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# Measuring Students' Awareness of Food Related Factors: The Role of Attitude, Price, Hygiene, and Food Safety

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**Abstract:** Food safety and hygiene issues gain increasing attention in people's daily lives and studies on the subject are crucial. The study aims to analyse the awareness of food safety and hygiene among students by applying a quantitative approach. A total of 381 questionnaires were distributed and collected within two weeks using convenient sampling. Four of the 381 questionnaires were void due to being incompetent or not suitable and inconsistencies in the answers, resulting in a 357 or 98.9% usable response rate. Data collection was performed made with assistance from others to distribute, collect, and analyse using statistical package for social sciences (SPSS) Version 24.0 software. The study discovered that food safety knowledge and hygiene significantly impacted student awareness of food safety. The results could provide information for food caterers and restaurant owners on the importance of food safety and hygiene. The study could also aid the Ministry of Health (MOH) to formulate strategies to enhance students' health across the country.

**Keywords:** Students' awareness, Food safety, Price

## 1. Introduction

Hygiene involves situations or practices conducive to maintaining health and preventing sickness, specifically through cleanliness. Significantly, human beings must understand food-associated dangers to preserve individual health. An unhygienic food stall or a restaurant will not prevent customers from enjoying meals. An unfortunate event will eventually point to the food handler. Moreover, consumers need to be aware instead of ignoring and blaming food handlers.

Food mishandling during preparation, processing, or storage may result in foodborne illness outbreaks, which impacts food handlers and consumers (Ling, Hassan, & Regina, 2021). Kandari, Abdeen and Sidhu (2019) stated that food poisoning is a result of poor understanding, attitude, and food safety practices among food handlers. The food handlers prepare or serve prepared meals to students, employees, and parents. Hence, understanding

the perceptions of food handlers in food safety education is critical. Minimising the frequency of foodborne infections in underdeveloped nations is possible by addressing a broad range of variables. The household is the main source of food-borne illness outbreaks in underdeveloped nations. Raw food is usually contaminated with cooked foods, inadequate attention on food safety, poor personal hygiene, and improper handling of prepared food. Food meant for human consumption becomes tainted in various ways. For instance, issues at home, such as placing food beside cooked food in the refrigerator might cause cross-contamination when the food arrives (Diplock et al., 2019). Cross-contamination occurs if uncleaned cutting boards are used. To avoid spreading foodborne illnesses, consumers and food workers are urged to practise proper personal hygiene. Microbes in food can be prevented by washing hands properly before and after eating and after using the washroom.

The MOH reported 60 episodes of food poisoning in schools in the nation, involving 2,325 cases (Salleh et al., 2019). Out of all the reported cases, 47 (78.3%) episodes occurred in schools and institutions under the Ministry of Education (MOE) involving 1,900 school residents, while the remaining were involved with other agencies, such as Majlis Amanah Rakyat (MARA), the State Government, and private schools. The statistics presented a 57% increase from 30 episodes in 2015 to 47 episodes in 2016. The statistics highlight the issue of how Malaysians, particularly students, understand food safety and practice hygiene in preparing food and before meals (see, smell, taste) implemented by MOH in the health campaign. Liu et al. (2019) mentioned that many customers are unconcerned about food safety. Generally, people lack knowledge about hygiene and ignore food safety and hygiene (Zanin et al., 2017). Thus, research should be conducted on students' awareness of food safety and hygiene. Accordingly, the study investigated the awareness of food safety and hygiene among students.

## **2. Literature Review**

Foodborne illness is a public health issue defined as food poisoning. Food poisoning could happen due to unsanitary surroundings, such as water used to clean food, cooking equipment, cooking, and the food itself. Food poisoning also occurs due to food contaminated with bacteria, parasites, viruses, or chemicals. The most common sources of food poisoning are meat and poultry that are undercooked and raw or under-pasteurised dairy products, raw seafood, unwashed vegetables, and fruits.

### **2.1 Food Safety**

Many students remain confused about the definition of food safety and hygiene. Food safety concerns how food is prepared, handled and stored to prevent foodborne illness. King et al. (2017) define food safety as the level of certainty that food will not cause harm or sickness to people from the time the food is made until the food is consumed. According to Zyoud et al. (2019), students view that food poisoning occurs due to poor hygiene during food preparation.

Microorganisms, such as bacteria and chemicals used in production and food processing, and physical contaminants, such as dust, dirt, and others contribute to food safety issues (2020). Hence, food poisoning may result from low cleanliness; thus, students must

be aware of food hygiene and safety to avoid illness. Therefore, food irradiation is used to increase food safety and longevity. Government and consumers also play a role in ensuring food safety and quality (Nayak & Waterson, 2019).

## 2.2 Hygiene

Hygiene is crucial for students to practice maintaining health and preventing any disease. Hygiene is a practice to maintain health and prevent disease through daily routines. Lema et al. (2020) explained that foodborne disease is due to poor food hygiene awareness and consistent dangerous food handling practices. Additionally, foodborne diseases are a result of low hygiene education and frequent improper food handling activities (Adane et al., 2018). Therefore, students must ensure they wash their hands before preparing or eating a meal. Nevertheless, food can be contaminated at any stage during preparation, storage, distribution, processing, and production. Chidziwisano et al. (2020) mentioned that ancient laws included food preparation and food hygiene, suggesting the importance of hygiene during ancient times.

## 2.3 Demographics

Susan and Badrie (2014) proposed that demographics affect the consumer's food safety knowledge and behaviour. High class level people are more selective in their daily food. Roseman, M., and Kuryzynske, J. (2006) "Age, sex, income, and educational levels influence food safety knowledge and behavior of the consumers". Vari et al. (2016) noted that gender-related differences might occur because girls are more frequently involved in food activities as females learn cooking at age 13 by assisting their mothers to cook daily. Spending more time in the kitchen increases understanding of the food than males. Higher educational influences an individual's knowledge of food safety and hygiene. An individual's understanding increases with knowledge.

## 2.4 Attitudes

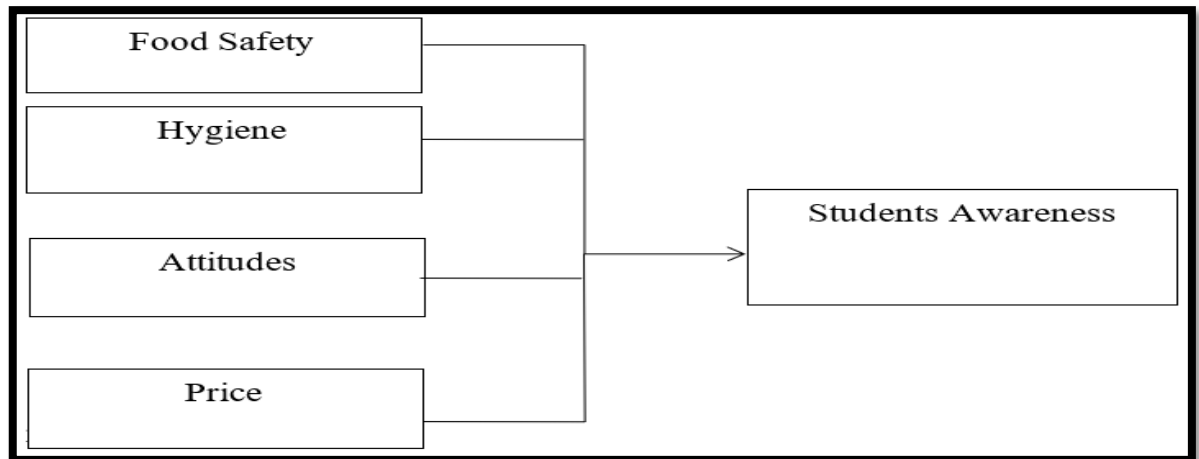
Booth et al. (2013) added that favourable opinions regarding food safety are associated with positive attitudes towards microorganisms. Bad behaviour originates from bad attitudes as attitudes are reflected in a person's behaviour (Whiley, Clarke, & Ross, 2017). Shahbaz et al. (2020) proposed improved hand hygiene as one of the most effective ways to prevent illness and germ transmission. When a person improves their attitude, the person's behaviour improves automatically. Therefore, when a person becomes aware of food safety and hygiene, their behaviour changes where they will consider cleanliness of the place and hygiene.

## 2.5 Price

Chang, Suki and Nalini (2014) stated that compared to other service areas, the price of the meal and services are equally important. Meanwhile, Kosa et al. (2011) noted that consumers pay more attention to the safety of perishable items than nonperishable items, indicating that pricing impacts purchasing decisions.

## 2.6 Students' Awareness

Food poisoning awareness also teaches pupils how to choose safe foods, nurture good practices, and correct hand washing actions before and after eating (Aluh, Nworie & Aluh, 2019). Taha et al. (2020) expressed that mandatory food safety training should be performed regularly and continuously to minimise any potential misunderstandings about food safety issues. Children become more aware of proper food handling practices when a food safety campaign or week is organised.



**Figure 1: Conceptual Framework**

### 3. Methodology

#### 3.1 Research Design

The research design is important in organizing and defining the study components. Vaus et al. (2007) described that the research design is the overarching method employed to combine various study components in an orderly and logical manner, thus ensuring that the research topic is sufficiently addressed. The study applied a qualitative approach that generated hypotheses that could be confirmed or refuted. The quantitative study is conducted using various ways, such as descriptive, correlational, developmental, observational, and survey research methods. Experimentation and causal-comparative research may also benefit from the methodologies. Therefore, the study applied a descriptive research design to answer all questions and research problems.

#### 3.2 Population and Sample

Marilyn and Shelly (2003) defined a research population as the total group of people, items, or events of interest. Populations are large groups of people or things at the centre of a scientific inquiry. The study applied the research population method, where 30,670 students were selected. Nonetheless, due to large populations, the study focused on sampling techniques. The technique involves a process of taking the subset of subjects representative of the entire population.

Sampling is divided into two major parts: probability and non-probability samples. Non-probability samples involve four techniques. The study employed convenient sampling for the subject selection. Therefore, all the population members possess an equal and independent chance of being selected. A sample depicts a portion or subset of a larger group or population. The study sample size was calculated based on the table and formula by Krejcie & Morgan (1970).

$s =$  Required Sample size.  $X^2 = 3.84$  (confidence level),  $N =$  population size  
 $P = 0.5$  (population proportion),  $d = 0.05$  (degree of accuracy).

$$\begin{aligned} s &= X^2 NP (1 - P) / d^2 (N - 1) + X^2 P (1 - P) \\ &= 3.84 \times 11466(0.5) / 0.05^2 \times 22931 + 3.84^2 \times 0.5(0.5) \\ &= 22014.72 / 61.0139 \\ &= 360.81 \text{ rounded to nearest hundred, approximately } 361 \end{aligned}$$

The results revealed that 361 respondents were adequate based on the 22,932 population. Hence, the population possessed an equal chance of being selected.

### 3.3 Research Instrument

A structured questionnaire was employed to collect data. Respondents were tasked with answering “yes” or “no” to one or more of the following questions: A variety of answers were presented to the responder to choose the one that most closely reflect their thoughts. Respondents could only choose from a restricted number of possibilities. The study data gathering method was more efficient by using the tool. Additionally, the questions for hygiene factors and student awareness were adapted from Fatimah et al. (2011) and Jianu and Golet (2014). The questions used a five-point Likert scale ranging from strongly disagree to strongly agree.

## 4. Data Analysis

### 4.1 Demographic

Data collection was performed with assistance from others to distribute, then collected and analysed using SPSS Version 24.0 software. A total of 381 printed questionnaires were distributed during the data collection and collected within two weeks using convenient sampling. From the 381 distributed questionnaires, only four were deemed void due to incompetence or not suitable because of inconsistencies in answering the questionnaire. Ultimately, the study collected 357 responses with a (98.9%) usable response rate.

Five variables were listed and analysed in the demographic profile using descriptive statistics, namely ‘gender’, ‘age’, ‘race’, ‘highest education level’, and ‘religion’. The first frequency test examined respondents’ gender, where female respondents (69.5%) were more than male respondents (30.5%). The results might be influenced by the population of more females than males. Furthermore, the respondents were asked about their age, where most respondents were 20 to 23 years old with 248 (69.5%), followed by 24 to 26 years old with 92 (25.8%). The respondents between 24 to 26 years old and 27 to 29 years old were the lowest with a total of one (0.03%) respondent each. The results suggested that all the

respondents were still under the young adulthood category as defined by dictionary.com (n.d).

The results revealed that the respondents' race were mostly Malay with a total of 256 (71.7%) followed by Chinese respondents with 62 (18.2%), Indian respondents with 26 (7.3%) and only ten (2.8%) for other races. The results might be influenced by the population demographic of more Malay respondents in the selected area. Another question concerns the level of education, where most respondents were STPM level with 256 (71.7%), followed by Matriculation level with 62 (18.2%), and Diploma level with 26 (7.3%). The results suggested that most undergraduate students were at the STPM level before pursuing undergraduate studies. The results after SPSS frequency analysis revealed that most respondents were Muslims with 261 (73.1%) respondents, followed by Buddhism with 52 (14.6%), Hinduism with 23 (6.4%), and Christianity with 21 (5.9%).

#### 4.2 Correlation Analysis

A correlation connects two or more variables with the same relationship. Notably, a significant association suggests a strong relationship between the variables, whereas a poor correlation implies that the variables are not connected. Using statistical data, correlation analysis could determine the strength of the connection. A linear connection between two variables was measured in the study. Table 1 illustrates the correlation coefficient between independent and dependent variables.

*Table 1: Correlation Coefficient*

<b>Correlation between</b>	<b>0.8 and 1.0</b>	<b>Strong Positive</b>
	0.5 and 0.8	Moderate Positive
	0 and 0.5	Weak Positive
	-0.5 and 0	Weak Negative
	-0.8 and -0.5	Moderate Negative
	-1 and -0.8	Strong Negative

*Table 2: Correlation Variables*

<b>Dimension</b>	<b>Significance Test</b>	<b>Students' Awareness</b>	<b>Correlation Coefficient Indicator</b>
Food Safety	Pearson Correlation	.080	
	Sig. (2-tailed)	.130	Weak Positive
	N	357	
Attitudes	Pearson Correlation	-.074	
	Sig. (2-tailed)	.164	Weak Negative

Hygiene	N	357	
	Pearson Correlation	-.203**	
	Sig. (2-tailed)	.000	Weak Negative
Price	N	357	
	Pearson Correlation	-.112*	
	Sig. (2-tailed)	.034	Weak Negative
	N	357	

Notes: Correlation is significant at the 0.01 level (2-tailed)\*\*, Correlation is significant at the 0.05 level (2-tailed)\*

The following are the four hypotheses proposed in the study:

- H1. A relationship exists between food safety and students' awareness.
- H2. A relationship exists between hygiene and students' awareness.
- H3. A relationship exists between attitudes and students' awareness.
- H4. A relationship exists between price and students' awareness.

The following tables summarise correlation matrix scores for every measured dimension.

Table 3: Pearson Correlation Matrix for Food Safety

		Students' Awareness	Food Safety
Food Safety	Pearson Correlation	.080	1
	Sig. (2-tailed)	.130	
	N	357	357
Students' Awareness	Pearson Correlation	1	.080
	Sig. (2-tailed)		.130
	N	357	357

H1. A relationship exists between food safety and students' awareness. Food safety illustrated a score of (p-value = .080), suggesting that food safety positively impacted students' awareness.

*Table 4: Pearson Correlation Matrix for Hygiene*

		Students' Awareness	Hygiene
Hygiene	Pearson Correlation	-.203**	1
	Sig. (2-tailed)	.000	
	N	357	357
Students' Awareness	Pearson Correlation	1	-.203**
	Sig. (2-tailed)		.000
	N	357	357

H2. A relationship exists between hygiene and students' awareness. Hygiene depicted a score of (p-value =  $-.203^{**}$ ), indicating that hygiene negatively influenced students' awareness.

*Table 5: Pearson Correlation Matrix for Attitudes*

		Students' Awareness	Attitudes
Attitudes	Pearson Correlation	-0.074	1
	Sig. (2-tailed)	.164	
	N	357	357
Students' Awareness	Pearson Correlation	1	-0.074
	Sig. (2-tailed)		.164
	N	357	357

H3. A relationship exists between attitudes and students' awareness. Attitudes depicted a score of (p-value =  $-.074$ ), implying that attitudes had a weak negative relationship with students' awareness.

*Table 6: Pearson Correlation Matrix for Price*



		Students' Awareness	Price
Price	Pearson Correlation	-.112*	1
	Sig. (2-tailed)	.034	
	N	357	357
Students' Awareness	Pearson Correlation	1	-.112*
	Sig. (2-tailed)		.034
	N	357	357

H4. A relationship exists between price and students' awareness. Price revealed a score of (p-value = -.112\*), suggesting that price had a weak negative relationship with students' awareness.

Simple Linear Regression

The simple linear regression analysis was conducted to measure the prediction level of the

Table 7: Result of Simple Linear Regression of the Elements in Food Safety and Students' Awareness

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.080 <sup>a</sup>	.006	.004	.37385

a. Predictors: (Constant): Food Safety

b. Dependent Variable: Students' Awareness

For food safety knowledge among the students, food safety explained 0.6% of the students' awareness, thus suggesting a weak positive relationship between the variables. The result might be due to low knowledge among students.

Table 8: Result of Simple Linear Regression of the Elements in Hygiene and Students' Awareness

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.203 <sup>a</sup>	.041	.039	.36725

a. Predictors: (Constant): Hygiene

b. Dependent Variable: Students' Awareness

Hygiene explained 41% of students' awareness, hence implying a weak negative relationship between the variables. Thus, if the students ignore hygiene, students' awareness will decrease.

*Table 9: Result of Simple Linear Regression of the Elements in Attitudes and Students' Awareness*

<b>Model</b>	<b>R</b>	<b>R Square</b>	<b>Adjusted R Square</b>	<b>Std. Error of the Estimate</b>
1	.74 <sup>a</sup>	.005	.003	.37404

a. Predictors: (Constant): Attitudes

b. Dependent Variable: Students' Awareness

The above table indicates the r square score for attitudes and students' awareness. The score for attitudes is 0.5% of students' awareness, thus implying a weak negative relationship between the variables.

*Table 10: Result of Simple Linear Regression of the Elements in Price And Students' Awareness*

<b>Model</b>	<b>R</b>	<b>R Square</b>	<b>Adjusted R Square</b>	<b>Std. Error of the Estimate</b>
1	.112 <sup>a</sup>	.013	.010	.37269

a. Predictors: (Constant): Price

b. Dependent Variable: Students' Awareness

The above table depicts the r square score for price and students' awareness dimensions. The score for the price is 13% of students' awareness, hence indicating a weak negative relationship between the variables.

## 5. Summary of Findings

The study measured the attributes that influence students' knowledge of food safety and hygiene. The study employed a quantitative approach and distributed a self-completed questionnaire survey to the respondents to collect the necessary information. The study obtained information using frequencies test, correlation, and simple linear regression on the issue related to the topic of interest. Furthermore, a set of questionnaires was designed to answer the question. All attributes in the data collection depicted a weak relationship with students' awareness of food safety and hygiene. Thus, an inverse relationship exists between the variables- when one variable decreases, the other increases. The correlation analysis suggested that all the attributes contribute to the students' lack of knowledge of food safety and hygiene. The negative correlation implied that the factors (attitudes, hygiene, and price) decrease as the students possess more knowledge on food safety and hygiene. Nonetheless,

food safety attributes signified a weak positive relationship with students' awareness. Therefore, students ignore food safety because of weak knowledge.

#### 5.1 Relationship between Food Safety Knowledge and Students' Awareness

Although the correlation coefficient indicated a weak positive relationship, the variables were still interrelated. The mean score for food safety knowledge was 1.6, suggesting that students possess high knowledge about food safety. The statement is strengthened with the result of the reliability test which suggests that the Cronbach's Alpha for food safety was 0.727. The internal consistency was acceptable for the variables. Hence, H1 is supported. The findings aligned with De Boeck et al. (2016) and Patwary and Rashid (2016).

#### 5.2 Relationship between Attitudes and Students' Awareness

The data collected depicted that the Cronbach's Alpha for the attributes was 0.201, which is unacceptable for the internal consistency. The mean score was 3.65 which is above the average 3.50. Nevertheless, the attributes presented a weak negative relationship; thus, H2 is not supported. The findings confirmed Medeiros et al. (2011).

#### 5.3 Relationship between Hygiene and Students' Awareness

The hygiene variable presented a weak negative relationship with students' awareness with a score of (-0.203<sup>\*\*</sup>). Nevertheless, simple linear regression suggested that hygiene explained 41% of students' awareness. Therefore, students who ignore hygiene possess lower awareness of food safety. The Cronbach's Alpha also indicates a good internal consistency for hygiene attributes with a score of 0.897. Thus, H3 is supported. The finding supported Patwary (2020) and Akter et al. (2020).

#### 5.4 Relationship between Price and Students' Awareness

The attribute suggested an unacceptable internal consistency with a score of 0.466. Although the mean for the attribute suggested scores of 3.25 which is below 3.50, the correlation analysis for the attributes suggests that the attribute possessed weak negative factors with a score of (-0.112<sup>\*</sup>). Thus, H4 is not supported, aligned with Afolaranmi et al. (2015).

The first research question addressed the factors contributing to a lack of knowledge on food safety and hygiene. The second question addressed why students ignore food safety and hygiene. The findings revealed that students ignore food safety and hygiene due to insufficient food safety knowledge and hygiene attributes. Based on the discussion above, food safety knowledge and hygiene are the attributes that cause a lack of knowledge on food safety and hygiene.

### 6. Conclusion

Every person needs to play a part in promoting healthy food and increasing the knowledge on food safety and hygiene. Although the study was carefully prepared, several limitations and flaws were noted. The first limitation is insufficient material regarding the study. Limited studies exist despite similar studies performed on the topic. Therefore, researchers should produce more articles or studies in the area. Future studies should be conducted by improving proper time management, hence allowing researchers to gain more time and more

information regarding the study. Moreover, the questionnaire needs to be improved to obtain more reliable data. As mentioned above, students, the university management, and the government need to cooperate as food is a source to continue development. Food safety and hygiene awareness begin by improving one's knowledge of food safety and hygiene.

## 7. Implication

Based on the study, students could increase their knowledge of food safety and hygiene. The Universiti Utara Malaysia management could improve the awareness on food safety and hygiene for students by providing food safety and hygiene seminars that allow students to increase knowledge on the issue. Furthermore, the management could create campaigns about food safety and hygiene that impact students and the food handlers in the university. The results could be a source of information for food caterers and restaurant owners about the importance of food safety and hygiene. The study could also facilitate the MOH to formulate strategies to improve the students' health across the country.

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**APPENDICES**  
**QUESTIONNAIRE**

1. Do you know what is a foodborne illness?
  - Yes
  - No
2. Foodborne illness is caused by consuming contaminated food or drink.
  - Yes
  - No
  - Not sure
3. Common symptoms of foodborne illness are diarrhoea or vomiting.
  - Yes
  - No
  - Not sure
4. Cross-contamination could lead to food poisoning.
  - Yes
  - No
  - Not sure
5. If the food looks presentable and smells good it is always safe to eat.
  - Yes
  - No
  - Not sure
6. It is important to understand food safety.
  - Yes
  - No
  - Not sure

Food safety attitudes						
7	I would read more journals about food safety in order to enhance my food sanitation knowledge.	1	2	3	4	5
8	I think there should be a campaign about food safety.	1	2	3	4	5

9	I would attend food safety seminar to gain more food safety knowledge.	1	2	3	4	5
10	I think I do not need to attend food safety seminar because I think I have sufficient knowledge about food safety.	1	2	3	4	5
11	Food handlers are responsible for preventing food poisoning.	1	2	3	4	5
12	The government is responsible for preventing food poisoning.	1	2	3	4	5
13	University is responsible for preventing food poisoning.	1	2	3	4	5
14	Consumers are responsible to prevent food poisoning.	1	2	3	4	5
15	Food safety is important than taste.	1	2	3	4	5
16	Food poisoning is not a serious matter.	1	2	3	4	5

Hygiene						
17	How would you rate the cleanliness of the cafeterias in Universiti Utara Malaysia?	1	2	3	4	5
18	How do you rate the quality of food in the cafeterias in Universiti Utara Malaysia?	1	2	3	4	5
19	The equipment used in the cafeterias is clean.	1	2	3	4	5
20	Food handlers in the cafeterias are always in a clean condition.	1	2	3	4	5

Price						
21	I prefer to look at the price of the food rather than the cleanliness in the food places.	1	2	3	4	5
22	I do not mind spending more on food.	1	2	3	4	5
23	How do you rate the price of food in the cafeterias in Universiti Utara Malaysia?	1	2	3	4	5

24. How many times in a week do you eat outside of the campus?

- 1 to 3 times
- 4 to 6 times
- 7 to 9 times
- More than 10 times

25. Why do you eat outside of the campus? (state your reason)

26. How common do you think students get food poisoning because of the food in university?

- Very common
- Somewhat common
- Not very common
- I do not know

27. If you get food poisoning, will you blame the food handler?

- Yes
- No

28. Will you go to Pusat Kesihatan Universiti if you have diarrhoea?

- Yes
- No