

## Consumer Perception on Food Safety of Online Food Delivery Services in Malaysia

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### Abstract

This study determines the food safety knowledge and perception of Online Food Delivery (OFD) services' consumers and its association with sociodemographic factors that influence the use of OFD services. The analysis was based on data collected through a cross-sectional survey in Sungai Buloh, Selangor, Malaysia, which described the OFD service consumer's knowledge and perception of hygiene, time-temperature abuse, food contamination, and foodborne illnesses. The validated food safety questionnaire was developed and completed by 437 participants. The results showed that consumers have a good and adequate level of knowledge and perception of food safety of OFD services. Logistic regression analysis showed that a high level of education contributes to consumer perceptions of OFD services' food safety. Most consumers have never experienced symptoms of food poisoning from ordering food online; therefore, they felt more confident with the food orders made and were willing to cooperate in providing feedback on the quality of food received and make complaints to the authorities in the event of symptoms of food poisoning through OFD services.

**Keywords:** consumer, knowledge, perception, food safety, online food delivery services

### 1.0 Introduction

Online food delivery (OFD) is a service through which restaurants or stores deliver food to customers via a website or an online delivery platform (Jacob et al., 2019). The OFD platforms today provide customers with access through a smartphone's simple touch to



a wide variety of food items and ready-to-eat foods. People use mobile applications to deliver food to them, not just to save time but for their convenience while having control over technology as they can order food exactly where they want (Panse et al., 2019). Most people choose to use food delivery services because it helps them get fresh and healthy food at work or at home while having the flexibility to remain at their current premises. Due to these factors, the growth of OFD services in Malaysia has been accelerating steadily. The current revenue in the OFD segment amounts to RM920.6 million, with the trend in the number of users of OFD services expected to be 2.4 million in the Platform-to-Consumer Delivery and 5.2 million in Restaurant-to-Consumer Delivery in 2020 (Online Food Delivery - Malaysia: Statista Market Forecast, 2020). It was also reported that restaurants in Malaysia experienced at least a 30% increase in sales via OFD services during the Movement Control Order (MCO) following the spread of the COVID-19 pandemic (The Asean Post, 2020).

Food hygiene and safety of food products in the OFD service cycle should be a concern among OFD service owners, restaurateurs, and the consumers themselves. Food hygiene is paramount in food preparation. Currently, the Food Safety and Quality Division, Ministry of Health (MOH) Malaysia has issued food safety guidelines for food products sold online during the Movement Control Order (MCO) to online food service practitioners, including consumers, to comply with food safety norms when handling food. The Food Safety Guidelines for Food Products Sold Online state that food delivery riders must always be clean and healthy, ensure packages are not open or leaking, thermal bags are in a clean condition and always close tightly, food times are stated on packages, personal goods are not placed with the food and no contamination occurs on the food delivered (Food Safety and Quality Division Malaysia, 2020). All of this is done to ensure that food provided to consumers is safe. All food handlers, including home-based food operators, must undergo training and have a Food Handler Training Certificate besides obtaining an anti-typhoid vaccine. Besides, consumers and food deliverers are also advised to always practise safe physical distance (social distancing) during food delivery.

Food safety is a challenge that gives food products perception and confidence, which are increasingly important to consumers. Positive feedback from consumers regarding OFD services provided by vendors is essential for maintaining the online food delivery business in the market. This has been proven by Lan et al. (2016), who



found that the factors of hygiene and food quality of OFD services are significant in measuring customer satisfaction with the purchase of online foods. Simultaneously, customer satisfaction will affect future purchases with the same OFD service by online users. Among the complaints that involved OFD services related to food safety and quality from consumers received through the Public Complaints Management System (PCMS) generated by the Ministry of Health Malaysia (2018), between 2015 to 2017, were foreign objects found in food, spoiled food, food contamination, food poisoning, food expires, food labelling and food premises hygiene. Complaints such as the above can poorly reflect food safety in OFD services.

While many studies have been conducted on consumer food safety knowledge and perception, studies that specifically focus on the food safety of OFD services, as well as factors contributing to food safety by OFD services in urban areas, are still lacking in the existing literature, especially in the Malaysian context. This study evaluates consumers' knowledge and perception of food safety on online food ordering and delivery services. The aspects of food safety considered in OFD are hygiene, cross-contamination, time-temperature abuse, and food poisoning symptoms. It is essential to understand consumers' concerns and experiences to protect this new trend of food consumption under public health initiatives. Consumers should protect their legitimate rights and interests to create a good environment for food safety in online delivery (Lan et al., 2016). All the parties directly or indirectly involved in the OFD industry, especially food handlers, must ensure safety and hygiene from the process of preparation of food to delivery services. This study is also important to identify consumer knowledge and perceptions in determining food safety criteria for excellent OFD services and creating a good and safe online delivery environment. The OFD services can also provide the best services and maintain compliance with the regulations of food safety.

## **2.0 Literature Review**

Business model development is changing due to technological advancements in many food industries. Efficient provisioning and delivery systems have helped to increase the productivity and profitability of a restaurant. The use of the OFD system is believed to drive the restaurant business from time to time and help restaurants facilitate their online business (Hong, 2016). However, Lan et al. (2016) stated that the OFD market is still immature. Some obvious issues can



be seen from the negative comments of consumers, especially on the quality and safety of foods delivered.

## 2.1 Food Safety of Online Food Delivery Services

Food safety is an essential term that describes the food products and food processors' credibility aspects and refers to any risks, chronic or acute, which may affect consumer health. It is defined as a set of guidelines, procedures, and activities that cover all aspects of the preparation and handling of raw materials, cooking processes, packaging, delivery transportation, and services to ensure that the food is safe for consumers to eat (Barrie, 1996; Ungku Fatimah et al., 2011). Hazards to food safety may occur at various points during food preparations. Therefore, food safety is also a responsibility shared by manufacturers, processors, retailers, distributors, and consumers (Aung & Chang, 2014).

A study on consumer preference for fast food in the Malaysian market by Habib et al. (2011) showed that the trend and pattern of fast-food consumption and the speed of delivery and taste of food are the key factors that influence purchasing among Malaysian consumers. In addition, Kamakshi (2016) highlighted that consumers eat fast food because of taste, price, offers, and discounts and due to the consistency in the safety and hygiene factors of the food. Fast food restaurants have also used OFD services, either through a platform or by their delivery. Fast food companies believe that the methods of OFD services can bridge the gap between restaurants and consumers (Anib et al., 2019).

Sethu and Saini (2016) analysed online food ordering apps based on certain characteristics. Most consumers were aware of purchasing on the Internet and found that it was very convenient to use the internet. This is supported by Jacob et al. (2019), who found that consumers prefer using food applications on their mobile phones due to ease of use and convenience. However, to improve the quality of OFD services, negative feedback from consumers on food safety and quality is necessary, especially on food ingredients and delivery (Lan et al., 2016). The aspect of food ingredients is primarily concerned with food quality and safety, while delivery deals with a priority for hygiene, speed, and stability.



## 2.2 Food Safety and Hygiene

Food safety and hygiene are something that needs to be focused on by food handlers and consumers in Malaysia. The food delivery time was the hardest part of the operation, especially in food temperature management (Kim and Lee, 2011). A lack of professional training or delivery skills was observed among many delivery workers from partner restaurants (Lan et al., 2016). To ensure that the best quality of food is distributed safely, delivery company managers must be provided with comprehensive sanitation education.

Inappropriate food containers and packaging are also among the issues related to food safety. If the containers and packaging are of low quality or not tightly closed, there may be serious food safety issues such as spills or leaks, especially in extreme weather conditions (Maimaiti et al., 2018). Here, liquid foods may spill out and hot foods turn cold easily (Lan et al., 2016). Additionally, unqualified plastic containers have an adverse effect not only on temperature control but are also considered unsafe for consumers (Varshavsky et al., 2018).

The feedback from consumers regarding OFD services provided by vendors is an important appreciation for maintaining the online food delivery business in the marketplace. This has been proven by Lan et al. (2016) who found that the factors of hygiene and food quality of OFD services are critical in measuring customer satisfaction with the purchase of online foods. Consumer confidence and trust in the delivery of food information presented on the platform also urge consumers to get the best service from vendors (Latvala & Kola, 2004). Simultaneously, customer satisfaction will affect future purchases with the same OFD service by online users.

Studies related to the process of consumer safety assessment of food during purchase have demonstrated the need to provide adequate information to assess consumer food safety, such as the quality of brands and labelling (Angulo & Gil, 2004; Mahon & Cowan, 2004). Online food providers need to practice honesty and transparency by offering various foods commensurate with the demand from consumers. Such practices are seen to make consumers feel satisfied and may make purchases at the same restaurants or food premises in the future.



### 2.3 Consumer Knowledge of Food Safety

Consumer knowledge refers to understanding the users, needs, and purposes (Sharma, 2013). A business should streamline its processes, products, and services to establish relationships with consumers in the market. Restaurants or food delivery platforms know about the needs of their users, but the lack of research on consumer needs and satisfaction has caused many issues arising from the services provided. Consumer knowledge plays a key role in the success or failure of a business and fills in the gaps between consumers and vendors. This provides the vendors the guidelines for studying consumer needs.

Knowledge of food safety is critical in condensing and promoting a positive attitude toward food safety, and it is crucial for handlers to ultimately follow hygiene controls (Kwol et al., 2019). The limited knowledge and common misperceptions of consumers in crucial areas of food safety, such as personal hygiene of food handlers, temperature control, and cross-contamination hazards that could consequently lead to poor and incorrect hygienic practices are the most common causes of food poisoning outbreaks (Faour-Klingbeil et al., 2015). The OFD service requires a Food Management System with the access to as much information of knowledge as possible on current food products (McGlenn, 2019), such as origin ingredients, processing date and time, life expectancy, packaging, transport requirements, temperature, and able to gather all relevant product information (raw ingredients, materials, how and when it was made and delivery) securely throughout the supply chain (suppliers, restaurants and delivery teams) to make it easier for consumers to know whether or not the food products are fresh, safe and good.

Studies of food safety interventions on consumer behaviour in psychosocial and educational aspects have shown their effectiveness in producing changes in terms of behaviour, knowledge, and attitudes (Milton & Mullan, 2010). Therefore, consumer understanding of information sources and aspects of food safety is important so that the resources and messages conveyed are effective for use. The past studies by Jacob et al. (2019) showed that most consumers fell under the category of students and working individuals who showed a strong level of awareness of food safety among young people through online food ordering systems. Consumer knowledge of food safety was high on personal hygiene, symptoms of the foodborne diseases as well as



cross-contamination, and contaminated food, but knowledge of temperature control seemed low on food handling (Ruby et al., 2019). This proved that domestic food safety education programs require a more robust reinforcement so that consumers can understand their role in determining the selection of food that is safe to eat, especially while using OFD services.

## 2.4 Consumer Perception of Food Safety

Consumers search for various information to reduce risk. Thus, consumers' reviews can be a strong indicator of perception of the level of risk on food safety in OFD services (Lee et al., 2017). Consumer perceptions of food safety risks also influence their buying behaviour (Yeung & Morris, 2001). This not only allows consumers to consider their choices, desires, intentions to purchase, and purchasing actions, but also provides complete awareness. From OFD services, customers will value the uniqueness and services in terms of quality, price, and delivery (Chandrasekhar et al., 2019).

A consumer perception study helps to understand the positive attitude of consumers toward OFD services. Positive consumer reviews are part of the way to improving OFD services with a restaurant feedback system since 90% of customers said that online reviews influence their purchasing decisions (Madan, 2016). Positive feedback indicates that OFD service platforms offer impressive customer service and top-quality food. Consumer expectations of selection, preparation, and delivery have focused on food quality as a factor in consumer satisfaction (Wasserstrom, 2018).

The perception of consumers may vary under different circumstances. According to Das (2018), bad experiences in the past were one of the most important factors that prevented consumers from using OFD services. Consumer perceptions of online food orders vary from individual to individual and those perceptions are limited to a certain extent to the right relationship and exposure to online food services (Rathore & Chaudhary, 2018). A study on consumers' concern about food safety information of online food products by Dang et al. (2018) revealed that about one-third of participants picked items based on valid proof of food protection or food origin certification. The issue of food labelling has a significant impact on explaining existing questions regarding food safety and the conduct of consumption. Consumers believe that food labels can help them obtain information



to make food purchase decisions as well as be a concern for food safety and change their food consumption habits (Rimal et al., 2001).

Consumers only tie themselves to restaurants that keep their kitchens clean and hygienic. This situation has made food safety a significant concern and might impact consumers' purchasing behaviour (Chandrasekhar et al., 2019; Yeung & Morris, 2001). As stated by Schiffman et al. (2012), people act and react according to their perceptions, not according to objective reality. Service providers should understand the entire concept of perception and related concepts to determine the factors that affect consumers.

### **3.0 Methodology**

#### **3.1 Research Design and Sample Selection**

A cross-sectional study using quantitative data analysis techniques assessed the level of knowledge and perception concerning food safety among OFD service consumers in Sungai Buloh, a fast-growing city in the central region of Selangor, Malaysia. The sample size required for this study was 400 respondents, as determined based on the calculation by Krejcie and Morgan (1970). The respondents' inclusion criteria for this study were residents who used OFD services between 18 and 50 years old, live and/or work in Sungai Buloh, Selangor, and are fluent in Malay or English. Respondents who were not within the area; did not use OFD, and those who worked as OFD workers are excluded as samples in this study. Ethical approval from the Universiti Teknologi MARA's Research Ethics Committee was obtained before this study's start [Ref. No: 600-TNCPI(5/1/6) REC/06/2020 (MR/108)]. The confidentiality of information and anonymity of the respondents was maintained throughout this study.

#### **3.2 Instrumentation**

The self-administered questionnaire was developed based on questionnaires adapted and modified from Ruby et al. (2019), Zeeshan et al. (2017), and Woh et al. (2016). Additional input from the Food Safety Guidelines on Food Safety of Online Food Delivery Services During Movement Control Order (MCO) recommended by the Food Safety and Quality Division, Ministry of Health, (2020) was also considered in the development of the questionnaire. There are four food safety themes included in the questionnaire: Food hygiene, time-



temperature abuse, food contamination, and foodborne illness. The questionnaire was divided into three sections: (1) demographic profile, (2) food safety knowledge, and (3) food safety perception.

The developed questionnaire was validated by four experts in food safety and quality from the university and the Ministry of Health, Malaysia. A pilot study was conducted on 35 respondents (not included in the main study), and Cronbach's alpha coefficient of internal consistency was used to test the validity and reliability. The alpha coefficients of 0.76 and 0.78 were obtained for food safety knowledge and perception, respectively, and were considered acceptable for the questionnaire (Santos, 1999; Tay et al., 2017).

### 3.3 Data collection

The questionnaire was randomly distributed via social media platforms and by offering questionnaires to customers using an online food delivery service when food was delivered.

### 3.4 Statistical Analysis

The data were analysed using the IBM Statistical Program for Social Sciences (SPSS) Statistics Version 21.0 software. Descriptive analyses were conducted on all data. For the food safety knowledge section, each question was given 1 mark for a correct answer and 0 for an incorrect answer or not sure. Scores for knowledge questions were obtained by calculating the total number of answer choices by 100%. Meanwhile, for the food safety perception section, to facilitate data interpretation, Likert Scale scores for 'Strongly Disagree' and 'Disagree' were combined into Disagree/Strongly Disagree in the discussion section. Similarly, the 'Agree' and 'Strongly Agree' were combined into Agree/Strongly Agree. Scores for all questions were obtained by calculating the total number of answer choices by 100%. A higher score indicates a higher relationship factor perceived by the respondents. The total score for the level of knowledge and perception of respondents was then classified into three categories ( Poor =< 50%; Moderate = 50% - 75% and Good => 75%) based on a study by Samapundo et al. (2016). The chi-square test was used to determine the relationship between sociodemographic characteristics and respondents' level of knowledge and perception of food safety of OFD services. Subsequently, multiple logistic regression was used to investigate the association between independent variables and the



perception of OFD services' food safety. The confidence level used in all tests in this study was set at a significance level of  $p < 0.05$ .

## 4.0 Findings

### 4.1 Sociodemographic Profile

A total of 437 respondents participated in this study. The participants' sociodemographic profiles are shown in Table 1. Based on the results of the consumers' sociodemographic characteristics, it was found that consumers preferred OFD services as it can save their time in managing daily activities and the need to get food. However, food quality and safety were also seriously considered to ensure the health and safety of the food ordered from this OFD service. The findings of the sociodemographic profile in this study showed that most of the users are young women (average age  $32.9 \pm 7.73$  years, between 26 and 35 years) having a high level of education and working in the government sector, with one half having an income of less than RM4000. This reflects that most participants are high-educated youth and are from low-income groups (B40). Our findings correspond to the study by Zulkarnain et al. (2015) conducted previously, which showed that most OFD users in Malaysia are female, with ages younger than 34 years, a higher level of education, and income less than RM4000. This has also been acknowledged by Asri and Hamid (2018) in their study, which analyses the behaviour of youths shopping online even though most of them are in the B40 group. The user profiles of the OFD service mentioned in the study also showed that most users were married and used the OFD service at least once a month. Employment and household income play an important role in influencing the food spending habits of OFD service consumers. This can be attributed to ordered decisions and buying behaviour influenced by purchasing power and employment status (Meenambigai & Thatchinamoorthy, 2018).

Table 1 : Sociodemographic Profile of Respondents

Characteristics	n (N = 437)	Percentage (%)
<b>Age</b>		
18 - 25	82	18.8
26 - 35	188	43.0
36 - 45	134	30.7
46 - 50	33	7.5



Characteristics	n (N = 437)	Percentage (%)
<b>Gender</b>		
Female	223	51.0
Male	214	49.0
<b>Educational level</b>		
No formal education	3	0.7
Primary school	1	0.2
Secondary school	195	44.6
University/College/Institution	234	53.5
Others	4	0.9
<b>Employment Status</b>		
Student	54	12.4
Housewife	37	8.5
Self-employed	48	11.0
Government sector	194	44.4
Private sector	98	22.4
Retiree	5	1.1
Others	1	0.2
<b>Marital Status</b>		
Single	143	32.7
Married	286	65.4
Others	8	1.8
<b>Monthly Income</b>		
Less than RM4000	245	56.1
RM4000 – RM8500	149	34.1
More than RM8500	43	9.8
<b>Frequency of ordering food online</b>		
Daily	6	1.4
Weekly	60	13.7
Fortnightly	86	19.7
Monthly	147	33.6
During Movement Control Order only	91	20.8
During the fasting month only	27	6.2
Others	20	4.6
<b>Order for a specific event</b>		
Sometimes	165	37.8
Always	13	3.0
Never	259	59.3
<b>Halal status</b>		
Yes	362	82.8



Characteristics	n (N = 437)	Percentage (%)
No	47	10.8
Not sure	28	6.4
<b>Experienced in food poisoning</b>		
Yes	302	69.1
No	115	26.3
Not sure	20	4.6

#### 4.2 Food Safety Knowledge of OFD Services

The distribution of the respondent's answers to the food safety knowledge section is shown in Table 2. The important finding was that all consumers managed to get the correct answer in understanding risk-controlled food temperature and materials as well as substances that cause cross-contamination. Most of them agreed that thermal bags can help maintain food temperature so that bacterial reactions do not occur. Due to the emergence of the symptoms of food poisoning by pathogens in food, these results support the idea of the possible absorption or leakage of hazardous materials from plastic and polyethylene packages, which are the preferred materials for raw packaging, processed, and ready-to-eat food in the food industry (Omari, 2016). Compared with other parameters, consumer knowledge of the temperature of the food being delivered was relatively low. This indicates the lack of consumer knowledge about the abuse of time-temperature during food delivery, which is the exposure to the ambient temperature that can cause the growth of foodborne pathogens, including *Salmonella spp.* and *Clostridium spp.* (Ruby et al., 2019). Additionally, methods such as storage and delivery of ready-to-eat and ready-cooked food require precise control because foods stored at an abused temperature with a lack of proper personal hygiene can cause an outbreak of foodborne diseases among consumers. Therefore, appropriate storage temperature, food safety training, and continuous monitoring are recommended for food handlers or food deliverers.



Table 2 : Distribution of Food Safety Knowledge of OFD Services

Statement (n = 437)	Number of responses (%)		
	Yes	No	Not Sure
<b>Knowledge of hygiene</b>			
1. Food safety guides are included through an online food delivery service platform.	<b>251 (57.4)</b>	149 (34.1)	37 (8.5)
2. The cleanliness of the restaurant/premises needs to be ensured before ordering food online.	<b>273 (62.5)</b>	135 (30.9)	29 (6.6)
3. The personal hygiene of food delivery riders affects the risk of food contamination.	<b>384 (87.9)</b>	34 (7.8)	19 (4.3)
4. Food handlers must get anti-typhoid vaccination.	<b>372 (85.1)</b>	23 (5.3)	42 (9.6)
5. Food delivery riders must undergo food hygiene training.	<b>389 (89.1)</b>	22 (5.0)	26 (5.9)
<b>Knowledge of time-temperature abuse</b>			
6. The time of cooked/prepared food should be stated on the food packaging.	<b>264 (60.4)</b>	150 (34.3)	23 (5.3)
7. Cooked food is a high risk if eaten after 4 hours.	<b>296 (67.7)</b>	51 (11.7)	90 (20.6)
8. Reheating the food at 75°C for at least 2 minutes is an important step to reduce the risk of food poisoning.	<b>312 (71.4)</b>	36 (8.2)	89 (20.4)
9. Hot food should be delivered at a temperature over 65°C.	<b>237 (54.2)</b>	68 (15.6)	132 (30.2)
10. The use of a thermal bag is intended to maintain food temperature.	<b>396 (90.6)</b>	24 (5.5)	17 (3.9)
<b>Knowledge of food contamination</b>			
11. The use of staples, clips, pins, or metal material for wrapping food causes a risk of food contamination.	<b>355 (81.2)</b>	58 (13.3)	24 (5.5)
12. Cross-contamination between raw food and 'ready-to-eat' (RTE) foods is a major factor in food poisoning.	<b>377 (86.3)</b>	27 (6.2)	33 (7.6)
13. A polystyrene container can be used as a food container.	109 (24.9)	<b>300 (68.6)</b>	28 (6.4)
14. The thermal bag should be clean and covered tightly during food delivery.	<b>415 (95.0)</b>	13 (3.0)	9 (2.0)
<b>Knowledge of foodborne illnesses</b>			
15. 'Ready-to-eat' (RTE) food can accelerate bacterial growth.	<b>321 (73.5)</b>	51 (11.7)	65 (14.9)



Statement (n = 437)	Number of responses (%)		
	Yes	No	Not Sure
16. Typhoid fever can be transmitted by food.	<b>302 (69.1)</b>	115 (26.3)	20 (4.6)
17. Symptom of food poisoning :			
a. Stomach pain	<b>413 (94.5)</b>	19 (4.3)	5 (1.2)
b. Diarrhea	<b>399 (91.3)</b>	34 (7.8)	4 (0.9)
c. Skin rash	38 (8.7)	<b>314 (71.9)</b>	85 (19.5)
d. Vomiting	<b>359 (82.2)</b>	53 (12.1)	25 (5.7)
e. Fever	<b>248 (56.8)</b>	89 (20.4)	100 (22.9)
f. Poor appetite	<b>258 (59.0)</b>	72 (16.5)	107 (24.5)

\* Responses in bold are the correct answers for the food safety knowledge items.

#### 4.3 Food Safety Perception of OFD Services

Table 3 summarises the distribution of the respondent's answers to the food safety perception section. The perception affected the consumers' awareness in considering the issues of personal hygiene of food deliverers, such as personal health, hygiene of clothing and helmets, the practice of wearing face masks, and not smoking when making deliveries is a necessity for every food delivery rider. It is also contained in the Food Safety Guidelines for Food Products Sold Online Through the Movement Control Order issued by the Food Safety and Quality Division, Malaysia (2020), where food delivery riders must be in good health and practise personal hygiene. Only 4.8% of consumers disagreed/strongly disagreed with providing feedback through the mobile application platform on the food safety aspects and the food delivery riders' hygiene. It can be assumed that cleanliness is the key consideration of consumers, making the rating factor of hygiene critical to them when deciding to order their food. This has also been mentioned in the study by Tribhuvan (2020).

About 20% of participants had a neutral opinion about getting hot food and 7% disagreed/strongly disagreed that their food was delivered at the right temperature. This may be because restaurants/food premises need time to prepare their food, causing food delivery riders to take time to deliver their food. It can be assumed that restaurants in food applications have efficient and suitable packaging protocols; therefore, causing consumers to agree that their food packaging expectations are in line with their desires. The



packaging container's durability affects consumers' perceptions that it is unsustainable and easily damaged. This is in line with Suhartanto et al. (2019) 's study, which emphasises the importance of customer satisfaction with cleanliness in their study. Overall, participants agreed that cases of food poisoning online should be reported to the health department or authorities.

Table 3 : Distribution of Food Safety Perception of OFD Services

Statement (n = 437)	Number of responses (%)		
	Agree / Strongly Agree	Neutral	Disagree / Strongly Disagree
<b>Perception of hygiene</b>			
1. I pay attention to the appearance of the food delivery rider (e.g.: no smoking, neat and healthy).	361 (82.6)	64 (14.7)	12 (2.7)
2. I will make sure the food delivery rider practices personal hygiene (e.g.: clean clothes, clean helmets, and short and clean nails).	357 (81.7)	65 (14.9)	15 (3.4)
3. I would like to give feedback on the food safety and personal hygiene of the food delivery rider on the application.	329 (75.3)	87 (19.9)	21 (4.8)
4. I think the food hygiene ratings for restaurants/food premises should be displayed on food delivery applications.	357 (81.7)	52 (11.9)	28 (6.4)
<b>Perception of time-temperature abuse</b>			
5. I make sure the food is consumed within 4 hours after delivery.	314 (71.8)	81 (18.6)	42 (9.6)
6. I make sure the food is delivered at the right temperature (e.g.: the hot food is delivered hot).	317 (72.5)	88 (20.2)	32 (7.3)
7. I ensure the food delivery rider uses an appropriate thermal bag to place the food.	362 (82.8)	56 (12.9)	19 (4.3)
8. I think the storage and reheat instructions should be included when food is delivered.	331 (75.7)	77 (17.7)	29 (6.6)
<b>Perception of food contamination</b>			
9. I prefer the food is in proper containers during delivery.	370 (84.7)	45 (10.3)	22 (5.0)
10. I will refuse to accept the order if the	341 (78.0)	79 (18.1)	17 (3.9)



Statement (n = 437)	Number of responses (%)		
	Agree / Strongly Agree	Neutral	Disagree / Strongly Disagree
food container is damaged/leaked when delivered.			
11. I know that cross-contamination can occur if put extra containers with the main food container.	327 (74.8)	85 (19.5)	25 (5.7)
<b>Perception of foodborne illnesses</b>			
12. I have experienced symptoms of food poisoning through the food ordered online.	128 (29.3)	76 (17.4)	233 (53.3)
13. I think the practice of the 'Look, Smell, and Taste' concept is necessary before eating the food ordered online.	340 (77.8)	68 (15.6)	29 (6.6)
14. I think that I am at risk of food poisoning when I eat food ordered online.	240 (54.9)	126 (28.9)	71 (16.2)
15. I have no issue with ordering food made at home.	278 (63.6)	117 (26.8)	42 (9.6)
16. I give feedback through the food delivery application about the service and quality of food ordered online.	332 (75.9)	82 (18.8)	23 (5.3)
17. I will report to the health authorities if there are cases of food poisoning in the food ordered online.	292 (66.8)	99 (22.7)	46 (10.5)

#### 4.4 Level of Food Safety Knowledge and Perception of OFD Services

The respondent's level of knowledge of food safety and food safety perception of OFD services according to the category set for this study (poor, average, good) is shown in Figure 1 and Figure 2, respectively. The level of perception was better than the level of knowledge where 66.4% of participants scored above 75%. Meanwhile, 33% of participants showed a moderate level of perception from 50% - 75%, and only 0.7% of participants reported a low level of perception, showing a score of less than 50%. The participants' level of knowledge in this study was similar to the results of the study by Ruby et al. (2019) and Norazmir et al. (2012). Additionally, the level of perception of participants in this study was better than that demonstrated by Tribhuvan (2020) on the perception of hygiene and perceived time-temperature abuse. This also has clear implications for



dealing with information about food quality and safety; only giving consumers more information will not reduce perception when they do not feel confident in using that information (Grunert, 2005).

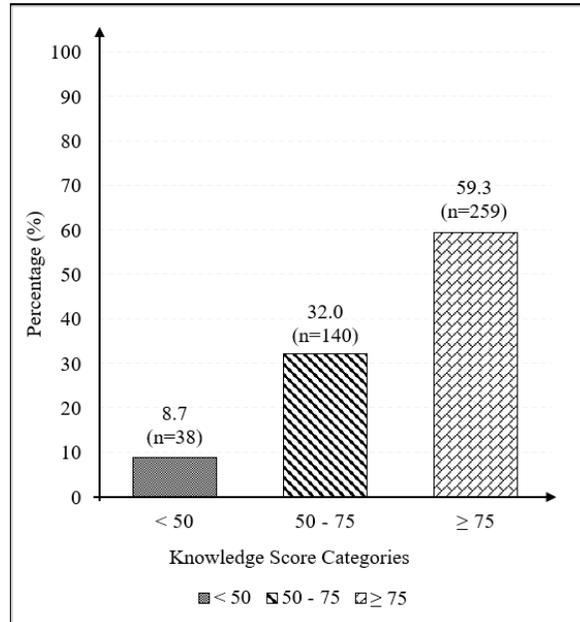


Figure 1 : Level of Food Safety Knowledge

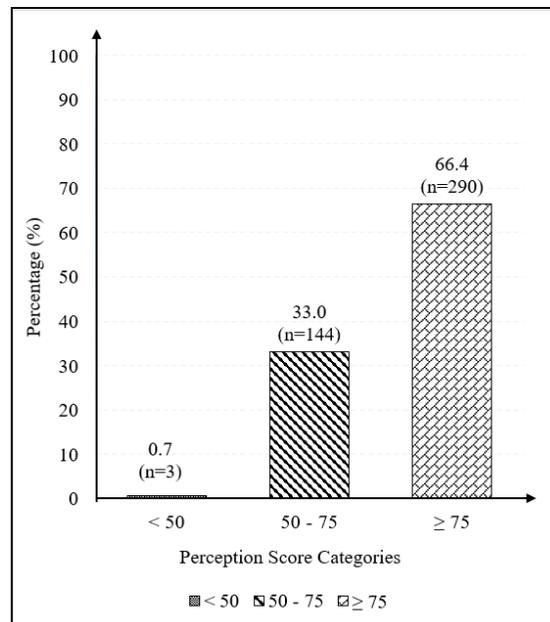


Figure 2 : Level of Food Safety Perception

The participants' knowledge was at a good level as the participants had a minimum score of 9% and a median value of  $77.3 \pm 15.95$ , while the participants' perception scores on food safety for OFD services showed a minimum score of 27% and a median value of  $80.0 \pm 11.60$ . The data were not normally distributed ( $p$ -value  $< 0.05$ ) according to the normality test; hence, the median value was used for basic categorization (Masyita et al. 2017).

#### 4.5 The Relationship of Sociodemographic with Knowledge and Perception on Food Safety of OFD Services

The chi-square test was conducted to compare the sociodemographic characteristics and participants' level of knowledge and perception of food safety by OFD service. The level of knowledge and perception was categorised into two categories, namely, high and low. Scores of less than 75% ( $< 75\%$ ) as low levels, while scores of more than 75% ( $\geq 75\%$ ) as high levels. As indicated in Table 4, there was a significant correlation in the scores between age, gender, level of education, frequency of OFD apps, OFD for a specific event, and Halal status with the perception of participants. Meanwhile, food poisoning experience had a significant correlation with knowledge level ( $\chi^2 = 64.52$ ,  $p = 0.00$ ) and perception ( $\chi^2 = 11.84$ ,  $p = 0.00$ ). Food safety knowledge was not further studied as there was only one significant factor and cannot be compared with other factors. The factors that may not show any association in this study include sources of information that do not reach the consumers and activities carried out by the consumers using the existing knowledge ingrained in their daily lives.

Table 4 : Relationship Between Variables on Food Safety of Knowledge and Perception of OFD Services

Variable (N = 437)	Food safety knowledge		Food safety perception	
	$\chi^2$	<i>p</i> -value	$\chi^2$	<i>p</i> -value
Age	5.94	0.11	8.75	0.03*
Gender	2.32	0.12	4.09	0.04*
Educational Level	3.60	0.46	23.51	0.00*
Employment Status	4.75	0.57	4.72	0.57
Marital status	0.95	0.62	1.78	0.41
Household Income	3.48	0.17	0.09	0.95
Frequency of OFD apps	8.93	0.17	20.20	0.00*
OFD for spec. event	1.67	0.43	16.77	0.00*
Halal status	1.40	0.49	6.88	0.03*
Experience with food poisoning	64.51	0.00*	11.84	0.00*

\*Chi-square test ( $p < 0.05$ ) for significant differences between knowledge and perception



Through the relationship between food safety knowledge level and gender, there were similarities observed with previous studies by Woh et al. (2016), which found that gender had no significant differences between food safety knowledge among consumers in Selangor, Ipoh, and Kuala Terengganu in Malaysia. However, the current study findings contradict the study by Tabrizi et al. (2017), which argued that there was indeed a significant relationship between food safety knowledge and the gender of the consumers. Also, age has a significant difference in food safety perception. Similarly, the study by Zorba and Kaptan (2011) using chi-square test results showed that consumer perceptions, age, and place of choice to make food purchases have a significant relationship with each other.

The influence of sociodemographic profile on participants' food safety perception was determined using the multiple logistic regression, as shown in Table 5. All predictors with significant differences between perceptions in the model were tested using Omnibus Tests of Model Coefficients ( $\chi^2 = 74.62$ ,  $df = 20$ ,  $p = 0.00$ ). In obtaining the best results to conclude the validation, the model was further tested using the Hosmer and Lemeshow Test ( $\chi^2 = 5.27$ ,  $df = 8$ ,  $p = 0.72$ ). Since the p-value of the Hosmer and Lemeshow test was greater than 0.05, this model was considered a good predictor of the level of food safety perception among participants. It is worth noting that the variety of participants' food safety perceptions between 15.7% (Cox and Snell  $R^2$ ) and 21.8% (Nagelkerke  $R^2$ ) had classified 72% of cases correctly.

Participants with high education levels were the strongest predictors (OR = 6.4; 95% CI: 0.57, 71.43), indicating that highly educated participants were six (6) times more likely to have a good food safety perception level. Therefore, the sociodemographic factor, namely, the high level of education, was a significant predictor factor that affected the participants' food safety perception of OFD service. The probability ratio of 0.25 for participants who ordered food online during the fasting month was found to be lower, indicating that this group is 0.25 times less likely to have a good level of food safety perception.



Table 5 : Logistic Regression Analysis of the Food Safety Perception of OFD Services

Variable	$\beta$	S.E	OR (95% CI)	p-value
<b>Age</b>				
18 - 25			1.00	
26 - 35	-0.81	0.32	0.82 (0.48, 1.41)	0.48
36 - 45	-0.12	0.33	1.43 (0.80, 2.59)	0.23
46 - 50	0.79	0.55	2.37 (0.88, 6.42)	0.09
<b>Gender</b>				
Female			1.00	
Male	0.59	0.23	1.51 (1.01, 2.25)	0.04*
<b>Educational level</b>				
No formal education			1.00	
Primary school	0.61	0.20	1.84 (1.23, 2.75)	0.02*
Secondary school	0.67	1.28	2.43 (0.22, 27.27)	0.04*
University/College/Institution	1.59	1.29	6.36 (0.57, 71.43)	0.03*
Others	0.79	1.74	6.00 (0.22, 162.53)	0.02*
<b>Frequency of ordering food online</b>				
Daily			1.00	
Weekly	-0.26	1.18	0.89 (0.09, 8.41)	0.92
Fortnightly	-1.17	1.15	0.32 (0.04, 2.87)	0.31
Monthly	-0.98	1.14	0.27 (0.03, 2.01)	0.24
During Movement Control Order only	-0.84	1.15	0.50 (0.05, 4.49)	0.54
During the fasting month only	-1.13	1.20	0.25 (0.03, 2.44)	0.23
Others	0.298	1.36	1.80 (0.13, 24.16)	0.66
<b>Order for a specific event</b>				
Sometimes			1.00	
Always	0.043	0.714	0.96 (0.25, 3.68)	0.96
Never	-0.416	0.263	0.41 (0.26, 0.63)	0.11
<b>Halal status</b>				
Yes			1.00	
No	-0.542	0.351	0.51 (0.28, 0.94)	0.12
Not sure	-0.571	0.435	0.52 (0.24, 1.12)	0.19
<b>Experienced in food poisoning</b>				
Yes			1.00	
No	0.628	0.289	2.30 (1.39, 3.82)	0.01*
Not sure	-0.713	0.523	0.74 (0.30, 1.84)	0.04*

\*  $p < 0.05$ , N = 437

Omnibus Test of Model Coefficients:  $\chi^2 = 74.62$ , df = 20, p = 0.00

Hosmer and Lemeshow Test:  $\chi^2 = 5.27$ , df = 8, p = 0.72

Nagelkerke R<sup>2</sup> = 21.8%

Overall, the low-income youth in the country are confident and satisfied with the aspects of food safety practised in OFD services. Good food safety knowledge and experience from food poisoning



incidents increases consumers' confidence and awareness of the importance of food safety aspects when ordering online so that they can get the best products possible. Simultaneously, education or information on time-temperature collisions should be applied to consumers so that they are unsusceptible to foodborne illnesses caused by pathogenic reactions in food. Highly educated consumers are the biggest influence in determining food safety perceptions by OFD services.

## **5.0 Conclusion and Recommendations**

In brief, it was found that most consumers of OFD services in Sungai Buloh, Selangor, Malaysia have a good level of food safety knowledge in online food ordering and most of them have a good food safety perception toward OFD service, suggesting the increasing popularity of online food ordering among young people with a high level of education. Transformations in the food order trend were due to changes in consumer lifestyle and changes to the new norms of modern life in Malaysia and the expansion of online food service activities.

Food safety is said to be part of the quality of OFD services focusing on its features such as fresh, healthy, well prepared, and cooked, which are among the factors that influence consumer satisfaction and the decision to re-order. In line with this study, consumer perceptions of food safety of OFD services should be given attention by service providers' consumers so that the quality obtained would increase consumer satisfaction (Zulkarnain et al., 2015; Kotler et al., 1991). Further, it was revealed that consumers' opinions on the awareness and food safety requirements available greatly influence their perception of food safety. They felt that inadequate food hygiene and safety by food handlers and deliverers would lead to exposure to health threats and were more likely to change their perceptions of the OFD service compared with consumers who were already satisfied with the existing hygiene level. However, only 29% of participants stated that they had experienced food poisoning symptoms while using the OFD service. This shows that the sales force is trying its best to convince and gain consumers' trust by maintaining the quality and safety of their food. The low level of consumer confidence in OFD services in terms of food safety has also been reported in a study by Rimal et al. (2001), in which respondents expressed their lack of



confidence in the existing regulatory system, protecting them from the risk of food insecurity.

Therefore, realising the issues of food safety and prevention methods, such as food handling during preparation and delivery, consumers have become more sensitive and concerned about food safety threats and place a high perception in changing their food order habits compared with those with a lower level of awareness. This is in line with the findings by Zimmerman et al. (1994), mentioning that when levels of perception and experience are low, opinions are often based on pre-existing global attitudes toward food safety-related issues. Meanwhile, the consumers' experience of receiving food orders purchased online according to the desired quality is a positive initial indicator that can encourage respondents to re-order online in the future.

Future studies should develop questions and methods based on this study to benefit from the basic knowledge available and enable comparisons over time to assess consumer perceptions of OFD service's food safety. Researchers should continue to explore possible relationships between different socio-demographic aspects with knowledge and perceptions of food safety, whether or not they impact these relationships. The more critical survey of inquiries and recommendations to observe the relationship between consumer needs and requirements on food safety of OFD services requires collaboration with government, industry, and academia to provide accurate and better research results.

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