

# Customer satisfaction and the food traffic light system survey, menu development and HACCP training to improve the food service quality of canteens



Dwi Budiningsari<sup>1,2\*</sup>, Siti Helmiyati<sup>1,2</sup>, Setyo Utami Wisnusanti<sup>1,2</sup>, Lily Arsanti Lestari<sup>1,2</sup>, Sridanti Annissa Putie<sup>1</sup>

## ABSTRACT

Canteens are an important aspect of the food environment in providing healthy food and supporting good nutrition. The food service quality of the canteens could be improved by customer satisfaction and the food traffic light system survey. This aimed to measure customer satisfaction and the food traffic light system implemented in the canteen via surveys and identify the impact of menu development training as well as Hazard Analysis Critical Control Point (HACCP) training for canteen staff. The customer satisfaction and the food traffic light system survey were collected using an online form involving 1,022 and 49 respondents, respectively. The training was attended by 31 canteen staff. In addition to menu development training, we also conducted HACCP training. Menu development training included menu variation, creating new recipes, and a food traffic light system. A descriptive post-evaluation was conducted to evaluate the impact of the training. A 6-question survey assessed how well the canteen staff retained knowledge from the provided food safety training. The customer satisfaction survey obtained the mean score for each indicator: 3.48 for canteen hospitality, 3.43 for canteen cleanliness, 3.32 for food taste, 3.22 for menu variation, and 3.14 for food prices. The training was useful to increase food service and board quality and the canteen staff's healthy food knowledge. More than half of the customers sometimes checked the food traffic light label. They mostly considered energy the main important nutrition to consider before buying food. The results of HACCP training showed that all participants correctly answered more than half of the questions. The responses of surveyed staff members suggest that the training was useful in increasing food service quality as well as food safety knowledge and practices of canteen staff. The sustainability of training impacts should be evaluated to gain comprehensive evaluation and identify further interventions to improve the food quality of canteens. As a health-promoting university, a food traffic light system should be implemented in canteens at other faculties at Universitas Gadjah Mada.

**Keywords:** Campus canteen; customer satisfaction; food service.

**Cite This Article:** Budiningsari, D., Helmiyati, S., Wisnusanti, S.U., Lestari, L.A., Putie, S.A. 2023. Customer satisfaction and the food traffic light system survey, menu development and HACCP training to improve the food service quality of canteens. *Journal of Community Empowerment for Health* 6(1): 30-36. DOI: 10.22146/jcoemph.v6i1.157

<sup>1</sup>Department of Nutrition and Health, Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada, Yogyakarta, Indonesia;

<sup>2</sup>Center of Health and Human Nutrition, Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada;

\*Corresponding author:

Dwi Budiningsari;  
Department of Nutrition and Health,  
Faculty of Medicine, Public Health and  
Nursing, Universitas Gadjah Mada,  
Yogyakarta, Indonesia;  
[budiningsari@ugm.ac.id](mailto:budiningsari@ugm.ac.id)

Received: 2022-08-11

Accepted: 2023-01-12

Published: 2023-01-24

## INTRODUCTION

Canteens can represent an important aspect of the food environment in providing healthy food and supporting good nutrition status. Education institutions are encouraged to implement comprehensive health and well-being programs, including food and nutrition education. The establishment and operation of campus canteens are important in cultivating interest in buying nutritious and healthy food among students and faculty members, as well as in making it possible for them to enjoy nutritious and healthy food at affordable prices.<sup>1,2</sup> Unfortunately, healthy food knowledge among canteen

staff members is currently limited.

Canteens can be found in hospital facilities, nursing homes, child and senior care centers, prisons, schools, and university campuses. The quality of food service is one of the most relevant items of satisfaction perceived by various customers.<sup>3,4</sup> In higher education institutions, food service attributes have become a prominent component contributing to the quality of campus life.<sup>5</sup>

Previous research suggests that perceptions of university food services tend to be unfavorable. Several factors contribute to this, such as environmental constraints, including repetitive

consumption of a limited or monotonous menu, low quality of food and service, and facility venue in general. Other findings indicate that foods sold in canteens do not comply with nutritional recommendations, further contributing to low satisfaction levels regarding these services.<sup>6,7,8</sup>

A cafeteria's value can be determined by its food quality. Food quality can be influenced by food safety, attractiveness and acceptance as the three key aspects. Other aspects include flavor, appearance, texture, color, temperature, and portion size.<sup>9</sup> Quality of food can also influence customer satisfaction and behavioral

intentions. One study by Ji and Ko on university canteens in China found that consumers consider appearance and color, taste, and nutrition of food as the important factors determining their satisfaction with food products.<sup>9</sup>

To encourage healthy eating habits among students and faculty members, it is not enough to merely provide nutritional information on the meals; instead, there should be some intervention in the food supply accompanying that information.<sup>10,11</sup> According to Torres et al., who conducted a study in Spanish university canteens, lunch provided by campus canteens exceeded 100% of the Recommended Dietary Allowance (RDA) for women in energy, fat, sodium, and cholesterol content.<sup>11</sup> This excess could result in imbalanced nutrient intake and overnutrition. Customers in canteens can choose healthier food using the food traffic light system.<sup>12</sup>

Campus food service operators should encourage adaption toward customer expectations, particularly with the increased competition from fast-food segments on and off campus. When customer expectations are high, campus food services are expected to be more responsive.<sup>13</sup> The university canteen represents an important food environment where consumers' overall satisfaction could be an important element of the overall eating experience on campus.<sup>5</sup>

Food service quality is an important aspect of canteen customer satisfaction. However, other elements also matter to students. For instance, several students will complain about prices if they find canteen products too pricey or unaffordable due to insufficient money. A more spacious canteen venue is also recommended to avoid overcrowding.<sup>1,14-16</sup> Hence, this study was conducted to assess the canteen service quality provided to customers at campus canteens and evaluate the food traffic light system and then use the findings as a feedback mechanism for providing good and satisfying canteen services in the future.

Foodservice quality of campus canteens could be improved by conducting customer satisfaction surveys and following up with staff training. This study aimed to measure customer satisfaction via surveys and evaluate menu development training,

the food traffic light system, and HACCP training for canteen staff. To fulfill this goal, we divided our study into two parts. The first part involved conducting a customer satisfaction survey among consumers. The second part involved training for canteen staff to improve food quality, afterward we conducted the food traffic light evaluation.

## METHODS

### Customer satisfaction survey

This cross-sectional study was conducted at nine canteen counters of the Faculty of Medicine, Public Health, and Nursing (FMPHN) at Universitas Gadjah Mada

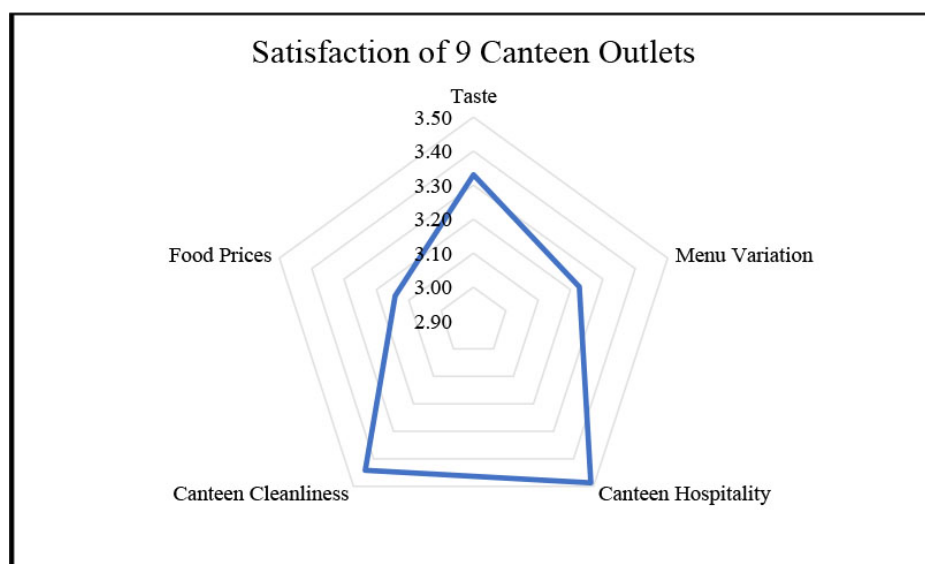
(UGM) in Yogyakarta from September 2019 until October 2021. Survey data were collected using an online form and included 1,022 customers. The inclusion criteria of the respondents encompassed any customer that bought food or drinks at any time during the study period from one of the nine canteen counters included in the study, such as students or university staff members. We conducted the customer satisfaction survey in three canteens at FMPHN, with Canteen A having five counters, Canteen B having three counters and Canteen C having one counter; therefore, the total was nine.

| - DAFTAR MENU -  |  |
|--|--|
| KANTIN MEDIKA 1 D  |  |
| Susu Kecil (UHT 125 ml)..... 7.000 🟡                               | Susu Kecil (UHT 125 ml)..... 7.000 🟡                               |
| Energik(kal) : 90   Lemak(gr) : 2   Protein (gr) : 4   KH(gr) : 14 | Energik(kal) : 90   Lemak(gr) : 2   Protein (gr) : 4   KH(gr) : 14 |
| Softdrink Kecil (sprite 250 ml)..... 4.000 🟡                       | Softdrink Kecil (sprite 250 ml)..... 4.000 🟡                       |
| Energik(kal) : 90   Lemak(gr) : 2   Protein (gr) : 4   KH(gr) : 14 | Energik(kal) : 90   Lemak(gr) : 2   Protein (gr) : 4   KH(gr) : 14 |
| Susu Kecil (UHT 125 ml)..... 7.000 🟡                               | Susu Kecil (UHT 125 ml)..... 7.000 🟡                               |
| Energik(kal) : 90   Lemak(gr) : 2   Protein (gr) : 4   KH(gr) : 14 | Energik(kal) : 90   Lemak(gr) : 2   Protein (gr) : 4   KH(gr) : 14 |
| Softdrink Kecil (sprite 250 ml)..... 4.000 🟡                       | Softdrink Kecil (sprite 250 ml)..... 4.000 🟡                       |
| Energik(kal) : 90   Lemak(gr) : 2   Protein (gr) : 4   KH(gr) : 14 | Energik(kal) : 90   Lemak(gr) : 2   Protein (gr) : 4   KH(gr) : 14 |
| Susu Kecil (UHT 125 ml)..... 7.000 🟡                               | Susu Kecil (UHT 125 ml)..... 7.000 🟡                               |
| Energik(kal) : 90   Lemak(gr) : 2   Protein (gr) : 4   KH(gr) : 14 | Energik(kal) : 90   Lemak(gr) : 2   Protein (gr) : 4   KH(gr) : 14 |
| Softdrink Kecil (sprite 250 ml)..... 4.000 🟡                       | Softdrink Kecil (sprite 250 ml)..... 4.000 🟡                       |
| Energik(kal) : 90   Lemak(gr) : 2   Protein (gr) : 4   KH(gr) : 14 | Energik(kal) : 90   Lemak(gr) : 2   Protein (gr) : 4   KH(gr) : 14 |
| Susu Kecil (UHT 125 ml)..... 7.000 🟡                               | Susu Kecil (UHT 125 ml)..... 7.000 🟡                               |
| Energik(kal) : 90   Lemak(gr) : 2   Protein (gr) : 4   KH(gr) : 14 | Energik(kal) : 90   Lemak(gr) : 2   Protein (gr) : 4   KH(gr) : 14 |
| Softdrink Kecil (sprite 250 ml)..... 4.000 🟡                       | Softdrink Kecil (sprite 250 ml)..... 4.000 🟡                       |
| Energik(kal) : 90   Lemak(gr) : 2   Protein (gr) : 4   KH(gr) : 14 | Energik(kal) : 90   Lemak(gr) : 2   Protein (gr) : 4   KH(gr) : 14 |
| Susu Kecil (UHT 125 ml)..... 7.000 🟡                               | Susu Kecil (UHT 125 ml)..... 7.000 🟡                               |
| Energik(kal) : 90   Lemak(gr) : 2   Protein (gr) : 4   KH(gr) : 14 | Energik(kal) : 90   Lemak(gr) : 2   Protein (gr) : 4   KH(gr) : 14 |
| Softdrink Kecil (sprite 250 ml)..... 4.000 🟡                       | Softdrink Kecil (sprite 250 ml)..... 4.000 🟡                       |
| Energik(kal) : 90   Lemak(gr) : 2   Protein (gr) : 4   KH(gr) : 14 | Energik(kal) : 90   Lemak(gr) : 2   Protein (gr) : 4   KH(gr) : 14 |

**Figure 1.** The menu on Medika canteen outlet as categorized by food traffic light system.

**Table 1.** Customer Satisfaction of 9 Canteen Outlets.

| Counter               | Taste | Menu Variation | Canteen Hospitality | Canteen Cleanliness | Food Prices |
|-----------------------|-------|----------------|---------------------|---------------------|-------------|
| 1                     | 3.46  | 3.19           | 3.57                | 3.60                | 3.09        |
| 2                     | 3.27  | 3.16           | 3.62                | 3.60                | 3.16        |
| 3                     | 3.45  | 3.36           | 3.61                | 3.62                | 3.06        |
| 4                     | 3.51  | 3.13           | 3.68                | 3.56                | 3.37        |
| 5                     | 3.55  | 3.32           | 3.62                | 3.40                | 3.33        |
| 6                     | 3.06  | 3.18           | 3.36                | 3.34                | 3.07        |
| 7                     | 3.18  | 3.05           | 3.28                | 3.26                | 3.03        |
| 8                     | 3.21  | 3.30           | 3.25                | 3.27                | 3.03        |
| 9                     | 3.27  | 3.35           | 3.38                | 3.32                | 3.14        |
| Overall<br>(n= 1,022) | 3.33  | 3.23           | 3.49                | 3.44                | 3.14        |

**Figure 2.** Overall satisfaction of 9 canteen outlets.**Table 2.** Customer Suggestions for Canteens.

| No | Customer Suggestions                                |
|----|---|
| 1  | Price should not frequently change.                 |
| 2  | The menu should be more variable to avoid boredom   |
| 3  | Nutrient contents can be informed on the outlets    |
| 4  | Dirty utensils place should be added on the canteen |
| 5  | The price is considerably high.                     |

The survey included the satisfaction components of food taste, menu variation, canteen hospitality, canteen cleanliness, and food prices. These components were evaluated by a 4-point Likert scale as follows: 1 – very unsatisfied, 2 – unsatisfied, 3 – satisfied, and 4 – very satisfied. Obtained data were analyzed using a quantitative descriptive approach. Each component for each canteen outlet was presented by means.

### Training

Based on the satisfaction survey results, we constructed two types of training for canteen staff. The first training was conducted on September 13<sup>th</sup>, 2019, lasting about two hours, and was attended by 21 canteen staff members. Two main topics were delivered for the first training: 1) Menu Development and 2) Balanced Nutritional Menu. During the menu development topics, canteen staff briefly discussed menu evaluation, menu variation and creating new recipes.

Meanwhile, in the 2<sup>nd</sup> topic about Balanced Nutritional Menu, canteen staff learned about the food traffic light system and nutritional menu.

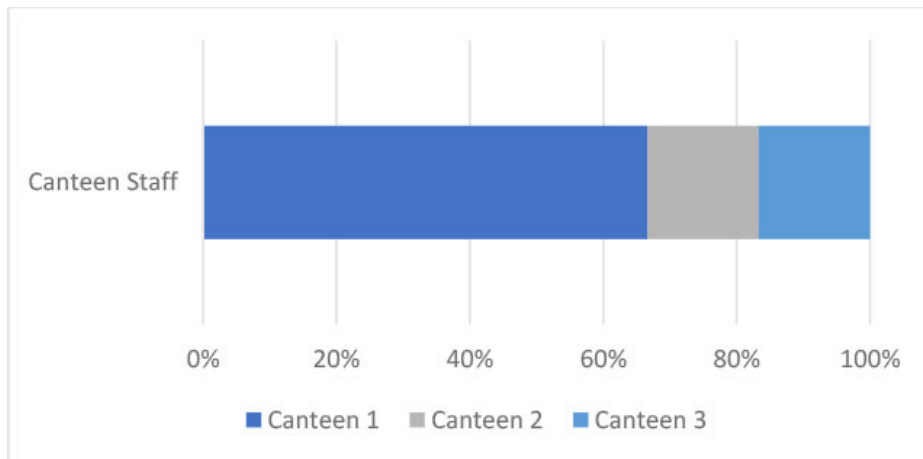
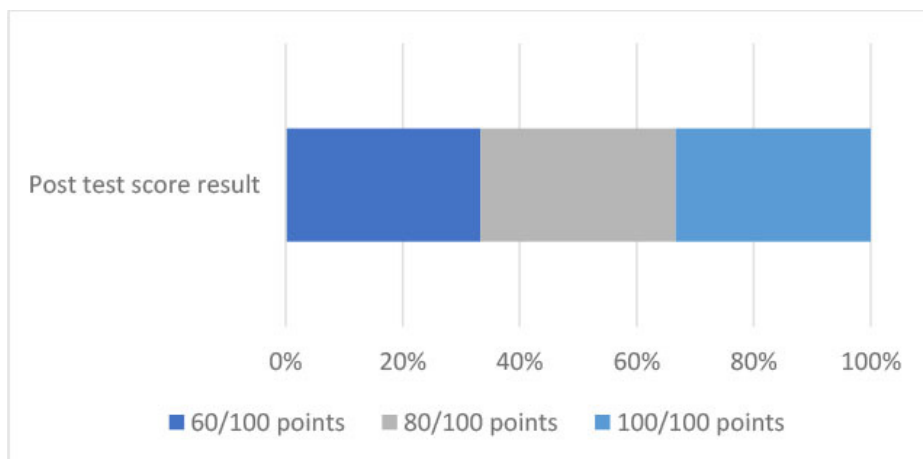
A nutritionist with expertise in menu evaluation and development delivered training topics. A food development expert was also present to discuss menu recipe creation. In addition to lectures, the training included tasting new recipes, such as *Bakmoy*, Soybean Chicken Feet, and *Serjuk* drinks (a combination of lemongrass and lime ice). A descriptive post-training evaluation was conducted to evaluate the impact of the training.

The follow-up was completed by incorporating promotional media regarding the food traffic light system in the canteens. Foods were categorized into three groups: green, implying low in both fat and energy and high in fiber content; yellow, implying moderate in fat, energy, added salt, and sugar; and red, implying high in both fat and saturated fat and low in fiber. Small posters were created and placed on food display shelves at each canteen outlet containing a menu list that has been provided with traffic light logos for each menu item (Figure 1).

The second training, “The Introduction of Hazard Analysis Critical Control Point (HACCP) for Management and Canteen Employees,” was conducted on October 8<sup>th</sup>, 2021. Considering the pandemic, this meeting was conducted via Zoom, lasted about one hour, and attended by 10 canteen staff members. This study was given ethical clearance no. KE/1226/10/2019 and KE/FK/0340/EC/2021 from the Medical and Health Research Ethics Committee of

**Table 3.** Training Survey Questions.

| No | Training Survey Questions   |
|----|---|
| 1  | How many principles in HACCP?   |
| 2  | Banned preservatives in food is an .... hazard potential.                   |
| 3  | Following statement that incorrect about CCP (Critical Control Point) is... |
| 4  | Condition to determine critical limits are...                               |
| 5  | Establish verification procedures is the ... HACCP principle.               |

**Figure 3.** Canteen staffs counters.**Figure 4.** Post Test Score Regarding HACCP Practice Results.

the Faculty of Medicine, Public Health and Nursing at Universitas Gadjah Mada (UGM) in Yogyakarta, Indonesia.

## RESULTS

### Customer satisfaction survey

We obtained satisfaction data from 1,022 customers. Satisfaction surveys from nine canteen outlets were evaluated. The surveys measured the satisfaction components of food taste, menu variation, canteen hospitality, canteen cleanliness, and food prices. The survey results can be seen in Table 1, Table 2, and Figure 2.

### Training

A descriptive post-training evaluation was conducted to evaluate the impact of the training of menu development involving 21 canteen staff (Table 3). Testimonies of canteen staff were also collected, for example:

*"This training gave benefit for us, thank you so much."*

- Canteen staff 1

*"This helps me to know how to evaluate the menu and develop new recipes, thank you."*

- Canteen staff 2

*"For the next training, maybe we can be given more information about healthy foods.."*

- Canteen staff 3

*"We need another training about good nutrition.."*

- Canteen staff 4

For HACCP training, we invited all of the staff from three canteens at FMPHN, but only ten staff attended from three canteens (Canteen A, C, and D). One canteen (Canteen B) was closed during the pandemic period. After HACCP training, ten canteen staff members from various origins (shown in Figure 3) also completed a 5-question survey to evaluate their knowledge regarding HACCP practice after training (Figure 4). The questions are shown in Table 3.

Participating canteen staff responded positively to this HACCP training and hoped that this kind of training could be provided routinely. Since the training was online, they also expressed interest in offline, in-person training and assistance with future HACCP training. Other topic suggestions for future training were product hygiene; the correct way of processing food from raw ingredients to the final, ready-to-sell product; and examples of simple, easy-to-make menu items.

### Customer survey on the use of Food Traffic Light System

Following the use of the food traffic light system in the canteens, we conducted an online customer survey regarding the use of this system in June-August 2021. A total of 49 customers answered the questions about the food traffic light system. Subjects' characteristics and questions are shown in Table 4 and Table 5.

This survey showed that more than half of the customers sometimes checked the nutritional label, and they mostly considered energy as the main important nutrition to consider before buying food. Less than half of customers felt no regret when choosing food with a red label, while there were 4% who felt very regretful. Food price and taste influenced the respondent's decision to buy one menu item besides nutritional value. More data are shown in Figure 5.

**Table 4. Subjects characteristics.**

|                               | Subjects (n=49) |
|-------------------------------|-----------------|
| <b>Age, n (%)</b>             |                 |
| 18-19                         | 9 (18.4)        |
| 20-21                         | 23 (46.9)       |
| 22-23                         | 17 (34.7)       |
| <b>Gender, n (%)</b>          |                 |
| Male                          | 12 (24.5)       |
| Female                        | 37 (75.5)       |
| <b>Education, n (%)</b>       |                 |
| Applied Bachelor              | 1 (2.0)         |
| Bachelor                      | 43 (87.8)       |
| Master                        | 5 (10.2)        |
| <b>Study Cluster, n (%)</b>   |                 |
| Social Humanity               | 11 (22.4)       |
| Health Science                | 26 (53.1)       |
| Science and Engineering       | 8 (16.3)        |
| Agriculture                   | 4 (8.2)         |
| <b>Monthly Income, n (%)</b>  |                 |
| ≤499,000.00                   | 8 (16.3)        |
| Rp 500,000.00 – Rp 999,000.00 | 19 (38.8)       |
| ≥Rp 1,000,000.00              | 22 (44.9)       |
| <b>On Special Diet, n (%)</b> |                 |
| No special diet               | 35 (71.4)       |
| Calories deficit              | 13 (26.5)       |
| Vegan                         | 1 (2.0)         |

**Table 5. Customer survey of food traffic light system questions.**

| No | Customer Survey Questions  |
|----|--|
| 1  | How often did you read the nutrition label before buying food?                         |
| 2  | Which nutritional value is the most important for you when you read a nutrition label? |
| 3  | Do you feel regretful when you buy food with red labels?                               |
| 4  | What factors influence your decision to buy one menu?                                  |

## DISCUSSION

This study aimed to determine canteen customers' overall satisfaction with campus food service attributes, and the findings have important implications for canteen food service staff. Accordingly, campus food service staff should develop strategies to improve food service quality. The survey showed that the means of all satisfaction components were above 3 points, indicating that customers were generally satisfied with the service. Maintaining the quality of their service ensures that canteen staff can continue to meet or exceed customer expectations.

Overall, the mean taste satisfaction score was 3.33, suggesting that customers were satisfied with the food taste, while the mean menu variation satisfaction score was 3.23, suggesting that customers were also

satisfied with the menu variation. Food and beverage quality was one of the canteen aspects most frequently commented upon by customers. These results suggest that possible strategic implementations should include menu variation and an increase in nutritious and healthy food. These findings align with a study by Kjøllesdal in Norway, which found that workplace eating habits are frequently associated with poor food quality and bad food choices, potentially leading to overnutrition.<sup>10</sup> In rural universities, healthy and varied food choices in places of work or education may be limited, making access to various foods difficult.<sup>5</sup>

Satisfaction components involving food taste, menu variation, and convenience positively affected the value of university dining services. Of the variables considered in this study, food

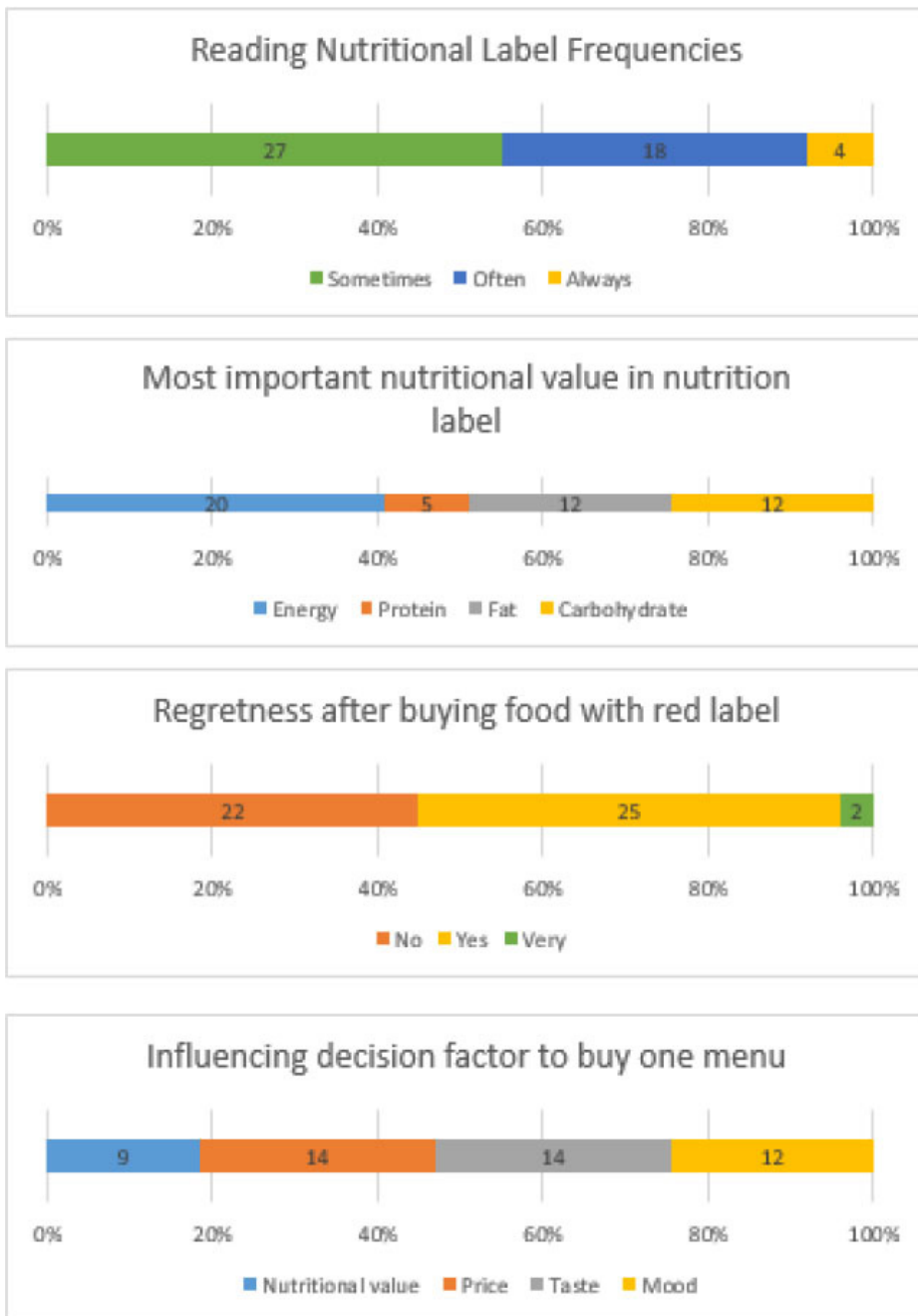
quality was the strongest factor impacting value, followed by menu and convenience.<sup>3</sup> The challenge for campus food service staff is providing products and services that enhance and facilitate healthy food choices.

The mean canteen hospitality satisfaction score was 3.49, suggesting that customers were satisfied with canteen hospitality. This was the highest score among all satisfaction components. The mean canteen cleanliness satisfaction score was 3.44, suggesting that customers were satisfied with canteen cleanliness. Campus canteen operators should continue to train their employees to greet customers politely, be attentive and friendly, and increase their knowledge about the products served. Maintaining canteen hospitality can be achieved through forming sincere and effective relationships in a commercial environment.<sup>4</sup>

Furthermore, university food service operators should pay more attention to the quality of the canteen setting, carefully designing cafeteria interiors and exteriors to deliver an engaging, comfortable atmosphere that will attract new customers and retain current ones. University food service operators should maintain a high standard for the cleanliness and hygiene of canteen facilities.<sup>5</sup>

The mean food price satisfaction score was 3.14, suggesting that customers were satisfied with food prices. Of all satisfaction components, this item scored the lowest, as customers tended to be the most dissatisfied with the price paid. University food service operators should improve the quality of products and offer reasonable pricing to prevent customers from switching to off-campus food service outlets, which could result in fewer sales and lower income in the long term. Higher customer satisfaction could increase customer retention and promote word-of-mouth endorsements of campus food service facilities.<sup>17</sup>

University committees often neglect training for campus canteen staff, though such training is vital in empowering canteen staff to provide healthier foods and better food service. Since the satisfaction survey results and suggestions focused primarily on menu variation and nutrition information of foods, we constructed training topics related to these.



**Figure 5.** Food traffic light customer survey.

University students chose the quality of food as the most important service provided by canteens that, showed their overall satisfaction, followed by price.<sup>18</sup> The results of a customer survey about the use of food traffic light system on the canteen reflected this finding. Besides nutritional value, food price and taste influence one's decision to buy one menu. Less than half customer felt no regret when choosing food with a red label, but only 4% of customers felt very regret. This finding aligns with a study that revealed that

menu labeling is ineffective in promoting healthier food choices.<sup>12</sup> Accordingly, it should be followed by another strategy, such as making healthier foods more visible than others which can improve the effect of traffic-light labelling.<sup>12</sup>

A meta-analysis from 60 intervention studies showed that food labeling effectively reduces consumer intakes of total energy and total fat while increasing intake of vegetables.<sup>19</sup> Our study also showed that consumers on a diet tend to check on traffic light labels more (64.3%)

than those, not on a diet (37.1%). Mostly, they consider total energy as the most important nutritional value.

From the feedback collected, it can be concluded that training may raise awareness of nutrition and healthy foods among canteen staff members. The feedback showed the canteen staff wanted more information and training about healthy foods. However, this finding requires further evaluation since we did not employ quantitative evaluation and repeated evaluation tests. Knowledge-based training can improve the knowledge of canteen staff regarding food safety and related topics.<sup>20</sup> Such training can be modified using behavior-based training, which may produce better results. A study by Price et al. in UK observed that behavior-based training can improve employee behavior. At the same time, knowledge-based training alone can also improve employee behavior, though to a lesser degree.<sup>21</sup> For the employee who practices after behavior training demonstrated, the no-intervention phase may have a highly successful impact with sustainable effects.

After training is enacted, assessment can take various forms. One of the most widely accepted methods is pre/post-intervention questionnaires, followed by direct observation of food handlers' food safety attitudes and behaviors. Some studies have even used microbial testing to assess the success of training interventions.<sup>22</sup> This study conducted a 6-question survey to assess how well the canteen staff retained knowledge from the provided food safety training. The results showed that all training participants correctly answered more than half of the questions. This could be due to canteen staff possessing prior knowledge of HACCP practices. Knowledge gained from the training cannot be measured and needs further evaluation, possibly through conducting both pre- and post-tests. A regular evaluation should be conducted to assess the sustainability impact of the training and identify further interventions to improve the food quality of canteens. The sustainability of training impacts should be regularly evaluated to gain comprehensive evaluation and identify further interventions to improve the food quality of canteens.

Media on food traffic light systems in the canteen outlets provided an easily understandable food categorization. Consumers increasingly demand more information on food eaten outside the home, such as dishes' nutritional content, ingredients' origin, and possible allergens' presence. In turn, this increasing demand requires sufficient nutrition knowledge from canteen staff. From a public health and food policy perspective, providing consumers with information at the point of purchase in canteens can empower them by offering a framework for measured food choice decisions.<sup>19</sup> UGM, as a health-promoting university, should implement a nutrition label policy for canteens at other faculties to improve healthy eating behaviors among students and the general public.<sup>23</sup>

The strength of this study is the large sample size of the customer satisfaction survey providing better representation. Meanwhile, this study had some limitations due to the lack of subject characteristics and customer satisfaction data from the post-pandemic period.

## CONCLUSIONS

The survey showed that the means of all satisfaction components were above 3 points; however, the least satisfied factors are food prices, menu variation, and taste. The possible strategic implementations should include menu variation and an increase in nutritious and healthy food. The responses of surveyed staff members suggested that the training was useful in increasing food service quality as well as the food safety knowledge and practices of canteen staff. The sustainability of training impact should be evaluated to gain comprehensive evaluation and identify further interventions to improve the food quality of canteens. The food traffic light system should be implemented in canteens at other faculties at UGM as a health-promoting university.

## ACKNOWLEDGMENTS

We want to thank for Department of Nutrition and Health, Faculty of Medicine, Public Health and Nursing, and Universitas Gadjah Mada for funding this program. We also thank Health Promoting University, Universitas

Gadjah Mada (HPU-UGM) and Campus Service Unit, Faculty Medicine, Public Health and Nursing, Universitas Gadjah Mada, for willingly collaborating in this program. Special thanks are extended to Maria Wigati, Titi Nurma Sari, and Alifah Sharfina for assisting with data collection and analysis.

## CONFLICT OF INTERESTS

We declare no conflict of interest in this publication.

## REFERENCES

- Galabo NR. Canteen service quality and student satisfaction. *Int J Sci Technol Res*. 2019;8(6):114–26.
- Czarniecka-Skubina E, Górska-Warsewicz H, Trafialek J. Attitudes and consumer behavior toward foods offered in staff canteens. *Int J Environ Res Public Health*. 2020;17(17):1–18. Available from: <http://dx.doi.org/10.3390/ijerph17176239>
- Ham S. Rethinking university dining services role of value in the formation of customer satisfaction and revisit intention. 2012;22(1):133–46.
- Lashley C. Hospitality studies: Escaping the tyranny? *Qual Assur Educ*. 2015;23(4):364–77. Available from: <http://dx.doi.org/10.1108/QAE-04-2015-0014>
- Serhan M, Serhan C. The impact of food service attributes on customer satisfaction in a rural university campus environment. *Int J Food Sci*. 2019;2019. Available from: <http://dx.doi.org/10.1155/2019/2154548>
- Kwon DJW. Effects of campus foodservice attributes on perceived value, satisfaction, and consumer attitude: a gender-difference approach. *Int J Hosp Manag* [Internet]. 2011;30(2):252–61. Available from: <http://dx.doi.org/10.1016/j.ijhm.2010.09.001>
- Lachat CK, Huybregts LF, Roberfroid DA, Van Camp J, Remaut-De Winter AME, Debruyne P, et al. Nutritional profile of foods offered and consumed in a Belgian university canteen. *Public Health Nutr*. 2009;12(1):122–8. Available from: <http://dx.doi.org/10.1017/S136898008002048>
- Garg A, Kumar J. Exploring customer satisfaction with university cafeteria food services. An empirical study of temptation restaurant at Taylor's University, Malaysia. *Eur J Tour Hosp Recreat*. 2017;8(2):96–106. Available from: <http://dx.doi.org/10.1515/ejthr-2017-0009>
- Ji, Yu Gang and Ko Wen Hwa. Developing a catering quality scale for university canteens in China: from the perspective of food safety. *Sustainability*. 2022;14,128110. Available from: <http://dx.doi.org/10.3390/su14031281>
- Kjøllesdal MR, Holmboe-Ottesen G, Wandel M. Frequent use of staff canteens is associated with unhealthy dietary habits and obesity in a Norwegian adult population. *Public Health Nutr*. 2011;14(1):133–41. Available from: <http://dx.doi.org/10.1017/S1368980010001473>
- Torres AF, Moreno-Rojas R, Martos FC. Nutritional content of foods offered and

- consumed in a Spanish university canteen. *Nutr Hosp*. 2015;31(3):1302–8. Available from: <http://dx.doi.org/10.3305/nh.2015.31.3.8006>
- Fernandes AC, Oliveira RC, Proença RP, Curioni CC, Rodrigues VM, Fiates GM. Influence of menu labeling on food choices in real-life settings: a systematic review. *Nutrition reviews*. 2016 Aug 1;74(8):534–48. Available from: <http://dx.doi.org/10.1093/nutrit/nuw013>
  - Lugosi P. Campus foodservice experiences and student wellbeing: an integrative review for design and service interventions. *Int J Hosp Manag*. 2019;83(September):229–35. Available from: <https://doi.org/10.1016/j.ijhm.2018.10.019>
  - Benhura C, Nyagura SF, Dakwa V, Gombiro PE, Ngwenyama P, Matanhire R, et al. Food service quality survey at the university of Zimbabwe private canteens. *Adv J Food Sci Technol*. 2012;4(5):281–5.
  - Li R, Wu Y, Jing L, Jaacks LM. Enablers and barriers to improving worksite canteen nutrition in Pudong, China: a mixed-methods formative research study. *BMJ Open*. 2018;8(4):1–10. Available from: <http://dx.doi.org/10.1136/bmjopen-2017-020529>
  - Ratih E, Hapsari W, Kasmini OW, Wijayanti Y. Factors that influence canteen conditions of Elementary Schools in Semarang City. *Public Heal Perspect J*. 2020;5(1):76–85.
  - Ranaweera C, Prabhu J. On the relative importance of customer satisfaction and trust as determinants of customer retention and positive word of mouth. *J Targeting, Meas Anal Mark*. 2003;12(1):82–90. Available from: <http://dx.doi.org/10.1057/palgrave.jt.5740100>
  - El-Said, OA and Fathy EA. Assessing university students' satisfaction with on-campus cafeteria services. *Research Gate*. 2015;16:318–324. Available from: <http://dx.doi.org/10.1016/j.tmp.2015.09.006>
  - Shangguan S, Afshin A, Shulkin M, Ma W, Marsden D, Smith J, Saheb-Kashaf M, Shi P, Micha R, Imamura F, Mozaffarian D. A Meta-analysis of food labeling effects on consumer diet behaviors and industry practices. *Am J Prev Med*. 2019;56(2):300–314. Available from: <http://dx.doi.org/10.1016/j.amepre.2018.09.024>
  - McFarland P, Checinska Sielaff A, Rasco B, Smith S. Efficacy of food safety training in commercial food service. *J Food Sci*. 2019;84(6):1239–46. Available from: <http://dx.doi.org/10.1111/1750-3841.14628>
  - Price S, Bray J, Brown L. Enabling healthy food choices in the workplace: the canteen operators' perspective. *Int J Work Heal Manag*. 2017;10(4):318–31. Available from: <http://dx.doi.org/10.1108/IJWHM-12-2016-0087>
  - Reynolds J and Dolasinski M. Systematic review of industry food safety training topics and modalities. *Food Control*. 2019;105:1–7. Available from: <http://dx.doi.org/10.1016/j.foodcont.2019.05.015>
  - Budiningsari, D., Wisnusanti, S., Prawiningdyah, Y. Nutrition Knowledge, The Use of Menu Labelling, and Food Purchasing Behaviour Among College Students (in Indonesian). In *Proceeding Temu Ilmiah Nasional PERSAGI 2022*. 2022:341–350.



This work is licensed under a Creative Commons Attribution