

# Do Nutrition-related Knowledge and Attitudes Impact Food Handlers' Practices in the COVID-19 Pandemic? A Case Study in Banyumas, Indonesia

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## ABSTRACT

**Objective.** Knowledge, attitudes, and practices about nutrition and hygiene sanitation in food handlers are important to provide good quality snacks for school children. The objectives of this study were to analyze the relationship between knowledge and attitudes toward nutrition with hygiene sanitation practices of food handlers around elementary schools in Banyumas, Indonesia.

**Methods.** This cross-sectional study was conducted among 150 food handlers representing urban and rural areas. The sampling method used was multistage sampling. Data on demographics, knowledge, attitudes, and practices were collected by a structured questionnaire and thorough interview with the subject.

**Results.** The study showed that out of the 150 subjects, 50.7% reported good nutritional knowledge, 82.7% reported good nutritional attitudes, and 75.3% reported good hygiene practices. The results showed that there was a relationship between knowledge, and attitudes, and attitudes and practices of food handlers ( $p < 0.05$ ) using the Spearman correlation test. There was no relationship between knowledge and practice of the subject ( $p > 0.05$ ).

**Conclusion.** There was a relationship between knowledge and attitude and between attitude and practice among food handlers. Continuous nutrition education and training should be organized to strengthen food handlers' knowledge, attitudes, and practices in areas that seem to be lacking.

*Keywords: attitude, food handler, knowledge, nutrition, practice, food hygiene, sanitation*

## INTRODUCTION

The school-age period encompasses the ages 6–12. At this time, the body requires good nutrition for optimal growth and cognitive development. Balanced nutrition for school-age children can be met by eating a variety of foods. Therefore, children need varied sources of macronutrients such as protein, carbohydrates, and fats, and sources of micronutrients such as minerals and vitamins. A well-chosen food can meet the nutritional needs for optimal body function. On the other hand, if children's food is not chosen properly, they are at risk of nutritional deficiencies.<sup>1</sup>

Street food has been developing rapidly in Indonesia recently. They are easy to find and meet the tastes of all ages, especially school-age children. Street foods in Indonesia are very common, are usually located near schools, and are accessible and consumed by most school children. The role of street food is also strategic because it can contribute to



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the daily nutritional intake of school children. However, some of these foods are unhygienic, which might cause health problems when consumed.

School-age children are the main consumers of street food snacks, but they often do not pay attention to safety and hygiene.<sup>2</sup> Children tend to buy and eat whatever snacks they like. Unhealthy snack habits for school children are a huge problem, especially when unsafe and unhygienic snacks are involved.<sup>1</sup> Around 72.5% of students choose snacks because of their good taste, 50% of students like chocolate-colored snacks, and as many as 87.5% of students like to consume various flavored sachet drinks.<sup>3</sup> Food handlers play a vital role in food safety and hygiene. A food handler is someone who touches food at any point from preparing, processing, storing, and distributing, to serving food.<sup>4</sup> Therefore, they should know about nutrition and hygiene to ensure the quality of their food.<sup>5</sup>

In Indonesia, most canteens or vendors do not meet health requirements. Missteps include food vendors failing hygiene and sanitation standards, and food handlers lacking in personal hygiene.<sup>6-8</sup>

Those previous studies were, however, conducted before the COVID-19 pandemic. Only one other study was conducted during the pandemic.<sup>9</sup> They found that despite heightened health awareness during the pandemic, 73.8% of food handlers did not meet the minimum hygiene requirements.

This study differs in a few aspects. The previous study aimed to analyze hygiene sanitation practices among workers in catering services. Catering services tend to serve a broad range of ages and tend to prepare food in a household setting. Meanwhile, this study focused on street food vendors located around elementary schools, which target school-age children and are more likely to be exposed to crowds and dusty roadside settings. We chose this setting as elementary school children may lack awareness about health and hygiene, and are heavily dependent on the food handlers' practices as responsible adults.

Food handlers' level of knowledge affects their personal hygiene and food hygiene practices from preparation to serving the consumers.<sup>10,11</sup> Economic limitations also cause food handlers – especially transient ones – to ignore the principles of food hygiene and sanitation.<sup>12</sup> There is also a relationship between monthly income and knowledge of food safety. Food handlers with a higher economic level have better knowledge than those with a lower economic level.<sup>13</sup> These considerations have encouraged us to research the relationship of knowledge and attitudes about nutrition to the practice of hygiene and sanitation of food handlers around elementary schools in Banyumas, Indonesia.

## METHODS

This study used a cross-sectional study design. The research was carried out in Banyumas Regency, Indonesia,

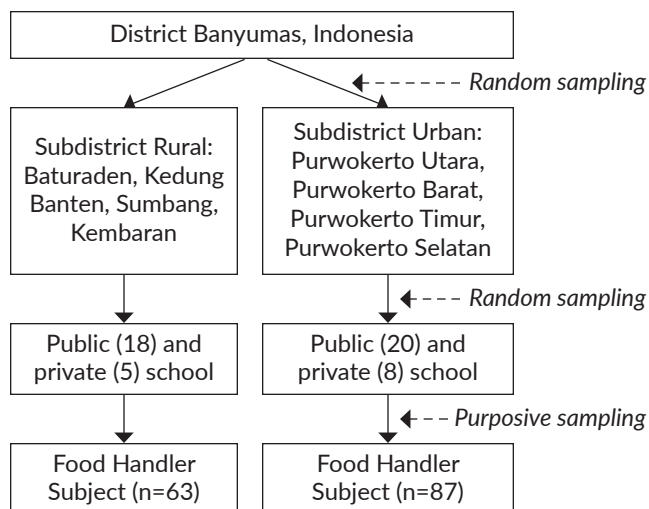


Figure 1. The process of selecting subjects for the study.

from August to November 2020. Ethical approval was obtained from the Research Ethics Commission, Faculty of Health Sciences, Jenderal Soedirman University (number 177/EC/KEPK/IX/2020).

The subjects of this research were food handlers around elementary schools in Banyumas Regency, Indonesia. A multistage sampling technique was used to select the subjects. The strategy for selecting primary schools was cluster sampling, specifically by selecting food handlers based on the distribution of primary schools in urban and rural areas. The subjects were included if they were 1) physically healthy, 2) food vendors near an elementary school (maximum distance 500 m), and 3) willing to participate. Subjects who did not fill out the research questionnaire completely were excluded (Figure 1). Based on the inclusion and exclusion criteria, 150 subjects participated in this study. Strict health protocols due to the COVID-19 pandemic were applied during data collection.

The data were obtained by direct interview using a questionnaire (Appendix). The questionnaire fulfilled the validity and reliability test requirements. All question items for knowledge, attitudes, and practice were valid content (using correlation test with  $r_{count} > r_{table}$ ). Meanwhile, the reliability tests (using reliability analysis with Cronbach's Alpha  $> r_{table}$ ) for the respective questionnaires were 0.641; 0.506; and 0.711. The questionnaire collected demographic data such as age, gender, education, income, and participation in training. Data were also collected on nutrition-related knowledge and attitudes, and sanitation and hygiene practices.

The collected data were then analyzed through univariate and bivariate analysis. Subject characteristics, knowledge categories, attitudes, and practices were analyzed descriptively. The categories for knowledge, attitudes, and practice were processed by adding up the correct scores from the subject's answers to the questionnaire. Values were displayed as percentages. The category was rated as good if the score was

>80%, moderate if the score was 60–80%, and poor if the score was <60%. In addition, the Spearman correlation test was performed to determine the relationship between variables.

## RESULTS

### Characteristic of the Subject

Most of our subjects (52.7%) were female. A total of 38.9% of the food handlers had achieved a senior high school educational level (Table 1). A total of 78% of the subjects had a monthly income lower than 2 million rupiah (IDR). Only 3.3% of subjects reported having participated in food safety and hygiene training.

### Knowledge

Around 50.7% of food handlers reported good knowledge of nutrition (Figure 2).

### Attitude

Most food handlers reported a good attitude toward nutrition and hygiene (82.7%) (Figure 3). They agreed to the importance of activities like washing their hands before handling the food, using clean water to process the food, separating the raw material and cooked food, and other similar questions. Almost all believed that their attitude in handling food can influence food safety.

### Practices

Most of the respondents reported good practices in hygiene behaviors (75.3%) such as washing hands before handling the food, cleaning areas where food is served, keeping tools clean, and wearing clean clothes (Figure 4). Most of the respondents believe that food handler sanitation and hygiene practices had an impact on food safety and hygiene.

There was a positive correlation between knowledge and attitude, and between attitude and practice of the respondents ( $p < 0.05$ ). There was no correlation between knowledge and practice ( $p > 0.05$ ) (Table 2). These results indicate that a higher level of knowledge regarding food hygiene and nutrition significantly correlated with a higher level of attitude among food handlers.

**Table 1.** Characteristic of the Subject

Variables	n	%
<b>Gender</b>		
Male	71	47.3
Female	79	52.7
<b>Age (Years)</b>		
18–29	32	21.3
30–39	42	28.0
40–50	50	33.3
>50	26	17.3
<b>Background Education Level</b>		
Elementary School	50	33.4
Junior High School	36	24.2
Senior High School	58	38.9
Higher Education	5	3.4
<b>Income Level (million IDR)</b>		
<2	117	78.0
2–5	30	20.0
>5	3	2.0
<b>Participation in food safety and hygiene training</b>		
Yes	5	3.3
No	145	96.7

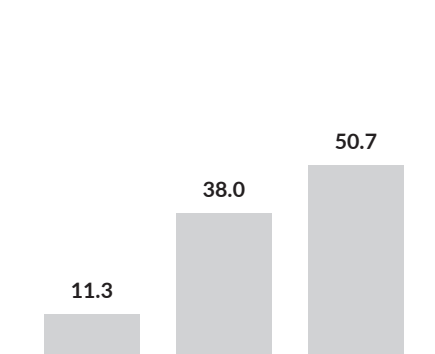
**Table 2.** Correlation among Food Handler’s Knowledge, Attitudes, and Practices

Variables	r	p-value
Knowledge-attitude	0.305	0.000*
Knowledge-practice	0.133	0.105
Attitude-practice	0.253	0.002*

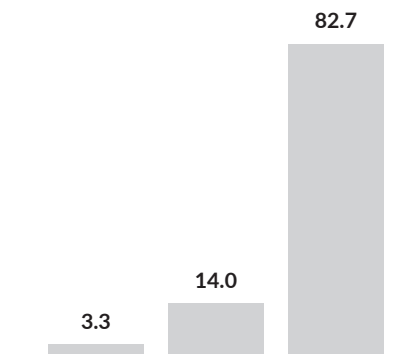
\* $p < 0.05$

## DISCUSSION

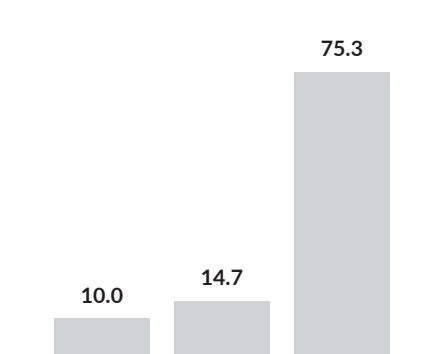
We found that there was a relationship between knowledge and attitudes ( $p < 0.05$ ) and no relationship between knowledge and practice of the subject ( $p > 0.05$ ). Similar findings were also found among food handlers in Yogyakarta and university students in Ankara which showed that better practice is associated with positive attitudes, and not with the level of knowledge.<sup>14,15</sup> Food handlers in Jakarta seem to be unique in reporting a positive association between knowledge, attitudes, and practices.<sup>2</sup>



**Figure 2.** Food Handlers Knowledge (%).



**Figure 3.** Food Handlers Attitude (%).



**Figure 4.** Food Handlers Practice (%).

A higher level of knowledge is theorized to precede better attitudes and practices and is also influenced by training, educational level, and age.<sup>2</sup> Most food handlers do not receive training on nutrition, food hygiene, and food-borne illnesses.<sup>2,16,17</sup> It is recommended that training be supported and monitored by the local government.<sup>17</sup> Older more experienced food handlers acknowledge the importance of maintaining hygiene and sanitation for their business.<sup>14,18</sup>

Attitude is one of the key elements that influence food safety.<sup>19,20</sup> Most food handlers in our study had good hygiene-sanitation attitudes (82.7%), higher than the rates in studies conducted in Ghana (58.2%) and Ethiopia (69.5%).<sup>19,20</sup>

Besides those mentioned, there are several other recommendations in the literature that may improve food handlers' hygiene practices: the use of modern tools,<sup>20</sup> certification of food handlers by a regulatory authority,<sup>19</sup> and education on risk factors and consequences of food-borne illnesses.<sup>21</sup>

Cultural differences may influence behavior; the optimist bias can skew reports of food safety practices as this behavior is observed by and can affect other people.<sup>21</sup> However, food handlers tend to overreport and overestimate socially desirable behaviors, causing differences between self-reported and observed practices.<sup>13</sup>

Poor knowledge can still be a limiting factor. For example, in the current study, food handlers stated that handwashing with soap is sufficient to avoid contamination, in contrast to local legislation which states hand sanitation should be completed by antiseptic liquid soap. This misunderstanding shows poor awareness of good handling procedures in food safety.<sup>22</sup> Differences in study settings, populations, and socio-demographics may also cause diverging results.<sup>19</sup>

Around 10% of food handlers reported poor hygiene and sanitation practices. While literature shows that most food handlers report good practices, they lack proper methods such as the use of towels, water, and the correct type of hand soap.<sup>23</sup> From these results, it is necessary to periodically monitor actual practice. The Total Aerobic Bacterial Count can also be used as an indicator of food contamination.<sup>24</sup>

The result showed that there was a correlation between knowledge to attitude and between attitude to practice but there was no correlation between knowledge to practice.

Unfortunately, the study could not explore more about the influencing factors of knowledge processing into practice such as socioeconomic and cultural differences and environment. The study also relied on self-reported rather than observed practices, potentially skewing the results towards socially acceptable behaviors.

## CONCLUSION

There was a significant correlation between knowledge and attitudes and between attitudes and practices relating to nutrition among street food handlers. We encourage continuing nutrition and hygiene education for food handlers

in an effort to increase knowledge, improve attitudes, and improve practices to produce safer and higher quality food.

## Statement of Authorship

All authors certified fulfillment of ICMJE authorship criteria.

## Author Disclosure

All authors declared no conflicts of interest.

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**APPENDIX**

Questionnaire code

**QUESTIONNAIRE**

**STUDY OF KNOWLEDGE, ATTITUDES AND PRACTICES OF  
HYGIENE, SANITATION AND NUTRITION OF FOOD HANDLERS  
AROUND PRIMARY SCHOOLS IN BANYUMAS DISTRICT, INDONESIA**

Date of Interview : \_\_\_\_\_  
 Name of School : \_\_\_\_\_  
 Village : \_\_\_\_\_  
 Sub-District : \_\_\_\_\_  
 Name of Enumerator : \_\_\_\_\_  
 Enumerator Phone : \_\_\_\_\_

**DEPARTMENT OF NUTRITION  
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PURWOKERTO**

<b>I. SUBJECT IDENTITY</b>	
A1. Name	
A2. Gender	1. Male 2. Female
A3. Date of Birthday	
A4. Age	_____ years old
A5. Weight	_____ kg
A6. Height	_____ cm
<i>Put a cross (X) on the most appropriate answer</i>	
A7. Educational background	1. Not School 2. Elementary school 3. Junior High School 4. Senior High School 5. Higher Education
A8. Monthly Income	1. <1.000.000 2. 1.000.000 – 2.000.000 3. 2.000.000 – 3.000.000 4. 3.000.000 – 5.000.000 5. 5.000.000 – 7.000.000 6. >7.000.000
A9. Place to sell	1. Cart/basket/motorbike (non-sedentary) 2. Stall/tent (sedentary)
A.11. School's location	1. Rural 2. Urban
A.12. Type of the school	1. Public School 2. Private School

<b>II. NUTRITION KNOWLEDGE</b>		
<i>A. Put a cross (X) on the answer that is most correct in your opinion!</i>		
B1. What is needed to be able to carry out optimal activities such as cooking, shopping, selling, etc. every day?	1. Energy 2. Fat 3. Sweat 4. Sunlight	
B2. What nutrients are a source of energy?	1. Vitamins, minerals, water 2. Carbohydrates, fats, proteins 3. Carbohydrates, Vitamins, Protein 4. Protein, Fat, Vitamins	
B3. Which of the following meal times contributes to daily energy?	1. Breakfast, lunch 2. Breakfast, snacks, lunch, dinner 3. Breakfast, snacks/snacks, lunch 4. Lunch, dinner	
B4. Which is a source of carbohydrates from the following types of food?	1. Rice, potatoes, sweet potatoes 2. Spinach, potatoes, carrots 3. Sweet potatoes, corn, oranges 4. Sago, apple, rice	
B5. Nutritious snacks must contain nutrients, such as	1. Carbohydrates, proteins, fats 2. Carbohydrates, proteins, fats, vitamins 3. Carbohydrates, proteins, fats, vitamins & minerals 4. Vitamins & minerals	
B6. The following are the requirements for clean snacks, namely:	1. Wrapped tightly and neatly 2. Sold in the open without a lid 3. Sold in dead freezers 4. The surrounding environment is full of flies	
B7. In packaged food, to see whether the food is still fit to be eaten or not, where is it located?	1. Expired date 2. Production code 3. Nutritional value information table 4. Serving suggestions	
B8. On packaged food labels, which section shows information about the nutritional content of the food?	1. Composition 2. Nutritional value information 3. Expiry date 4. BPOM number (Food and Drug Supervisory Agency)	
B9. Which of the following diseases arises from contaminated snacks?	1. Malaria 2. Dengue 3. High blood pressure 4. Diarrhea	
B10. Before eating, what should you do to keep your hands clean?	1. Wash your hands 2. Wash your hands with soap 3. Wash your hands with water 4. Wash your hands with soap in running water	
<i>B. Put a cross (X) on the True/False answer that you think is correct!</i>		
Statement	Correct	Wrong
C1. Energy can be obtained from snacks that contain carbohydrates		
C2. Snacks can supplement energy deficit from meals prepared at home		
C3. Snacks that contain lots of sugar, salt and fat are good		
C4. Snacks that smell rancid should not be eaten		
C5. Littering can cause disease		
C6. Wash your hands before consuming snacks		
C7. Breakfast is not a must		
C8. Snacks made from raw water can cause stomach ache		
C9. Flu and coughs can be caused by dirty snacks		
C10. To find out the ingredients used in snack products, you can look at the nutritional value information on the label		

<b>III. ATTITUDES</b>		
<i>Based on the statements in the following table, put a cross (X) in the Agree/Disagree box that matches your opinion!</i>		
<b>Statement</b>	<b>Agree</b>	<b>Disagree</b>
D1. Good snacks are snacks that contribute to daily energy needs		
D2. Nutritious snacks, good for the health and growth of school children		
D3. Flu and coughs can be caused by cold snacks		
D4. School children must choose snacks that are clean and covered		
D5. Get into the habit of washing your hands with soap in running water		
D6. Snacks that spoil quickly are better stored in the refrigerator (fridge/freezer)		
D7. Choose snacks made from boiled water		
D8. Open snacks are safe to eat		
D9. Contaminated and unsafe snacks can cause coughing		
D10. Nutritious snacks can contain a lot of salt, sugar & oil		
<b>IV. PRACTICES</b>		
<i>Choose the answer by putting a cross (X) in the Yes/No column that corresponds to your snacking habits!</i>		
<b>Statement</b>	<b>Yes</b>	<b>No</b>
E1. Do you wash your hands first before preparing snacks?		
E2. Do you always clean the serving area after use?		
E3. Do you read the expiration date when buying packaged ingredients?		
E4. Do you pay attention to the cleanliness of tools for processing food?		
E5. Do you wash your hands after handling money?		
E6. Do you use an apron when processing and handling food?		
E7. Do you wear a head covering when handling food?		
E8. Do you wear jewelry when preparing food?		
E9. Do you use your hands to hold cooked food?		
E10. Do you wear clean clothes when selling?		
E11. Do you smoke when preparing/serving food?		
E12. Do you practice coughing/sneezing etiquette when handling food?		
E13. If a part of your body itches, do you scratch it and continue preparing/serving food?		
E14. Do you wash utensils after using them to prepare food?		
E15. Do you use the same cloth for food and drying utensils??		
E16. Do you store food that spoils quickly in a separate place?		
E17. Are snacks served in a clean and safe place/equipment?		
E18. Are the snacks served wrapped or covered?		
E19. Are snack foods transported in separate containers from raw ingredients?		
E20. Do you have a trash can or trash storage area?		