

## Relationships between Knowledge, Sanitation and Hygiene of Food Handlers, and Food Safety in the Restaurants in Pasir Panjang, Kupang, East Nusa Tenggara, Indonesia

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### ABSTRACT

**Background:** The hygiene factor of the food handler or manager, commonly called personal hygiene, is a very important procedure in maintaining the cleanliness of safe and healthy food management. Hygiene procedures are clean behaviors to prevent contamination of the managed food. This study aimed to determine sanitation hygiene behavior based on food handlers' knowledge on food safety at restaurants in the working area of the Pasir Panjang Puskesmas (Community Health Center).

**Subjects and Method:** A cross-sectional study were conducted in the working are of Pasir Panjang Health center, Kupang, East Nusa Tenggara in December, 2022. A total of 47 restaurants were selected for this study. The dependent variable was food safety. The independent variables were the knowledge and sanitizing hygiene attitude of the handler. The data were collected using questionnaires, and analyzed using Chi-square.

**Results:** There is a significant relationship between knowledge ( $p < 0.001$ ) and behavior ( $p < 0.001$ ) with food handler hygiene and food safety.

**Conclusion:** knowledge and behavior were associated with food handler hygiene and food safety.

**Keywords:** knowledge, behavior, food handlers, food sanitation hygiene.

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### BACKGROUND

In accordance with the Decree of the Minister of Health of the Republic of Indonesia Number. 715/ MENKES/ SK/ V/ 2003, food sanitation hygiene is an effort to control all possibilities ranging from food

ingredients, food handlers, the environment or place and equipment that has the potential to be an agent in the spread of diseases or health disorders. Improper food handling plays a significant role in the occurrence of foodborne illness. There are

often violations in poor food handling practices in restaurants.

Food safety is a condition and effort needed to prevent food from possible biological, chemical, and other contamination that can interfere, harm, and imperil human health and does not conflict with people's religion, beliefs, and culture so that it is safe for consumption. Food can be contaminated from the process of production to consumption. Food producers, shippers, food processing workers, distributors, and handlers have a responsibility in ensuring food safety (Chekol et al., 2019).

Government Regulation Number. 28 of 2004, food consumed must be of high quality and meet food safety criteria. Consumption of harmful foods can result in food poisoning. Food poisoning occurs when disease-carrying bacteria or pathogens contaminate food or drinks, causing illness. Pathogens can stick to the hands, wounds, mouth, skin, or hair of food handlers, causing foodborne diseases such as Hepatitis A and various viruses (*Salmonella typhi*, *Staphylococcus aureus*, *Shigella* species, and other bacteria (Khairina et al., 2018).

The Attack Rate (AR) of cases of Extraordinary Events (KLB) of food poisoning in Indonesia in 2017 was 2041 cases or 38.56% and the highest cause of cases came from microbiological contamination of 45.28% (Mustika, 2019). The hygiene factor of the handler or food manager, commonly called personal hygiene, is a very important procedure in maintaining the cleanliness of safe and healthy food management. Hygiene procedure is a clean behavior to prevent contamination of the food managed.

Efforts from food hygiene and sanitation basically include people handling food, food handling sites, food processing equipment, food storage, and food serving

(Brutu, 2022). Based on the results of research from Brutu (2022), the knowledge of food processor workers is relatively good, however observing from the behavior of food processing workers, they still do not pay attention to the hygiene. The study concludes that good food safety knowledge will determine good food management behavior.

Based on the background elaborated above, researchers were interested in conducting a study on the association of knowledge and hygiene behavior of food handlers toward the food safety of restaurants in Pasir Panjang health center working area in 2022. The study aims determine sanitation hygiene behavior based on food handlers' knowledge of food safety at restaurants in the work area of the Pasir Panjang health center.

## SUBJECTS AND METHOD

### 1. Study Design

A cross-sectional study were conducted in the working area of Pasir Panjang health center, East Nusa Tenggara in December 2022.

### 2. Population and Sample

The population in this study was all restaurants in the working area of the Pasir Panjang Health Center. There were 47 restaurants selected in total sampling.

### 3. Study Variables

The dependent variable was food safety. The independent variables were the knowledge and sanitizing hygiene attitude of the handler.

### 4. Operational Definition of Variables

**Knowledge** was the result of knowing that can be obtained from the learning process and experience about food processing safety. The measuring instrument used was questionnaires.

**The sanitation hygiene behavior of food handlers** was an attempt to control

factors of food, people, places, and equipment that can or may cause disease or health problems. The measuring instrument used was questionnaires.

**Food safety** was a value that describes the eligibility of food to be consumed, which is the result of observations on the selection and storage of foodstuffs, hygiene of handlers, processing, and distribution of food, measurements are carried out by observation to the production site using a food safety score form.

### 5. Study Instruments

The data used consisted of primary and secondary data. The primary data were obtained from respondents' direct information including knowledge and hygiene behavior of food processing workers. Data on knowledge were obtained by interviewing subjects using questionnaires, while behavioral data were obtained by conducting direct observation toward the respondents.

### 6. Data Analysis

**Table 1. Distribution of Respondent Frequency by Gender, Age, Education and Nutrition.**

Characteristics	Categories	Frequency (n)	Percentage (%)
<b>Gender</b>	Male	8	16.66
	Female	39	83.33
<b>Age</b>	Adult (18 – 60 Thn)	47	100
	Elderly (> 60 Thn)	0	0
<b>Education</b>	Primary School	4	8.33
	Secondary School	2	4.16
	High School	39	83.33
<b>Training</b>	Ever	2	4.16
	Never	45	95.83

Based on table 2, it can be seen that the food safety category eligible were 29 restaurants (61.7%), while respondents with an excellent knowledge were 19 people (40.4%), sufficient knowledge were 14 people (29.8 %), poor knowledge were 14

Univariate analysis was performed to describe each variable, both independent variables and dependent variable, and subjects' characteristics. Bivariate analysis was performed to test the relationship of the independent variables and dependent variable using the chi square statistical test.

## RESULTS

### 1. Sample Characteristic

Table 1 showed that indicated that most subjects were female, which was 39 people (83.33%). The distribution of respondents by age group showed that all respondents belonged to the adult age group, which was 47 people (100%). The distribution of subjects by education level showed that most respondents had a high school education level of 39 people (83.33%). The distribution of respondents based on training obtained showed that only 2 people (4.16%) who attended the training.

people (29.8%), and respondents with excellent sanitation hygiene behavior were 14 people (29.8%), subjects with sufficient sanitation hygiene behavior 19 people (40.4 %), respondents with poor sanitation hygiene behavior were 14 people (29.8 %).

**Table 2. Sample Frequency Distribution Based on Knowledge, Sanitation Hygiene Behavior, and Food Safety Score**

Variables	Categories	Frequency (n)	Percentage (%)
<b>Knowledge</b>	Excellent	19	40.4
	Sufficient	14	29.8
	Poor	14	29.8
<b>Sanitation Hygiene Behavior</b>	Good	14	29.8
	Sufficient	19	40.4
	Poor	14	29.8
<b>Food Safety</b>	Eligible	29	61.7
	Ineligible	18	38.3

**2. Bivariate Analysis**

Based on table 3, the results of a bivariate analysis between food handlers' knowledge and food safety showed a significant associ-

ation ( $p < 0.001$ ). The sanitation hygiene behavior of food handlers and food safety also showed a significant association ( $p < 0.001$ ).

**Table 3. The Association of Food Handler Sanitation Hygiene Knowledge and Behavior toward Food Safety**

Variables	Category	Food Safety				p
		Eligible		Ineligible		
		n	%	n	%	
<b>Knowledge</b>	Excellent	19	40.4	0	0	<0.001
	Sufficient	10	21.2	4	8.50	
	Poor	0	0	14	29.7	
<b>Behavior</b>	Excellent	13	27.6	1	2.10	<0.001
	Sufficient	16	30.4	3	6.30	
	Poor	0	0	14	0	

**DISCUSSION**

**The Association of Food Handlers' Knowledge and Food Safety**

Knowledge is the result of human sensing or the result a person's awareness of an object through the senses owned (eyes, nose, ears and so on) (Notoatmojo, 2007). Table 3 presents the results of the bivariate analysis between food handlers' knowledge of food safety which showed a significant association with a p value of  $p < 0.001$ . The results of bivariate analysis between food handlers' sanitation hygiene behavior and food safety also showed a significant association with a p value of  $p < 0.001$ . The results of this study are in line with Mulya-

na's research, 2014 that among 25 well-informed respondents, a total of 17 (68%) people behave hygienically, while among 17 less knowledgeable respondents only 5 (29.4%) who behave hygienically. From these results, people with an excellent knowledge show higher percentage of hygiene behavior than those with less knowledge. A study conducted by Putri et al. (2017) states that respondents also have an excellent knowledge, an excellent knowledge of cross-contamination (81.9%) and time and temperature control (70.85%). However, respondents had poor knowledge of food-borne illness (39.81%)

In line with research by Firdani

(2022) it shows that 65.4% of handlers have good knowledge, compared to 18 food handlers with poor knowledge (34.6%). Lack of knowledge among food handlers regarding cross-contamination is the main cause of food poisoning (46.2) wearing plastic gloves when carrying out food processing activities food processing activities can help reduce the risk of transmitting infection to consumers and staff (25%), storing various types of food in containers the same can help reduce the risk of cross-contamination (19.2%); and wearing masks and head coverings can help reduce the risk of food contamination (19.2%).

The knowledge of processing personnel regarding hygiene and sanitation can affect the application of hygiene and sanitation in food processing to ensure food safety. Inadequate hygiene and sanitation in the production stages can lead to the growth and development of putrefactive and pathogen in food (Brutu, 2022). The results of a study conducted by M.A-Rifat et al. (2022) discovered that knowledge, education, and training in food handling skills were found to be related to good food handler practices. On the other hand, education, training, years of food handling experience, and attitudes are found to be related to food safety knowledge.

The results of this study showed that the knowledge of food handlers in restaurants in the Pasir Panjang Puskesmas Working Area which was included in the category of excellent knowledge was 47 people (61.5%), ineligible as many as 18 restaurants (38.3 %), while respondents with good knowledge as many as 19 people (40.4 %), sufficient knowledge as many as 14 people (29.8 %), less knowledge as many as 14 people (29.8 %). Respondents with the category of good sanitation hygiene behavior were 14 people (29.8 %), sufficient sanitation hygiene behavior as many as 19

people (40.4 %), poor sanitation hygiene behavior as many as 14 people (29.8 %). The study is also in line with a study conducted by (Akabanda et al., 2017) that food handlers have knowledge of hygiene practices, cleaning and sanitation procedures. Almost all food handlers are aware of the important role of common sanitation practices in the workplace, such as handwashing (98.7% correct answers), use of gloves (77.9%), proper cleaning of tools/equipment (86.4%) and the use of detergents (72.8%).

Based on the results of interviews and analysis, most handlers were included in the category of excellent knowledge. It was because the educational background of most handlers in restaurants was high school / vocational high school. This food sanitation hygiene knowledge can be influenced by the working period of food the handlers or the trainings they obtained from the restaurant owners. The addition of knowledge can be obtained through courses, trainings, reinvigoration on sanitation and personal hygiene, since what is required are skills. Food handler knowledge is influenced by working experience whereas handler practice is influenced by trainings obtained by food handlers thus increasing a positive attitude when handling food.

### **The Association of Food Handlers' Behavior and Food Safety**

The behavior of food handlers is the result of a classification of the actions and knowledge of food handlers. Behavior based on knowledge will last longer than behavior that is not based on knowledge While attitude will determine a person's behavior. If one's attitude is positive on something then the person will have good behavior, on the contrary if one's attitude is negative on something then the person will have bad behavior as well. Personal hygiene behavior is caused by various factors, namely predis-

position factors (knowledge and attitudes), supporting factors (training), and motivating factors (supervision) (Notoatmodjo, S. 2010). The behavior of food handlers is said to be "good" when the actions and knowledge of both are in the excellent category. Behavior is said to be "bad" when one and both are in the poor category.

The behavior of a food handler includes two essential components, namely action and knowledge. What is meant by the actions of the handler are the behaviors demonstrated by the handler, such as the habits that are often carried out while handling food. Whereas the knowledge of food handlers is how far the food handler's ability is in understanding the food sanitation hygiene and how and what actions must be acquired by food handlers. The behavior of food handlers is said to be "good" when the actions and knowledge of both are in an excellent category. Behavior is said to be "bad" when one and both are in the poor category.

The behavior of the food handler includes two components, namely the actions and knowledge of the handler. What is meant by the actions of the handler are the behaviors demonstrated by the handler, such as the habits that are often carried out while handling food. Whereas the knowledge of food handlers is how far the food handler's ability is in understanding the food sanitation hygiene and how and what actions must be acquired by food handlers (Trugunarjo, 2020).

According to the Regulation of the Minister of Health of the Republic of Indonesia No. 1096 / Menkes / PER / VI / 2011, individual circumstances should be considered by food handlers in term of food processing personnel, to prevent the diseases transmission and pathogenic microbial contamination through food are, among others, not smoking, not eating and chew-

ing, not wearing jewelry except undecorated wedding rings (plain), always washing hands before work, after work, and after using the toilet, always wear clean work-clothes and protective clothing properly and that are not worn outside the workplace and do not talk much and use a mouth covering (mask) during food processing (Mulyani, 2014).

According to a study by Firdani (2022) A correlation between hygiene and sanitation training with hygiene and food sanitation behaviors can be concluded that there is a association between hygiene and sanitation training and food hygiene and sanitation behaviors. One of the biggest ways to avoid foodborne illness is to educate food workers about food safety. It is possible to improve the quality and safety of food hygiene in the campus cafeteria by teaching food handlers using materials that emphasize food safety. Therefore, it is very important that food handlers should obtain trainings on regular basis.

From Table 2, it is discovered that excellent sanitation hygiene behavior was only 29. 8% and poor sanitation hygiene behavior was also 29.8%. These results show that the sanitation hygiene behavior of food handlers in serving and preparing meals was still insufficient. This study is in line with that previously conducted by Akabanda et al. (2017), that majority (61. 7%) of food handlers do not wear aprons or wear masks only when necessary. In addition, they eat and drink during working hours. On the use of sanitizers, 61. 7% report that they do not use sanitizer in washing the utensils such as dishes, mugs, and spoons. All respondents do not use sanitizer when washing fruits or vegetables. About 83. 8% of food handlers prepare food in advance. Only 17% of respondents reported that they pay attention to the shelf life of food as they taking the food.

## **The Association of Training and Sanitation Hygiene Behavior of Food Handlers**

From the results of study in Table 1, the percentage of food handlers who have obtained training was 4. 16% of 47 respondents. It indicates that the majority of food handlers from the total respondents have not obtained training related to food safety. A study conducted by Lee et al. (2017), reveals that educational levels, work experience, and safe food handling courses have different levels of impact on food safety knowledge and attitudes of food handlers.

It is interesting to note that those who did not obtained formal education performed better than those who obtained primary education. On the other hand, food handlers who have more work experience in the food service industry have better overall food safety knowledge (more than 6 years > 5-6 years > 2-4 years ≥ 2 years, than food handlers with less experience. From the questionnaire, it was discovered that although safe food handling courses did not significantly improve food safety knowledge, those who had taken the course performed slightly better than those who had not taken the course. Most importantly, safe food handling courses have a significant positive impact on attitudes towards food safety (Lee et al., 2017),

Knowledge of food safety does not indicate positive behavior towards food safety/hygiene practices. This suggests that food handlers may not necessarily practice strict food safety procedures during food handling, even when they indicated that they were knowledgeable in surveys. Therefore, other factors such as employees' continuous motivation and education and training are compulsory to be provided at work place to inspire food handlers, which will influence the attitudes and subsequently

food safety practices (Akabanda et al., 2017).

Several matters to be concerned by the food handlers are that before doing the work, they should always wash hands using soap with clean running water, use a mask, disposable plastic gloves, head coverings, and an apron. Efforts to improve sanitation hygiene behavior among food handlers in restaurants are by supervising, empowering, and conducting counseling and training on food safety so that the quality of human resources continues to be optimized and it becomes a good habit overtime. According to Ababio et al. (2015), Good Hygiene Practices training in the form of power point presentations, video presentations on "Safer Food Better Business", and effective handwashing demonstrations show differences in food handler hygiene practices.

Community health center serves as an agency in the effort to improve personal hygiene of food handlers and food processing sites. It requires a socialization about sanitation hygiene to be further improved. As a community, it is expected to be able to increase public knowledge and sensitivity to pay more attention to hygiene and personal hygiene in food.

### **AUTHOR CONTRIBUTION**

Yohanes K. Tokan as principal author that selected topics, collected data, data analysis, and write the manuscripts. Yeni W. Astutik, Adrianus Samba, Fany A. Djubida, Dorthea I. Lakahena, Sertulus L. Mali, Eka M.Rahmawati, Marylin S. Junias provide input to the main researcher in data collection and manuscript writing.

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This study is self-funded.

## CONFLICT OF INTEREST

There is no conflict of interest in this study.

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