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Original Research Article

Evaluation of Food Safety Knowledge, Attitude, and Practices among Street Food Vendors in the Klang Valley, Malaysia

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Abstract: Street food vendors are proliferating in Malaysian communities because the foods are reasonably priced and accessible since they are typically found in crowded areas. Due to informal observation of food handling practices, street food vendors have been noted as a common cause of foodborne diseases. Hence, the objectives of this study are 1) to determine the level of knowledge, attitude, and practices (KAP) of food safety among street food vendors, 2) to examine the associations between the level of food safety practices and socioeconomic characteristics of street food vendors, and 3) to investigate the relationship between level of knowledge, attitude, and practices of food safety among street food vendors, A purposive sampling method was used, and 268 street food vendors were involved in this study. Several statistical analyses, including descriptive analysis, Chi-square analysis, and Pearson correlation analysis, were used to analyze the data. Out of 268 street food vendors, 219 (81.7%) had adequate knowledge, 239 (89.2%) had a favourable attitude, and 245 (91.4%) vendors implemented good practices in their food handling procedures. Street food vendors' practices were associated with education level (p=0.069), type of stalls (p=0.030), monthly revenue (p=0.006), license (p=0.027), food safety training (p=0.001), and typhoid injection (p=0.005). The study revealed a positive correlation between the street food vendors' knowledge, attitude, and practices (KAP) regarding food safety. This investigation suggests that the street food vendors demonstrated a commendable proficiency in food safety KAP. However, relevant authorities must prioritize rigorous enforcement and educational interventions. This proactive approach is essential to elevate food safety standards further and effectively address the potential risks of foodborne diseases.

Keywords: street food; food safety; knowledge; attitude; practices

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1. Introduction

Street-sold foods are ready-to-eat foods and drinks prepared and sold by street vendors, hawkers, or similar public places (Rane, 2011). Street food vending is rapidly gaining popularity across all socioeconomic backgrounds because the foods sold are far less expensive, and a wide variety of options are available (Alimi, 2016). Most foods sold by street food vendors are pre-cooked and ready-to-eat (RTE) (Khater *et al.*, 2013). These foods are prepared ahead of time (4–8 hours) and have cast significant doubt in terms of bacteriological quality due to such preparation methods and the lack of essential cleanliness at these premises (Latchumaya *et al.*, 2021), which allow bacterial growth (Rosset *et al.*, 2004). When meals are prepared hours before selling and presented in an open environment without proper incubation, there is a high potential for bacterial contamination (Latchumaya *et al.*, 2021), which can also contribute to foodborne illness (Sharifa Ezat *et al.*, 2013). In Malaysia, night markets and street stalls have popularized street food vending concepts and sell household goods, clothing, and a variety of authentic Malaysian foods (Latchumaya *et al.*, 2021). Because night markets are temporary and usually occur in densely populated areas, basic sanitation and utility are frequently reported as lacking (Abdul-Mutalib *et al.*, 2012). The environmental conditions in the vendor area, among other things, contribute to the contamination of street food (Abd Rahim *et al.*, 2019). Besides, incorrect holding temperature and increased holding duration in street vending have also resulted in severe food poisoning incidents and foodborne outbreaks (Birgen *et al.*, 2020).

According to Soon *et al.* (2011), nearly half of all foodborne diseases from reported food poisoning cases were caused by unsanitary food handling practices. However, foodborne disease cases in Malaysia are often underestimated because most incidents are not reported, and many procedures must be completed before any cases can be reported to the authorities (Soon *et al.*, 2011). Hence, a lack of accurate data on foodborne diseases has made it difficult for policymakers to improve the current food hygiene policies or regulations (Salleh *et al.*, 2017). Despite the inherent advantages of selling and eating street food, its safety can be jeopardized by a variety of factors, including the quality of the raw ingredients used, contaminated water supply, unsanitary environment, unhygienic food handlers, storage conditions, and the operation of businesses in areas that do not me*et a*ll food safety regulations can contribute and increase the risk of foodborne illness (Choudhury *et al.*, 2011; Aluko *et al.*, 2014). Although street food is popular, it is frequently reported to be contaminated with pathogens and linked to foodborne illnesses (Das *et al.*, 2010; Hussain & Sheikh Dawood, 2020), puts people who eat the food at risk of food-borne illnesses such as salmonellosis, listeriosis, typhoid fever, cholera, and diarrhea (Liu *et al.*, 2014).

Previous studies have indicated that the knowledge, attitude, and sociodemographic factors of food vendors play a significant role in shaping their food safety practices (Pang & Toh, 2008; Woh *et al.*, 2016; Jores *et al.*, 2018; Addo-Tham *et al.*, 2020). The knowledge possessed by food handlers affects their attitude and, consequently, their adherence to personal hygiene, kitchen cleanliness, and disease control measures (Kwol *et al.*, 2020). In

addition to possessing sufficient knowledge and facing strict enforcement, cultivating the right attitude among food handlers can reduce the incidence of foodborne illnesses (Abdullah Sani & Siow, 2014). Moreover, Azaman *et al.* (2016) highlighted that knowledge and attitude are pivotal factors in prompting appropriate actions among consumers, especially concerning health matters. When equipped with knowledge and a positive attitude, food handlers are crucial in sustaining food safety practices, ensuring higher quality, and delivering safe products to consumers. Consequently, the level of knowledge emerges as a critical element in comprehending the interplay between attitude and practices (Zanin *et al.*, 2017). Attitude is highlighted as a crucial factor influencing food safety behaviour and practices, contributing to reducing the occurrence of foodborne diseases (Aziz & Dahan, 2013; Abdullah Sani & Siow, 2014).

Hence, understanding street food vendors on their food safety knowledge, attitudes, and practices is crucial to minimizing the incidence of foodborne diseases (Majowicz *et al.*, 2015). Because street food vendors serve food directly to the consumers, they must take significant steps to reduce the number of pathogenic microorganisms transferred to food to the minimum level (Medeiros *et al.*, 2011). As people consume street food, the number of customers potentially exposed to food-borne hazards increases (Adam *et al.*, 2014). In light of the above discussions, the objectives of this study are 1) to determine the level of knowledge, attitude, and practices (KAP) of food safety among street food vendors, 2) to investigate the relationship between the level of knowledge, attitude, and practices of food safety among street food vendors, and 3) to examine the associations between the level of food safety practices and socioeconomic characteristics of street food vendors.

2. Literature Review

Figure 1 illustrates the study's conceptual framework adapted from Abdullah Sani and Siow (2014) and Kwol *et al.* (2020).

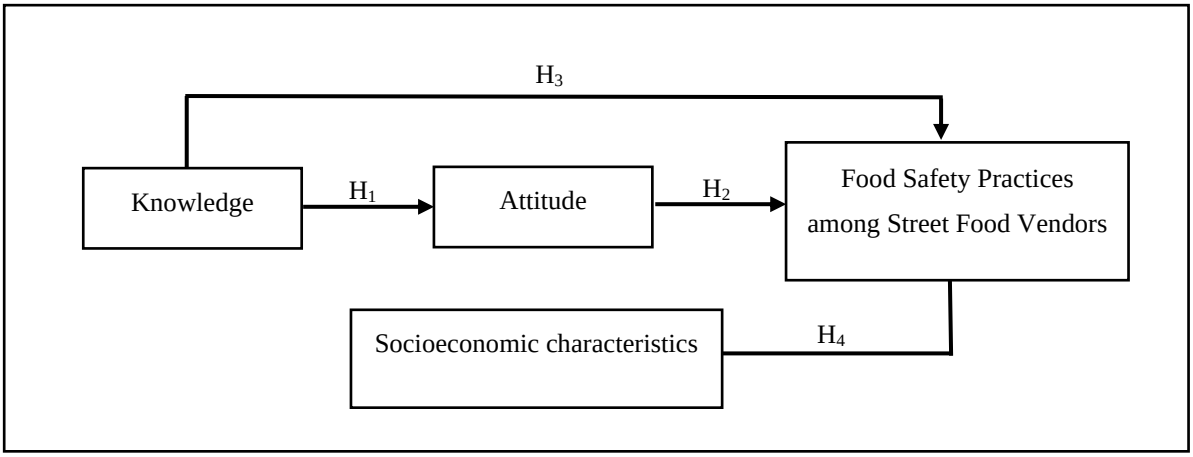

Figure 1. Conceptual framework of food safety practices among street food vendors. Source: Abdullah Sani and Siow (2014); Kwol *et al.* (2020)

The KAP model proposes that an individual's behaviour is influenced by his or her knowledge and that information will lead to attitudinal changes, subsequently leading to behavioural practice changes (Rennie, 1995). Even though researchers found various factors that influence food handling behaviour, everyone agrees that food handlers must have enough knowledge of food safety and the ability to apply that information when handling food (Mortlock *et al.*, 2000). Three independent variables, namely knowledge, attitude, and practices (Kwol *et al.*, 2020), were used to study food safety practices among street food vendors. The framework shows that knowledge will lead to attitudes towards food safety practices among street food vendors (Kwol *et al.*, 2020). Attitude, in turn, will lead to food safety practices among street food vendors (Akabanda *et al.*, 2017; Kwol *et al.*, 2020;). Previous studies show that demographic characteristics influence street food vendors' food safety practices (Mukherjee *et al.*, 2018; Tuglo *et al.*, 2021). Hence, four hypotheses were established for this study as follows:

H1: There is a positive relationship between the level of knowledge and attitude among street food vendors.

H2: A positive relationship exists between attitude and level of practices among street food vendors.

H3: There is a positive relationship between the level of knowledge and practice among street food vendors.

H4: There are associations between socioeconomic characteristics and food safety practices among street food vendors.

2.1. Study Area

In selecting respondents for this study, a purposive sampling method was utilized to carefully choose 268 street food vendors in the Klang Valley, Malaysia. The criteria for inclusion involved respondents who met two specific conditions. Firstly, respondents needed to engage actively in the street food business as food handlers. Secondly, they were required to actively participate in the food handling processes associated with street food vending.

2.2. Questionnaire Design

The responses from these street food vendors were collected using a structured questionnaire through face-to-face interviews. A structured questionnaire was developed consisting of four parts; the first part was established to obtain the socioeconomic characteristics of the respondents. The second part consisted of 18 statements about knowledge of street food vendors with three optional answers: 1=No, 2= Not Sure, and 3=Yes. A score of 1 was given for each correct answer, while incorrect answers and not-sure answers were given a 0 score. The third part included 18 statements to assess the respondents' attitudes regarding food safety. The statements were established based on a 5-point Likert scale with 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree. The score was 1 (1=strongly disagree) to 5 (5=strongly agree). In the last part, 18 statements

on food safety practices based on three optional answers of 1=Never, 2= Seldom, and 3= Always were established. Each statement was recorded as 1 (never) to 3 (3=always).

2.3. Statistical Analysis

Descriptive analysis, Chi-square analysis, and Pearson correlation analysis were used to analyse the data. The respondents' socioeconomic characteristics and KAP level were summarized using descriptive analysis. The score for food safety knowledge ranged from 0 to 18. Street food vendors with scores below eight were categorized as having inadequate knowledge, while those above nine were considered adequate. The attitude's total scale ranged from 18 to 90, and total scores above 54 were categorized into favourable attitude and unfavourable attitude, with a total score between 18 and 53. Evaluation for food safety practices employed a 3-point Likert scale (1= Never, 2= Seldom, 3= Always). Scores ranged from 1 (Never) to 3 (Always), and a total score between 36-54 was considered good practices and poor practices for those with a score between 18-35. Chi-square analysis was used to determine the association between sociodemographic characteristics of street food vendors and their food safety KAP levels. Meanwhile, Pearson correlation analysis was used to determine the relationship between three variables: the level of knowledge, attitude, and practices toward food safety among street food vendors.

Business organisations have widely used social media in their marketing activities, whether they sell products or services. Social media functions as an instrument for socialisation and communication based on the viewpoint of the individual, whereas from the business viewpoint, social media functions as a medium by which businesses connect with clientele as a whole (Boyd & Ellison, 2007; Mangold & Faulds, 2009; Hutton & Fosdick, 2011; Che Nawi *et al.,* 2019). Remarkably, social media needed only a few years to grab the attention and time of Internet users since its inception. The adoption of social media has since expanded (Zolkepli & Kamarulzaman, 2014; Ahmad *et al.,* 2019) and has changed how consumers and organisations interact (Akman & Mishra, 2017). Parveen *et al.* (2015) stated that the competency and performance of institutions, such as development in information, approachability and enrichment of customer service and relations activities, can be improved by social media. Cox (2012) described that businesses can network with clientele to understand customer requirements better and build connections using social media. Chmielecki (2014) noted that marketers could get away with a voice to converse with prospective customers and partners through social network media. Adopting marketing strategies based on social media has tremendously improved the interaction of firms with consumers, improving marketing strategies based on consumer feedback and helping companies gain marketing information (Galati *et al.,* 2017). Adopting social media for business procedures that motivate consumer and business commitment levels is indeed a rising trend (Tuten & Angermeier, 2013).

Social media has been recognised as a viable marketing tactic by many organizations across the globe to reach their key audiences. Dahnil *et al.* (2014) characterised social media

marketing as involving the marketing of products, brands, services, thoughts, and information via social media platforms, and it can be recognised as an emerging business routine. According to Barefoot and Szabo (2010), social media marketing utilises social networking sites to promote or advertise a company and sell products. Eagleman (2013) described social media as a unique marketing and communication strategy. Further, Gensler *et al.* (2013) stated that online presence via social media in accomplishing marketing actions may affect a brand's performance. Hence, social media marketing is an emerging trend that is quickly evolving, and with the advancement of social media platforms, businesses can reach their targeted audiences faster.

Razak and Latip (2016) further proposed using social media as a collaborative platform. It allows companies to form a brand image and awareness, boost sales, captivate new customers, and secure present customers. Shahizan *et al.* (2012) affirmed that well-established companies in Malaysia have broadly embraced social media as a marketing tool. On the other hand, Hong *et al*. (2015) declare social media as a trend among the younger generation and business partners, as indicated by an overwhelming number of marketers (92%) based on Hubspot's 2014 figures, that social media marketing is the key to boosting business development. Thus, to ensure their business can cover a wider market and customers, agropreneurs need to use social media marketing as one of the means to run the business.

3. Results and Discussions

3.1. Socioeconomic Characteristics of Street Food Vendors

This survey included 268 street food vendors in the Klang Valley. According to the data in Table 1, most vendors (166 vendors) were male, and 38.4% were between the ages of 30 and 39. Many vendors were Malay, accounting for 242 (90.3%), with Muslims accounting for 98.1% (263). Approximately 165 vendors (61.6%) were married, and the majority (133 vendors (49.6%) had completed secondary school. Meanwhile, 239 (89.2%) of the vendors were sole proprietorships and 45.9% (123) of the vendors operated at night. Most street food vendors have 1–15 years of food handling experience (94.0%) and have stationary stalls (71.6%). Most sellers (91.8%) employ 1 to 7 people, and 175 (65.3%) earn between RM1,000 and RM10,000 monthly. Around 220 (82.1%) vendors had licenses issued by locals to operate street food vendors. Half of the vendors (56.0%) attended food safety training. The findings revealed that 69.4% (186) of the vendors had received their typhoid vaccine before working in food handling and processing.

Table 1. Respondents' socioeconomic characteristics.

Characteristics		Frequency (*n*)	Percentage (%)
Gender	Male	166	61.9
	Female	102	38.1
Age (years)	20–29	97	36.2
	30–39	103	38.4
	40–49	52	19.4
	50–59	16	6.0
Race	Malay	242	90.3
	Chinese	6	2.2
	Indian	1	0.4
	Others	19	7.1
Religion	Islam	263	98.1
	Buddha	5	1.9
Marital status	Single	103	38.4
	Married	165	61.6
Education level	Primary School	19	7.1
	Secondary School	133	49.6
	Certificate	30	11.2
	Diploma	40	14.9
	Bachelor's Degree	42	15.7
	Master	4	1.5
Business ownership	Sole Proprietorship	239	89.2
	Partnership	23	8.6
	Company	6	2.2
Operation hour	Morning	66	24.6
	Evening	79	29.5
	Night	123	45.9
Experience in food handling (years)	1–15	252	94.0
	16–30	16	6.0
Type of stalls	Mobile	76	28.4
	Stationary	192	71.6
Number of workers	1–7	246	91.8
	8–15	22	8.2
Monthly revenue (RM)	1,000–10,000	175	65.3
	10,001–50,000	91	34.0
	50,001–100,000	2	0.7
License	Yes	220	82.1
	No	48	17.9

n=268

3.2. Food Safety Knowledge of Street Food Vendors

In Table 2, most of the street food vendors (92.5%) agreed with the statement "Washing hands before handling food reduces the risk of food contamination" and 91.8% agreed that "Changes in appearance, taste, colour, and smell can identify foods that are not safe to eat". 78.4% of street food vendors answered correctly with the statement, "Foodborne diseases are caused by contaminated food and microbial (bacteria, pathogens, viruses, or parasites) that spoils food", and 70.1% of street food vendors have heard about foodborne diseases whereas 73.5% responded that "Foodborne diseases are caused by unhygienic practices in the production, post-harvest, processing, and preparing of food". Approximately more than half of food vendors agreed that "Cross-contamination is a major contributing factor to food contamination" and "Preparation of foods in advance could contribute to food contamination" (72.4%). %). As indicated by Haapala and Probart (2004), Siau *et al.* (2015), and Azanaw *et al.* (2021), cross-contamination and preparing foods in advance are the main contributing factors to food contamination. Only 35.1% knew that Salmonella, S. aureus and E. coli are among foodborne pathogens that can contaminate foods. The results were similar to those of Abdullah Sani and Siow (2014), and Woh *et al.* (2016), and 45.5% of the street food vendors wrongly answered the statement that "Food handlers with minor injuries can continue food handling activities", proving that they tend to continue to prepare the food even though they got minor injuries. Lastly, more than half of street food vendors (59.3%) answered wrongly to "Typhoid injection can prevent typhoid fever". This showed that most street food vendors do not know about typhoid injection and have not taken the injection before handling food.

Table 1. Street food vendors' food safety knowledge.

Statements		**Responses (%)**			**Mean**	**SD**
		1	**2**	**3**		
1.	Washing hands before handling food reduces the risk of food contamination.	3 (1.1%)	17 (6.3%)	248 (92.5%)	2.91	0.318
2.	Foods that are not safe to eat can be identified by changes in appearance, taste, colour, and smell.	4 (1.5%)	18 (6.7%)	246 (91.8%)	2.90	0.343
3.	It is important to know the temperature of the refrigerator to reduce the risk of food spoilage.	2 (0.7%)	35 (13.1%)	231 (86.2%)	2.85	0.374
4.	Food handlers should wear clean and appropriate attire when handling food.	9 (3.4%)	24 (9.0%)	235 (87.7%)	2.84	0.447
5.	Wearing gloves is required for safe food handling.	8 (3.0%)	27 (10.1%)	233 (86.9%)	2.84	0.442

Statements		Responses (%)			Mean	SD
		1	2	3		
6.	Proper cleaning and sanitation of utensils decrease the risks of food contamination.	9 (3.4%)	32 (11.9%)	227 (84.7%)	2.81	0.469
7.	Well-cooked foods are free from microbes that can cause foodborne illness.	9 (3.4%)	46 (17.2%)	213 (79.5%)	2.76	0.500
8.	Foodborne diseases are caused by contaminated food and microbial (bacteria, pathogens, viruses, or parasites) that spoil food.	23 (8.6%)	35 (13.1%)	210 (78.4%)	2.70	0.620
9.	Foodborne diseases are caused by unhygienic practices in the production, post-harvest, processing, and preparation of food.	15 (5.6%)	56 (20.9%)	197 (73.5%)	2.68	0.575
10.	I have heard about the foodborne disease.	15 (5.6%)	65 (24.3%)	188 (70.1%)	2.65	0.585
11.	Preparing food in advance increases the risk of food contamination.	28 (10.4%)	46 (17.2%)	194 (72.4%)	2.62	0.668
12.	Reheating cooked food can contribute to food contamination.	29 (10.8%)	55 (20.5%)	184 (68.7%)	2.58	0.680
13.	Frozen foods can kill microbes that cause food spoilage and foodborne illness.	21 (7.8%)	73 (27.2%)	174 (64.9%)	2.57	0.635
14.	Cross-contamination is a major contributing factor to food contamination.	25 (9.3%)	96 (35.8%)	147 (54.9%)	2.46	0.660
15.	Raw and cooked foods should be kept separately to avoid cross-contamination.	46 (17.2%)	57 (21.3%)	165 (61.6%)	2.44	0.770
16.	*Salmonella*, *S. aureus*, and *E. coli* are among the foodborne pathogens.	41 (15.3%)	133 (49.6%)	94 (35.1%)	2.20	0.683
17.	Food handlers with minor injuries can continue food handling activities.	122 (45.5%)	47 (17.5%)	99 (36.9%)	1.91	0.906
18.	Typhoid injection can prevent typhoid fever.	159 (59.3%)	34 (12.7%)	75 (28.0%)	1.69	0.882

Note: 1= No, 2= Not sure, 3= Yes

3.3. Food Safety Attitude of Street Food Vendors

More than half of the street food vendors shown in Table 3, agreed that it is their responsibility to handle food safely and adequately (mean of 4.21), followed by 46.3% of street food vendors who agreed that good personal hygiene can prevent foodborne disease

(mean of 4.17). More than half of the street food vendors (51.1%) were willing to attend food safety training (mean of 4.03). Only 33.2% of the street food vendors were willing to take leave when sick or had a fever that prohibited them from handling food preparations (mean of 4.05). About 30.6% of the food vendors strongly agreed that food utensils and containers must be appropriate, clean, and safe (mean of 3.94). Meanwhile, more than half of street food vendors concurred that food premises should always be kept clean to prevent contamination (mean of 3.77). It shows that the street food vendors understand the consequences of contamination if the operators mishandle the food. As addressed by Coleman and Roberts (2005) and Powell *et al.* (1997), attitude usually precedes practices. 58.2% of the food vendors agreed that every employee and employer must always maintain personal hygiene when handling food (mean of 3.77). This finding is consistent with Abdullah Sani and Siow (2014) and Jores *et al.* (2018), who state that serving safe food and maintaining personal hygiene are the utmost responsibilities of street food operators. 55.6% of street food vendors agreed, while 9.7% strongly agreed that wearing caps and gloves is critical to avoid food contamination while handling food. More than half (52.2%) believe that wearing accessories can lead to cross-contamination. The results align with a study by Letuka and Nkhebenyane (2021), where most of their food handlers agreed that wearing masks, gloves, and caps is a significant practice that can reduce food contamination. Meanwhile, Akabanda *et al.* (2017) found that 60% of food handlers indicated that using caps, masks, and gloves can minimize the risk of contamination. About 51.5% of street food vendors agreed that all food handlers must attend food safety training before being involved in food handling.

Table 2. Street food vendors' food safety attitude.

Statements		**Responses (%)**					**Mean**	**SD**
		1	**2**	**3**	**4**	**5**		
1.	I believe that handling food properly and safely is my responsibility.	0 (0.0%)	6 (2.2%)	40 (14.9%)	113 (42.2%)	109 (40.7%)	4.21	0.776
2.	I know that good personal hygiene can prevent foodborne diseases.	1 (0.4%)	1 (0.4%)	46 (17.2%)	124 (46.3%)	96 (35.8%)	4.17	0.743
3.	I am willing to attend food safety training.	0 (0.0%)	16 (6.0%)	38 (14.2%)	137 (51.1%)	77 (28.7%)	4.03	0.818
4.	I am willing to take leave when sick, with a fever or cold.	0 (0.0%)	1 (0.4%)	74 (27.6%)	104 (38.8%)	89 (33.2%)	4.05	0.789
5.	I believe the use of food utensils and food containers must be appropriate, clean, and safe.	0 (0.0%)	10 (3.7%)	77 (28.7%)	99 (36.9%)	82 (30.6%)	3.94	0.861
6.	I am willing to change my food handling habits if it is unsafe.	0 (0.0%)	5 (1.9%)	73 (27.2%)	130 (48.5%)	60 (22.4%)	3.91	0.752
7.	I believe that wearing clean and appropriate attire will prevent	0 (0.0%)	9 (3.4%)	85 (31.7%)	107 (39.9%)	67 (25.0%)	3.87	0.828

Statements		Responses (%)					Mean	SD
		1	2	3	4	5		
	food contamination.							
8.	I think food premises should always be kept clean to prevent food contamination.	0 (0.0%)	10 (3.7%)	101 (37.7%)	98 (36.6%)	59 (22.0%)	3.77	0.834
9.	I feel that every employee and employer must always maintain personal hygiene when handling food.	2 (0.7%)	15 (5.6%)	60 (22.4%)	156 (58.2%)	35 (13.1%)	3.77	0.772
10.	I believe improper food storage can contribute to food contamination.	0 (0.0%)	9 (3.4%)	81 (30.2%)	150 (56.0%)	28 (10.4%)	3.74	0.687
11.	I believe raw materials and cooked food must be stored separately.	0 (0.0%)	29 (10.8%)	73 (27.2%)	111 (41.4%)	55 (20.5%)	3.72	0.913
12.	I believe that it is my responsibility to ensure that the food provided is safe.	0 (0.0%)	30 (11.2%)	62 (23.1%)	133 (49.6%)	43 (16.0%)	3.71	0.869
13.	I believe wearing caps and gloves is critical to avoid food contamination while handling food.	1 (0.4%)	11 (4.1%)	81 (30.2%)	149 (55.6%)	26 (9.7%)	3.70	0.714
14.	I believe that educating myself with food safety knowledge enhances my confidence in handling food.	0 (0.0%)	20 (7.5%)	85 (31.7%)	132 (49.3%)	31 (11.6%)	3.65	0.781
15.	I believe that sanitation is the food handler's responsibility.	0 (0.0%)	7 (2.6%)	112 (41.8%)	121 (45.1%)	28 (10.4%)	3.63	0.704
16.	I believe that producing safe food is more important than tasty food.	2 (0.7%)	26 (9.7%)	104 (38.8%)	101 (37.7%)	35 (13.1%)	3.53	0.867
17.	I think all food handlers need to attend food safety training.	1 (0.4%)	50 (18.7%)	55 (20.5%)	138 (51.5%)	24 (9.0%)	3.50	0.910
18.	I believe that wearing accessories can lead to cross-contamination.	3 (1.1%)	39 (14.6%)	72 (26.9%)	140 (52.2%)	14 (5.2%)	3.46	0.845

Note: 1= Strongly disagree, 2= Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree

3.4. Food Safety Practices of Street Food Vendors

About 79.9% of food vendors always made sure that they checked the quality of raw materials at the time of purchase receipt from the supplier, with a mean of 2.72 (Table 4). More than half of the street food vendors (77.4%) reported consistently ensuring their health status before handling food (mean of 2.68). Besides, 69.8% of the street food checked the temperature of the storage place that stores the raw materials, with a mean of 2.61. Approximately 74.3% of the street food reported that they always wash their hands with soap and water before and after handling food (mean of 2.60), which is also consistent with the findings by Siau *et al.* (2015) and Zhang *et al.* (2015). Only 69.8% reported consistently ensuring the water supply is clean and safe. In addition, 67.9% of street food vendors will

ensure their nails are clean and short before handling food. These outcomes are supported by Tan *et al.* (2013) and Samapundo *et al.* (2015), and clean and short nails during food handling are among the main conditions the food operators address. Most street food vendors wear a suitable apron and disposable head cover during food handling and proper attire when on food premises (62.3% and 60.8%, respectively). Over half (57.5%) of the food vendors did sanitizing activities in their food-handling areas. Lastly, about 61.6% of street food vendors always wear disposable gloves during food handling.

Table 3. Street food vendors' food safety practices.

Statements		Responses (%)			Mean	SD
		1	2	3		
1.	Check the quality of raw materials at purchase/receipt from the supplier.	24 (9.0%)	30 (11.2%)	214 (79.9%)	2.71	0.622
2.	Ensure the health status before handling food.	26 (9.7%)	35 (13.1%)	207 (77.2%)	2.68	0.644
3.	Check the temperature of the storage place that stores the raw materials.	23 (8.6%)	58 (21.6%)	187 (69.8%)	2.61	0.641
4.	Using separate equipment to handle food raw and cooked food.	14 (5.2%)	76 (28.4%)	178 (66.4%)	2.61	0.586
5.	Wash hands with soap and water before and after handling food.	39 (14.6%)	30 (11.2%)	199 (74.3%)	2.60	0.730
6.	Ensure the water supply is clean and safe.	27 (10.1%)	54 (20.1%)	187 (69.8%)	2.60	0.666
7.	Use appropriate utensils and food containers when handling food.	29 (10.8%)	62 (23.1%)	177 (66.0%)	2.55	0.682
8.	Ensure not to wear accessories during food handling.	37 (13.8%)	50 (18.7%)	181 (67.5%)	2.54	0.726
9.	Wear clean, tidy attire and appropriate footwear when handling food.	50 (18.7%)	30 (11.2%)	188 (70.1%)	2.51	0.791
10.	Ensure nails are short and clean when handling food.	49 (18.3%)	37 (13.8%)	182 (67.9%)	2.50	0.786
11.	Ensure good food waste management.	38 (14.2%)	70 (26.1%)	160 (59.7%)	2.46	0.730
12.	Wear a suitable apron and disposable head cover during food handling.	49 (18.3%)	52 (19.4%)	167 (62.3%)	2.44	0.784
13.	Ensure raw materials are clean before use.	45 (16.8%)	59 (22.0%)	164 (61.2%)	2.44	0.765
14.	Avoid cross-contamination during food handling.	42 (15.7%)	70 (26.1%)	156 (58.2%)	2.43	0.748
15.	Ensure safe food preparation and handling processes.	43 (16.0%)	68 (25.4%)	157 (58.6%)	2.43	0.753
16.	Wear proper attire when on food premises.	64 (23.9%)	41 (15.3%)	163 (60.8%)	2.37	0.845
17.	Ensure that disinfection activities are always carried out in food-handling areas.	54 (20.1%)	63 (23.5%)	151 (56.3%)	2.36	0.798
18.	Wear disposable gloves during food handling.	68 (25.4%)	35 (13.1%)	165 (61.6%)	2.36	0.861

Note: 1= Never, 2= Seldom, 3= Always

3.5. Level of Street Food Vendors' KAP on Food Safety

Table 5 summarises the KAP level of food safety among street food in Klang Valley. 219 (81.7%) street food vendors had adequate food safety knowledge, 239 (89.2%) had favourable attitudes, and 245 (91.4%) showed good practices in food handling. Overall, this study's KAP level of street food vendors is considered relatively good.

Table 5. Summary of street food vendors' food safety KAP levels.

Level (score)	Frequency (n)	Percentage (%)
Food Safety Knowledge		
Adequate knowledge (9 – 18)	219	81.7
Inadequate knowledge (0 – 8)	49	18.3
Food Safety Attitude		
Favourable attitude (54 – 90)	239	89.2
Unfavourable attitude (18 – 53)	29	10.8
Food Safety Practices		
Good practice (36 – 54)	245	91.4
Poor practice (18 – 35)	23	8.6

3.6. Associations between Food Safety KAP and Socioeconomic Characteristics

Table 6 summarizes the outcomes of the association between food safety KAP level and socioeconomic characteristics among street food vendors in Klang Valley. There were statistically significant associations between food safety knowledge level and gender ($p<0.10$), race ($p<0.01$), education level ($p<0.10$), number of workers ($p<0.10$), monthly revenue ($p<0.05$), and license ($p<0.05$). Besides, there was also an association between food safety attitude level and experience in food handling ($p< 0.01$), number of workers ($p< 0.10$), food safety training ($p<0.05$), and typhoid injection ($p<0.01$). Lastly, only education level ($p<0.10$), type of stalls ($p<0.05$), monthly revenue ($p<0.01$), license ($p<0.05$), food safety training ($p<0.01$), and typhoid injection ($p<0.01$) that associated with food safety practices level as shown in table 6. These results align with a study by Tuglo *et al.* (2021), where educational level, average monthly income, registered street-cooked food handler, and food safety training course had a statistically significant impact on food safety hygiene practices. Addo-Tham *et al.* (2020) highlight the statistically significant association between food handling practices and license and training, thereby emphasizing the importance of food safety training in influencing the practices of street food vendors. Furthermore, Woh *et al.* (2016) indicated that those who had attended food safety training were likelier to have good practices than those who had not.

Table 6. Associations between the levels of KAP and food safety of street food vendors.

Variables	Knowledge Level		Attitude Level		Practices Level	
	Value	Significance	Value	Significance	Value	Significance
Gender	3.033	0.082*	0.000	0.988	1.018	0.313
Age	4.133	0.246	3.754	0.289	0.383	0.944
Race	12.823	0.005***	5.781	0.123	4.588	0.205
Religion	1.140	0.286	0.618	0.432	0.478	0.489
Marital status	0.003	0.956	1.617	0.204	0.005	0.943
Education level	9.327	0.097*	6.943	0.225	10.213	0.069*
Business ownership	1.335	0.513	0.892	0.640	1.207	0.547
Operation hour	0.793	0.673	0.287	0.866	0.399	0.819
Experience in food handling	0.381	0.537	7.359	0.007***	1.597	0.206
Type of stalls	0.150	0.699	0.115	0.735	4.693	0.030**
Number of workers	3.028	0.082*	2.908	0.088*	2.250	0.134
Monthly revenue	9.036	0.011**	0.883	0.643	10.233	0.006***
License	4.635	0.031**	1.171	0.679	4.871	0.027**
Food safety training	1.985	0.159	4.294	0.038**	11.963	0.001***
Typhoid injection	0.474	0.491	6.835	0.009***	7.963	0.005***

Note: ***Significant at 1% level of significance; **Significant at 5% level of significance; *Significant at 10% level of significance

3.7. Relationship between Level of Knowledge, Attitude, and Practices on Food Safety

Table 7 summarizes the outcomes of the correlations. Analysis of the Pearson correlation revealed a statistically significant positive relationship between the level of knowledge and attitude of street food vendors ($r = 0.301$, $p < 0.01$), the level of knowledge and practices ($r = 0.269$, $p < 0.01$), and the level of attitude and practices ($r = 0.279$, $p < 0.01$). These findings revealed that the street food vendors' level of knowledge influenced their attitudes and practices on food safety. These results offer valuable insights, indicating that the educational background of street food vendors and their participation in food safety training programs directly affect their level of knowledge regarding food safety. As a result, it is anticipated that this heightened knowledge will lead to improved comprehension and application of safe food handling practices. This relationship showed that food handlers with good knowledge have good attitudes and good practices, which was also supported by other researchers (Abdullah Sani & Siow, 2014; Siau *et al.*, 2015; Al-Shabib *et al.*, 2016; Asmawi *et al.*, 2018). Food handlers with adequate knowledge will have a good attitude toward food safety (Mendagudali *et al.*, 2016) and their practices on proper food safety (Abd Rahman *et al.*, 2015). Asmawi *et al.* (2018) stated that a positive attitude could motivate and positively impact their food safety practices. Abdullah Sani and Siow (2014) emphasized the importance of a food safety attitude that can influence food safety performance and practices, thereby reducing foodborne illness outbreaks. Hence, improving knowledge will improve the attitude and practice in food handling procedures.

Table 7. Correlation between the KAP of food safety.

		Knowledge	Attitude	Practices
Knowledge	Pearson Correlation (*r*)	1	0.301***	0.269***
	Sig. (2-tailed)		0.000	0.000
Attitude	Pearson Correlation (*r*)	0.301***	1	0.279***
	Sig. (2-tailed)	0.000		0.000
Practices	Pearson Correlation (*r*)	0.269***	0.279***	1
	Sig. (2-tailed)	0.000	0.000	

Note: *** Correlation is significant at a 1% level of significance (2-tailed)

4. Conclusions

The study's results suggest that the knowledge, attitude, and practices (KAP) related to food safety among street food vendors in the Klang Valley were generally good. This conclusion is drawn from the positive indicators observed in assessing their food safety behaviours and practices. However, a small percentage of street food vendors did not obtain a license and took their typhoid injection before running their business. Local authorities can improve this further since both license and injection are mandatory for all food handlers. Addressing the lack of a regulation system and improving inspections can enhance street food vendors' activities in Malaysia. Frequent checking on those street food vendors and penalties should be implemented for those who obey the regulations. Regular in-house training and food safety educational programs also need to be done to ensure that food handlers consistently acquire the necessary food safety knowledge, enabling them to apply what they have learned in their day-to-day operations effectively. Hence, this will reduce the occurrence of foodborne diseases. Overall, street food vendors have the potential to provide tasty, affordable, and healthy food as long as they obey and follow all the food safety standard operating procedures. This is crucial since the number of people consuming street foods is increasing among locals and tourists.

In summary, relevant authorities must place a high priority on robust enforcement measures and educational interventions. This proactive stance is essential for advancing food safety standards to a higher level and efficiently mitigating the potential risks linked to foodborne diseases. By combining stringent enforcement with targeted education, authorities can foster a safer and healthier environment within the food industry, ensuring the well-being of consumers and promoting a culture of proactive food safety practices among street food vendors.

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