.*, 2006; Little and McLauchlin *et al.*, 2007) having also been reported that it is important that everyone who handles food or works in a place where food is handled be aware of food safety procedure.

We reported a low level of safe food-handling practices with food-handlers tending to display unsatisfactory and poor food handling practices in this food-handlers population of the highest food-borne pathogens prevalence country demonstrated in a meta-analysis of selected African countries conducted by Paudyal *et al.*, (2017) with 50.8% prevalence, which also records 1.3 million individuals diagnosed with food-borne diseases annually as reported by Uganda ministry of Health (MOH, 2019). The 36.7% prevalence of food handling practices in this study revealed that majority of the food-handlers do not always embark on safe food-handling practices and this is in contrast to the report from similar study by Faremi and others little above half of their respondents displayed a good food-handling practices despite the fact that the proportion of the respondents in our study being a little higher than that of Faremi *et al.*, (2018).

The report that 4 in every 10 respondents (40.9%) which constitute the majority in our study frequently washing their hands most of the time before handling foodstuff is similar to the report from the studies of Marcia, (2014); Baluka *et al.*, (2014); Faremi *et al.*, (2018) and that majority of the respondents sanitizes plates most of the time or every time before using is in line with the report of Marcia, (2014) and that of Faremi *et al.*, (2014).

Regarding putting on head gears while handling food where less than half (38.1%) of the respondents sometimes cover their hairs with just 8% of them responding to always put on a head gear while handling food which is very lower compare to the report from the study of Faremi and others. Could this mean that they are not aware that hair can harbor microorganisms which may contaminate foodstuffs or they chose to disregard the fact? However, irrespective of the answer, food handlers need to always cover their hairs as a form of hygienic and safe food-handling practice.

Moreover, concerning frequent use of hand gloves where nearly half 46.5% of the respondents answered to use hand gloves none of the time while handling food is in contrast with the report from the study of Faremi *et al.*, (2018) that reported half (50.8%) of their participants sometimes using hand gloves before handling food. This report is upsetting considering the current Covid-19 pandemic that requires proper hand washing frequently and other infectious diseases that may be transmitted via poor hygiene. Conclusively, the report of majority of our respondents not using face masks and aprons while handling food among others might be as a result of inadequate safety equipment within the restaurants for lack of safety equipment remain a major hindrance to food-handlers behavioral change as reportedly stated by Donkor *et al.*, (2009).

However the high level of knowledge did not predict good handling practices in our study owing to the fact that information-adequacy alone cannot directly predict safe practices except with the interaction with some underlying variables like perception and behavioral skills that serve as prerequisites to initiating behavioral change which in turns determine practices as explained by the information-motivation-behavioral skills (IMB) model of J. Fisher and Fisher, (1992).

## V. CONCLUSION AND RECOMMENDATION

Findings from our study demonstrated that most of the food-handlers are adequately informed about food-borne disease but majority displayed an unsatisfactory low level of food-handling practices however this acceptable level of information-adequacy leaves a gap for further research on some intermediate variables between good knowledge and appropriate practices for good knowledge alone does not always translate to good practices. Only with this can the focused point of intervention be highlighted to the regulatory agencies for effective actions towards micro-elimination of food-borne diseases in the region.

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