

Determinants to Compliance with Food Hygiene and Safety Practices Among Food Handlers in Boarding Schools in Embu County, Kenya

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Abstract

Background: Globally, and particularly in low- and middle-income countries, food-borne illnesses are a major public health concern. Mainly escalating the spread of food-borne illnesses are poor food hygiene practices. The purpose of this research was to assess the determinants of compliance with food hygiene and safety practices among food handlers in boarding schools in Embu County, Kenya.

Methods: An analytical cross-sectional study design was utilized. A sample size of 196 study respondents was calculated by the use of the Magnani formula. Multistage sampling was applied to select the study participants. STATA version 17 was employed for data analysis.

Results: In the multivariate analysis, factors associated with compliance with food hygiene and safety measures included sex (OR=2.2, 95% CI: 1.1-4.6, p=0.028), age (OR=2.7, 95% CI: 1.1-6.4, p=0.023), those who had previously had training on food safety (OR=2.0, 95% CI: 1.0-4.0, p=0.046), monthly income (OR=3.0, 95% CI: 1.2-7.3, p=0.015), and regular inspection by public health officials (OR=1.7, 95% CI: 1.2-2.3, p=0.001). However, education level, marital status, and work experience were not associated with compliance with food hygiene and safety measures.

Conclusion: In the multivariate analysis, education, marital status, and work experience were not associated with compliance with food hygiene and safety measures while the presence of previous training on food safety, presence of regular inspection of food premises, age, gender, and income level were found to be significantly associated with compliance with food hygiene and safety measures.

1. Introduction

Compliance with food hygiene standards can be achieved through health education and promotion, frequent training, and law enforcement [1]. To achieve safety in the production, manufacturing, and service of food, establishments must adhere to food safety measures [2]. Due to the vicious cycle that is created by disease, diarrhea, and malnutrition, unsafe foods are detrimental to both public health and socioeconomic development [3]. Each year as indicated by the World Health Organization (WHO), 420,000 mortalities are reported due to consumption of contaminated food [3]. The recurrence of food-borne illness has raised eyebrows globally about food hygiene and safety practices among food handlers [4].

disease (FBD) is important for public health. Each year, approximately 420,000 of the victims who contract illness from eating contaminated food die [5]. This causes an estimated 600 million people to get sick. Worldwide, 1 in 10 people suffer from an illness related to food, according to the World Health Organization (WHO) [6]. Although it is challenging to pinpoint the exact mortality linked to foodborne diseases, estimates of the number of people affected and deaths caused by foodborne infectious diseases in 2010 suggest that there were 550 million people affected and 230,000 deaths worldwide [7]. The majority of the risks that lead to illnesses linked to food are not only spread by food, making it challenging to estimate the burden of these illnesses [7].

Approximately 70 percent of cases of diarrhea in nations that are developing are linked to eating tainted food [8]. Because of bad

In both industrialized and developing nations alike, foodborne

hygiene, a lack of drinking water, contaminated and inappropriate food storage equipment, and a lack of food safety education, foodborne illnesses are more frequent in developing countries [9]. Additionally, Foodborne illness outbreaks are particularly serious in nations with low incomes because of poor sanitation, a lack of food safety regulations, weak regulatory frameworks, contaminated raw food, improper cooking, abused temperature, insufficient storage facilities, poor personal hygiene, improper handling techniques, and cross-contamination of cooked food with uncooked raw food [10].

Potential Public health is a concern when foodborne illness occurs in places where there are lots of people because outbreaks could affect lots of people all at once [11]. To prevent cross-contamination and safeguard customers from illnesses resulting from foodborne contaminants, staff handling food are expected to practice excellent hygiene [12]. Foodborne illness is frequently caused by poor personal hygiene, so it is clear that food handlers' knowledge and handling techniques need to be improved [13]. In 2017 and 2019, for instance, there were foodborne outbreaks that resulted in 46 cases and 3 fatalities, [14]. During 2019, the Kenya Health information system reported an aflatoxicosis outbreak in Embu which left 35 admissions from Moi high school Mbiruri following consumption of aflatoxins contaminated porridge. The institutions are at high risk of foodborne diseases due to the high number of students population that require mass catering which has inherent risk linked with bulk handling of food and other associated factors. There aren't many studies on the state of eating places and drinking establishments in Kenya. The research gaps included lack of information, paucity of data and scarce studies. As a result, the purpose of this study was to evaluate the determinants of compliance with food hygiene and safety practices among food handlers in boarding schools in Embu County, Kenya.

2. Materials and Method

2.1 Study Design

The current study used an analytical cross-sectional study design to determine the association between determinants of compliance with food hygiene and safety practices.

2.2 Study Area

The research was conducted at Embu County in Kenya among food handlers from December 2022 to May 2023. The research was carried out in boarding schools both primary and secondary located in Embu County.

2.3 Study Population

The study population was made up of food handlers who agreed to take part and who worked in Embu County boarding primary and secondary schools that satisfied the inclusion requirements.

2.4 Sample Size Determination

For determining the sample size for the study, the Magnani formula has been advocated as the best approach [15]. The study recruited 84 food handlers from different primary and secondary boarding

schools.

2.5 Sampling Technique

Because there has been an increase in the frequency of foodborne illnesses linked to a disregard for food hygiene and safety practices, Embu County was specifically chosen for this study. Multistage sampling and purposive sampling techniques were used, thus Embu County was purposefully selected since there had been an increased incidence of food borne illness related to non-compliance to food hygiene and safety practices. In 2017 and 2019, for instance, there were foodborne outbreaks that resulted in 46 cases and 3 fatalities, [14].

2.6 Data Collection Tools and Procedures

A structured questionnaire was employed to capture the quantitative data of this study. An observation checklist was used to obtain information on the extent of compliance with food safety and hygiene standards as stipulated by the Public Health Act of 2012. Section A of the data collected captured socio-economic information including age, gender, income level, marital status, and level of education of food handlers. Section B of the data collected captured information on determinants of food safety and hygiene practices. The check list included constructs on personal hygiene, environmental hygiene, and availability of resources. An observation checklist was used to obtain information on the extent of compliance with food safety and hygiene standards as stipulated by the public health Act of 2012. Information on the sanitary conditions of food premises and equipment, personal hygiene of food handlers as well as food handling practices was collected through direct observation.

2.7 The Response Rate

The study aimed at interviewing a sample of 84 and 82 of them gave their full cooperation during data collection period, yielding a response rate of 97.61%.

2.8 Statistical Analysis

Data from food handlers was gathered, and it was transformed into frequency and percentage. Data analysis was conducted using STATA version 17. The responses on each of the variables used to measure compliance were added up to create composite scores. Overall compliance (dependent variable) was dichotomized with a compliance score of greater than 68% classified as satisfactory (coded 1) otherwise coded 0. This cut-off was chosen to be consistent with other studies [16]. To determine the factors (determinants) associated with compliance with food hygiene and safety practices a multiple linear regression model was utilized for data analysis. Statistical significance was set at a p-value equal to or less than 0.05.

2.9 Ethical Consideration

The MKU Institutional and Ethical Review Committee (MKU/ISERC/2386) provided the study with ethical approval and all methods were performed in accordance with the relevant guidelines and regulations. by including a statement in the methods

section to this effect, and the National Commission for Science, Technology, and Innovation (NACOSTI/P/22/20949) granted permission to conduct the study. Written informed consent was used to obtain the subjects' voluntary consent to participate in the study, and participant confidentiality was protected by withholding any information that could be used to identify them, such as their names.

3. Results

3.1 Status of Compliance with Food Hygiene and Safety Practices

The study sought to evaluate the level of adherence to food hygiene and safety practices among food handlers in boarding schools within Embu County, Kenya. This was assessed in three categories: compliance by person (food handler), food premise, and environmental hygiene measures. Overall compliance was obtained as an average of the scores for each of the three measures of compliance. The scores for each of the three measures (person or the food handler, food premise, and the environment) were obtained by summing the scores for each individual and dividing

by the total expected score. The overall status of compliance with hygiene measures was rated at 74%. Overall compliance with personal hygiene measures was rated at 70%. Overall compliance to hygiene measures in relation to the premise was rated at 69%, while overall compliance to environmental hygiene measures was rated at 77%.

3.2 Bivariate Logistic Regression Analysis on Sociodemographic Factors Associated with Compliance with Food Hygiene Measures

As indicated in Table 1, sociodemographic factors associated with compliance with food hygiene and safety measures included sex (male), age (those aged 21-30 years old), work experience, monthly income, and previous participation in food safety training. Sociodemographic characteristics that were significant in the bivariate model were included in the full model (multivariate) which also included inspection by public health officials, institutional supervision, availability of protective gear and knowledge, attitudes, and practice scores.

Variables	Odds Ratio	95% CI	p-value
<i>Sex</i>			
Female	Ref		
Male	3.67	2.13-6.32	<0.001
<i>Age (in years)</i>			
51+	Ref		
41-50	1.52	0.77-2.99	0.225
31-40	1.09	0.55-2.18	0.802
21-30	3.43	1.20-9.80	0.021
<i>Marital Status</i>			
Ever married	Ref		
Single	0.91	0.46-1.77	0.808
<i>Education level</i>			
No formal education	Ref		
Primary	0.76	0.09-6.67	0.804
Secondary	1.05	0.12-9.43	0.967
Vocational/tertiary	1.48	0.14-15.38	0.743
<i>Work experience (in years)</i>			
1-9	Ref		
10-19	2.72	1.28-5.79	0.009
20+	0.95	0.48-1.90	0.891
<i>Monthly Income (in USD)</i>			
0-100	Ref		
100+	4.55	2.30-8.97	<0.001
Ever had a food safety training program	3.54	2.00-6.27	<0.001

Table 1: Bivariate Analysis on Sociodemographic Factors Associated With Compliance with Food Hygiene Measures

3.3 Multivariate Analysis on Sociodemographic Factors Associated with Compliance with Food Hygiene Measures

As indicated in Table 2, In the multivariate analysis, factors associated with compliance included sex, age, those who had previously had training on food safety, monthly income, regular inspection by public health officials, and practice scores. Specifically, male food handlers were twice times more likely to comply with food hygiene measures compared to their female counterparts (Odds Ratio (OR)=2.2, 95% CI:1.1-4.6, p=0.028). Those aged 41-50 years old (OR=2.7, 95% CI:1.1-6.4, p=0.023) and those aged 21-30 years old (OR=6.0, 95% CI:1.7-20.7, p=0.005) had higher odds of being compliant compared to those aged 51 years or older. Those who earned USD 100 or more every month were 3 times more likely compared to those who earned less

than USD 100 monthly (OR=3.0, 95% CI:1.2-7.3, p=0.015) and also those who had previously had food safety training were twice more likely to comply compared to those who had never had such a training (OR=2.0, 95% CI:1.0-4.0, p=0.046). Regular inspection by public health officials was also significantly associated with compliance with those who were regularly supervised being 1.7 times more likely to comply (OR=1.7, 95% CI:1.2-2.3, p=0.001). On KAP, only practices score was most significant with those with higher safety measures practice scores being slightly more likely to be compliant (OR=1.1, 95% CI:1.0-1.1, p=0.001). In the multivariate model, education, marital status, and work experience were not associated with compliance with food hygiene and safety measures.

Variables	Odds Ratio	95% CI	p-value
Sex			
Female	Ref		
Male	2.24	1.09-4.61	0.028
Age (in years)			
51+	Ref		
41-50	2.72	1.15-6.42	0.023
31-40	2.12	0.79-5.69	0.135
21-30	5.97	1.72-20.68	0.005
Work experience (in years)			
1-9	Ref		
10-19	2.26	0.93-5.49	0.072
20+	0.46	0.17-1.21	0.116
Monthly Income (in USD)			
0-100	Ref		
100+	3.00	1.24-7.27	0.015
Ever had a food safety training program	1.96	1.01-3.98	0.046
Availability of protective gear	1.33	0.95-1.86	0.098
Regular inspection by public health officials	1.67	1.22-2.28	0.001
Regular institutional supervision by employer	0.90	0.58-1.41	0.656
Knowledge score	1.03	0.99-1.07	0.124
Attitudes score	0.98	0.96-1.01	0.149
Practices score	1.03	1.01-1.06	0.006

Table 2: Multivariate Logistic Regression Analysis on Sociodemographic Factors Associated with Compliance with Food Hygiene Measures

4. Discussion

Compliance with food hygiene and safety standards reduces the cases of foodborne illness and can be achieved through a multisector approach and engaging relevant stakeholders [17]. The Food, Drugs, and Chemical Substances Act of 2009, in Kenya, has set out the regulations to ensure food hygiene and safety [18]. These include but are not limited to the personal hygiene of food handlers, the premises, and the environment. Another study by

revealed that food service outlets (premises) were projected to manage upcoming and emerging concerns of barriers to compliance with food hygiene and safety standards [19]. Previous training on food safety increased the odds of complying with food hygiene measures. These findings were consistent with another study conducted in Kenya [7]. A crucial part of ensuring adherence to food hygiene regulations is food safety training. It provides people and organizations with the knowledge and abilities necessary to

prevent foodborne illnesses, uphold hygienic standards, and abide by food safety laws, ultimately protecting the general public's health and the standing of restaurants. Regular inspection by public health officials increased the odds of complying with food hygiene measures. Findings from this survey were concurrent with another study carried out in Zambia [20]. Regular inspection is essential for ensuring adherence to food hygiene regulations and maintaining industry-wide standards for food safety. Regulatory agencies, health departments, or internal quality control teams frequently conduct these inspections. They support the identification, prevention, and correction of problems with food safety, ultimately preserving the integrity of the food facility and protecting public health.

From this research, food handlers who earned USD 100 or more every month were 3 times more likely to comply with food hygiene measures compared to those who earned less than USD 100 monthly. These findings were consistent with another study conducted in Ethiopia where a good income was found to increase the odds of complying with food hygiene measures [21]. The amount of money food handlers make can have a variety of effects on how closely they adhere to food hygiene regulations. Although income may not be the only factor in determining compliance, it can have a big impact on how people behave and think about food safety. A higher income translates into easier access to resources for food preparation, inspection, cooking, and service, better access to education and training, and better working conditions. According to study findings, male food handlers were twice as likely to comply with food hygiene measures compared to their female counterparts. These findings were consistent with another study conducted in Ethiopia where male food handlers were found to comply with food hygiene measures as compared to their female counterparts [21]. This might be due to other factors such as educational status and work role which could predict compliance with food safety practices.

5. Conclusion

Results showed that in the multivariate analysis, education, marital status, and work experience were not associated with compliance with food hygiene and safety measures while the presence of previous training on food safety, presence of regular inspection of food premises, age, gender, and income level were found to be significantly associated with compliance with food hygiene and safety measures [22].

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Statements and Declarations

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Conflict of Interest: The authors have no competing interests to declare that are relevant to the content of this article.

Ethical Approval: The study was approved by the Institutional Ethics Committee.

Data Availability Statement: The datasets generated and/or

analysed during the current study are not publicly available due to ethical reasons but are available from the corresponding author on reasonable request.

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