Factors influencing consumers in purchasing street food in Malaysia

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This cross-sectional study aimed to determine the factors influencing street food purchasing among Malaysian consumers and to examine the relationship between these factors and the frequency of street food consumption. In an online self-administered questionnaire, participants were required to rate their agreement on ten influencing factors being studied using a 5-point Likert scale. Results among a total of 1434 participants revealed significant differences in the factors influencing street food purchasing across consumption frequency groups for time, environment, and nutritional factors including fat, sugar, and energy content ($p < 0.05$). Post-hoc analyses indicated that frequent consumers placed greater importance on these factors compared to less frequent consumers. Multinomial logistic regression further identified time and fat content as significant predictors of consumption frequency, where higher importance on time and fat content increased the likelihood of more frequent street food consumption. These findings suggest that time convenience, environmental appeal, and nutritional considerations are key drivers of purchasing behaviour among Malaysian street food consumers.

Keywords: street food; consumer behavior; purchase decision, factors influencing; ready-to-eat food

1. Introduction

Street food is defined as food that are sold by roadside hawkers on trolleys, bicycles, trucks, stalls, or other vending sites that are not confined within a fixed building (Food and Agriculture Organization, 2007). Compared to other types of out-of-home sources, street foods are considered as a convenient, affordable, and accessible source (Trafialek et al., 2017), especially in the low- and middle-income countries (Alimi, 2016).

Researchers have studied on this out-of-home informal sector through different lenses including economy, cultural, tourism, and nutrition to name a few. This informal economy in Malaysia represents approximately 25.3% of the nation's Gross Domestic Product (GDP), equating to RM1.19 trillion, in which street food vendors play a substantial part of this sector (Sin Chiew Daily, 2023). According to the Department of Statistics Malaysia (2023), the food and beverage services sector in Malaysia employed 1,079,843 individuals, with a total wage payout of RM 15.5 billion. While specific figures for street food vendors are not detailed, this sector encompasses a wide range of establishments, including street food stalls. Beyond its economic role, street food is deeply intertwined with Malaysian tourism, especially in states such as Malacca and Penang, which are renowned for food tourism. Here, service quality and emotional value are key determinants of tourists' intention to revisit street food outlets (Noradzhar et al., 2021; Mohamad et al., 2022; Abd Rahman et al., 2023).

Despite its cultural and economic importance, the nutritional quality of street food remains a growing concern. In Malaysia, the unavailability of healthy out-of-home food options was found to be one of the factors that hinder engagement in healthy eating (Ismawati Sharkawi & Rezai, 2014). This is a concern, as eating out has been a regular practice daily among 70% of Malaysian adults (Institute for Public Health, 2014). Based on the literature, there is a lack of recent studies that have determined the barriers to healthy eating of foods

specifically provided by street vending sites. However, the unavailability of healthy food options as a barrier towards healthy eating has been reported to involve foods from other types of out-of-home settings, such as worksite cafeterias (Lima et al., 2021; Stern et al., 2021). Nutritionally, street foods available in developing countries are generally high in energy, fats, and sugar (Nonato et al., 2016) which are a health threat when consumed in excess. This suggests that healthy street food offerings in Malaysia may be limited.

One possible explanation for this imbalance lies in consumer perceptions. Many consumers believe that unhealthy foods taste better than healthier alternatives (Paakki et al., 2022), discouraging vendors from reformulating their products. Taste, therefore, alongside factors such as price, cleanliness, convenience, quantity, tradition, and environment, has been shown to shape purchasing decisions (Chang et al., 2020; Mohamad et al., 2022; Morano et al., 2018; Sekar & Thamilselvi, 2016; Tacardon et al., 2023). However, the relative importance of these factors remains inconsistent across studies. Moreover, while food safety has been a dominant research theme in street food literature, the role of nutritional considerations in consumers' purchasing behaviour remains understudied. Furthermore, existing Malaysian studies have predominantly examined tourists' perceptions (Phurungrit et al., 2023; Rishad et al., 2019) or focused on specific local contexts (Abd Hanan et al., 2021; Ahmad Suraini et al., 2023; Azrol et al., 2023; Chang et al., 2020), limiting generalisability.

Understanding the multifaceted nature of street food purchasing decisions requires a robust theoretical foundation. This study draws upon the Theory of Planned Behavior (TPB) (Ajzen, 1991) and the Food Choice Model (Furst et al., 1996) as complementary frameworks to examine consumer decision-making processes. The TPB posits that behavioral intentions are shaped by attitudes toward the behavior, subjective norms, and perceived behavioral control. In the street food context, these correspond to consumers' perceptions of food attributes and nutritional content (attitudes), social and environmental influences (subjective norms), and

factors such as cleanliness, price, and time convenience (perceived behavioral control). Previous studies have successfully applied TPB to explain street food consumption behavior, demonstrating its relevance in predicting purchase intentions (Jeaheng & Han, 2020). Complementing this, the Food Choice Model suggests that food choices result from dynamic interactions between personal factors, available resources (such as price and time), and food product characteristics (including attributes and nutritional composition) (Mak et al., 2012). By integrating these theoretical perspectives, this study examines how multiple factors collectively influence not only purchase decisions but also consumption frequency patterns, moving beyond isolated variable analysis to understand the holistic decision-making process among Malaysian street food consumers.

To address this gap, the present study aims to determine the factors influencing street food purchasing among Malaysian consumers and to examine the relationship between these factors and the frequency of street food consumption. Using a questionnaire-based approach, this study assessed consumers' perceptions across multiple domains – food attributes, price, cleanliness, quantity, practice and tradition, time, environment, high sugar content, high-fat content, and high energy content – measured on a five-point Likert scale. The mean scores of these factors were compared across different levels of consumption frequency. By examining how these factors vary across different consumption frequencies, this study provides insights that could guide street food vendors and policymakers in developing effective strategies to promote healthier and safer street food options while maintaining consumer acceptance.

2. Materials and methods

2.1. Study design and participants

This cross-sectional study was conducted online to determine the most influential factors of street food purchasing among street food consumers in Malaysia. This study was an extension of another cross-sectional study conducted to determine the knowledge, attitude, and practice (KAP) of street food consumers towards salt intake. In both studies, eligible participants were provided with a link to a set of questionnaires that comprised sections on the influencing factors of street food purchasing and KAP related to salt intake. Eligible participants were Malaysians aged 18 to 59 years with experience in purchasing street food. Potential participants were recruited via convenience sampling through on-field approaches, social media, and established contacts and networking followed by snowball sampling. The sample size was calculated according to Cochran's (1963) formula as follows: n refers to the sample size, z refers to the critical value of the desired confidence interval (CI), p refers to the estimated proportion of the attribute present in the population, q refers to 1-p, and e is the desired level of precision.

$$n = \frac{z^2 pq}{e^2}$$

Since this study is an extension of the study on KAP on salt intake, the reference population for street food consumers was the 86.2% national prevalence of Malaysian adults who have good awareness of a high-salt diet and its impact on health (Institute for Public Health, 2019). The sample size was determined using a 95% confidence interval (CI) and precision level of 5%. Therefore, the calculation is as follows:

$$n = \frac{(1.96)^2(0.86)(1-0.86)}{(0.05)^2}$$

n = 185 participants

The drop rate of response was assumed to be as high as 10%; hence, the calculated *n* was 204 participants. Since we planned to recruit participants from 13 states and one federal territory in Malaysia, the expected number (n) of participants was 204 for every state and one federal territory. Therefore, the expected total sample size for this study was 2856 participants. Data were collected between January 2021 and October 2022. At the end of the data collection, only 1434 responses with completed questionnaires were considered valid and usable for this study.

2.2. Ethical approval

This study complied with the Declaration of Helsinki and was approved by the Research Ethics Committee of Universiti Kebangsaan Malaysia with the approval number: UKM PPI/111/8/JEP-2020-433. Prior to answering the questionnaire, all participants agreed to provide consent for their data to be published in a collective manner with no reference to an individual to ensure anonymity and confidentiality.

2.3. Instrumentation

This study utilised a 5-Likert scale questionnaire that was administered to the participants online. The questionnaire was developed and pretested to ensure validity and reliability before data collection commenced. The online questionnaire comprised three sections: (A) seven close-ended items on sociodemographic characteristics, that is, age group, gender, race, marital status, level of education, employment, and monthly household income; (B) three close-ended items related to the habits of street food consumption; and (C) ten influencing factors of street food purchasing that included food attributes, price, cleanliness, quantity, practice and tradition, time, environment, high sugar content, high-fat content, and high energy content.

Section A was on an information sheet containing the study details, participants' inclusion criteria, and consent form to participate in the study. Participants were only able to proceed to Section B onwards after they ticked the statements that they had read the study details, fulfilled the inclusion criteria, and consent to participate in the study.

The items in Section C were adopted from questionnaires developed by previous studies. The food attribute factor (Thatchinamoorthy & Meenambigai, 2018; Sekar & Thamilselvi, 2016; Thatchinamoorthy & Meenambigai, 2018) consisted of four items, whereas price (Steyn et al., 2011; Dammann & Smith, 2009; Chang et al., 2020), cleanliness (Rheinländer et al., 2008; Sezgin & Şanlıer, 2016), practice and tradition (Rishad, 2018; Mak et al., 2012; Gupta et al., 2019), time (Albuquerque et al., 2019; Rajagopal, 2010; Choi et al., 2013), environment (Lee et al., 2020; Ahasanul et al., 2011; Hu et al., 2017), and high sugar content (Ohiokpehai, 2003; Chavarria & Phakdee-auksorn, 2017; Long-Solís, 2007) consisted of three items each. Meanwhile, there were two items under the quantity (Choi et al., 2013; Mensah et al., 2013), high-fat content (Gupta et al., 2019; Long-Solís, 2007; Ohiokpehai, 2003), and high-energy content (Block et al., 2013; Ohiokpehai, 2003; Chang et al., 2020) factors. Participants were required to rate their agreement with each item for every factor, from 1 (strongly disagree) to 5 (strongly agree). A pilot study was conducted among 96 respondents to ensure the reliability of the questionnaire. The reliability test conducted presented a Cronbach alpha value of 0.81 which indicates that the questionnaire is reliable (Ursachi et al., 2015).

2.4. Statistical analysis

Statistical Package for Social Sciences (SPSS) version 25.0 (IBM, New York, USA) was used to analyze the data collected. Descriptive statistics were used to summarize the consumers' sociodemographic characteristics and street food consumption habits. The score for each item

and the factors influencing street food purchasing were averaged and presented as means ± standard deviations (SD).

Prior to inferential analyses, data were screened for normality using the Kolmogorov-Smirnov test. The results indicated that the distribution of factor scores did not meet the assumption of normality; therefore, non-parametric tests were applied for inferential statistical analysis. The Kruskal–Wallis H test was conducted to examine differences in factor scores across five levels of frequency of street food consumption, which was treated as an ordinal categorical variable (2–3 times per year, ≤1 time per month, 1 time per week, 2–3 times per week, and every day). When significant differences were found, post-hoc pairwise comparisons with Bonferroni adjustment were performed to identify which frequency groups differed significantly from one another. A two-tailed p-value of <0.05 was considered statistically significant. Results from the Kruskal–Wallis and pairwise tests were summarised in tables and visualised using pairwise comparison charts to facilitate interpretation of group differences.

Subsequently, a multinomial logistic regression analysis was carried out to identify predictors of higher street food consumption frequency. The dependent variable was frequency of street food consumption (five categories, with "2-3 times per year" set as the reference group). Independent variables included the mean scores of the influencing factors (food attributes, price, cleanliness, quantity, practice and tradition, time, environment, high sugar content, high-fat content, and high energy content).

3. Results

3.1. Sociodemographic characteristics

A total of 1434 street food consumers participated in the study. As shown in Table 1, approximately half of them were between 18-29 years old (51.6%), followed by 30-39 years

(18.3%), 50-59 years (15.4%), and 40-49 years (14.7%). Regarding gender distribution, the majority of consumers were females (69.5%) compared to males (30.5%).

Consumers of Malay ethnicity (62.3%) dominated the study compared to those of Chinese (29.2%), Indian (5.8%), and other ethnicities (2.6%). Approximately half of them were single (54.9%), while the rest were married (43.4%) or previously married (1.7%). Regarding education level, the majority attained tertiary education (81.4%), followed by secondary education (16.2%).

Only 2.4% had received education until the primary level. Regarding employment status, 39.8% were students, whereas 21.8% worked in the government sector, followed by the private sector (17.8%). Approximately 10.5% and 10.1% were either unemployed or self-employed, respectively. Finally, more than half of the consumers lived with the lowest monthly household income of ≤ RM 4850 (58.3%). This was followed by the middle range of RM 4851-RM 10,970 (31.8%), and the highest range of ≥ RM 10,971 (9.9%).

3.2. Habits of street food consumption

As displayed in Table 2, nearly half of the consumers consumed street food once a week (30.1%), followed by once a month (28.0%), and twice to three times a week (27.9%). Only 11.7% and 2.3% of them consumed street food 2-3 times per year or every day, respectively.

In terms of mealtimes of street food consumption, nearly half of them consumed street food during afternoon tea consumption (41.1%). This was followed by dinner (22.0%), and breakfast (20.4%). Street foods were the least consumed lunch (9.4%), supper (4.5%), and morning tea (2.6%).

Approximately half of the consumers preferred to purchase street food in the snack category (49.7%), followed by the main meal category (37.2%). However, 13.0% preferred to purchase street food in the dessert category.

3.3. Average score for influencing factors of street food purchase decision

According to Table 3, most consumers agreed that cleanliness (4.10 ± 0.88) was the most important factor influencing their purchase of street food. They mostly agreed that they preferred to purchase street food from a clean stall (4.24 ± 0.92). Aside from clean stalls, they agreed that they purchase street food from vendors that practice good hygiene (4.15 ± 0.98). Most consumers agreed that they often buy street food that is covered (3.92 ± 1.03).

The second most agreed factor that influenced street food purchasing among consumers in this study was food attributes (3.68 ± 0.86). Mostly agreed that the tastiness (4.12 ± 0.92), texture (3.69 ± 1.03), and aroma (3.62 ± 1.07) of the food influenced their purchase decision. Meanwhile, most were neutral on the appearance aspect of food (3.29 ± 1.18).

Third, the price of food was the next factor that influenced street food purchasing (3.64 ± 0.89). Most of them buy street food that is within their budget (3.92 ± 1.00). They also agreed that they often buy street food because of its cheaper price compared to other options of out-of-home food (3.62 ± 1.07). On the other hand, they were neutral in comparing prices between street foods before deciding to purchase (3.37 ± 1.20).

At the same rank as price, consumers agreed that practice and tradition were influencing factors in purchasing street food (3.64 ± 0.89). They mostly agreed that they could easily find street food based on different ethnicities (3.76 ± 1.09), including food from their ethnicity (3.68 ± 1.10), which influenced their purchase of street food. Next, familiarity with buying street food since childhood (3.48 ± 1.17) was also a factor that influenced them to purchase street food.

Next, the quantity of food was also the agreed-upon factor influencing consumers' purchasing of street food (3.53 ± 0.88). Most consumers often buy street food because they

have a portion size that is reasonable with the price (3.90 ± 0.92). However, they were neutral in looking for a large portion size to purchase street food (3.15 ± 1.08).

The last factor that influenced consumers' street food purchasing was time (3.50 ± 0.91). They agreed that they often buy street food due to the quick preparation time (3.81 ± 1.01) and due to the nearby location (3.59 ± 1.09). However, they neither agreed nor disagreed that they buy street food because they do not have time to cook (3.11 ± 1.21).

Most consumers were neutral about the high energy content of food as a factor that influences their street food purchasing (3.20 ± 0.94). They neither agreed nor disagreed with buying street food due to the preparation method used, which was either frying or boiling (3.22 ± 1.08). They were also neutral about buying street food because of the adequate energy provided or making them full (3.19 ± 1.10).

Aside from high energy content, most consumers were also neutral about the environment as a factor that influenced their street food purchasing (3.14 ± 0.94). They neither agreed nor disagreed that the influence of family members, friends, and relatives (3.42 ± 1.15), a lively environment (3.16 ± 1.15), or attraction to the advertisements (2.83 ± 1.14) were their reasons for purchasing street food.

High sugar content was neither an agreed nor disagreed influencing factor of street food purchasing among consumers (2.53 ± 0.99). Specifically, consumers neither agreed nor disagreed that the happy feeling they get from eating sweet-tasting food was a reason for purchasing street food (2.79 ± 1.18). In addition, the availability of sweet-tasting food was also neither agreed nor disagreed on the reason for purchasing street food (2.71 ± 1.14). Meanwhile, most consumers disagreed that they often add sweet toppings along with street foods of the dessert type that they purchased (2.10 ± 1.08).

Finally, high-fat content was the only disagreeing factor that influenced consumers to purchase street food (2.47 ± 0.93). They neither agreed nor disagreed that they often preferred

to purchase coconut milk-based street food (2.50 ± 1.05). They also disagreed that they often added cheese along with the street food that they purchased (2.43 ± 1.14).

3.4.Differences in influencing factors across frequency of street food consumption

Differences in influencing factors across frequency of street food consumption A Kruskal–Wallis H test was conducted to examine whether the importance of various influencing factors differed across five frequency categories of street food consumption. As shown in Table 4, significant differences were observed for food attribute ($\chi^2(4) = 13.495$, $p = 0.009$), price ($\chi^2(4) = 11.360$, $p = 0.023$), quantity ($\chi^2(4) = 11.111$, $p = 0.025$), practice and tradition ($\chi^2(4) = 13.721$, $p = 0.008$), time ($\chi^2(4) = 42.041$, $p < 0.001$), environment ($\chi^2(4) = 30.754$, $p < 0.001$), sugar content ($\chi^2(4) = 15.233$, $p = 0.004$), fat content ($\chi^2(4) = 34.005$, $p < 0.001$), and energy content ($\chi^2(4) = 20.693$, $p < 0.001$). No significant difference was found for cleanliness ($\chi^2(4) = 3.553$, $p = 0.470$).

Pairwise comparisons using Dunn's test with Bonferroni correction were performed to identify specific differences between consumption frequency groups. Several significant differences were observed among consumers with varying frequencies of street food consumption. For the food attribute factor (Figure 1(a)), no significant differences were detected after adjustment. However, for price (Figure 1(b)), consumers who consumed street food 2–3 times per week reported significantly higher factor scores compared to those who consumed ≤ 1 time per month ($p = 0.049$). Similarly, for quantity (Figure 1(c)), those consuming 2–3 times per week scored higher than the ≤ 1 time per month group ($p = 0.043$).

Regarding practice and tradition (Figure 1(d)), consumers who purchased street food 2–3 times per year scored significantly lower than those who consumed 1 time per week ($p = 0.039$) and 2–3 times per week ($p = 0.017$). For the time factor (Figure 1(e)), frequent consumers—particularly those eating street food every day—tended to have higher mean

ranks, suggesting that convenience and time availability were more influential for frequent purchasers. Likewise, significant differences were found for the environment factor (Figure 1(f)), where frequent consumers showed higher mean ranks than infrequent consumers, indicating the greater influence of ambience and eating environment on those who purchase street food more regularly.

Significant differences were also found for nutritional factors, namely sugar content (Figure 1(g)), fat content (Figure 1(h)), and energy content (Figure 1(i)). Consumers who consumed street food 2–3 times per week had higher sugar content scores compared to those consuming ≤ 1 time per month ($p = 0.012$). The fat content factor showed multiple significant differences – consumers who ate street food 2–3 times per year reported significantly lower scores than those consuming 1 time per week ($p < 0.001$), 2–3 times per week ($p < 0.001$), and every day ($p = 0.004$). Additionally, the 2–3 times per week group scored higher than the ≤ 1 time per month group ($p = 0.006$). For energy content, the 2–3 times per week group scored significantly higher than both the ≤ 1 time per month ($p = 0.001$) and 2–3 times per year ($p = 0.005$) groups.

Overall, these post-hoc results reinforce that consumers who frequently consume street food tend to place greater importance on time, environment, and nutritional content (fat, sugar, and energy) compared to less frequent consumers.

3.5.Predictors for frequency of street food consumption

A multinomial logistic regression was conducted to identify which influencing factors predicted the frequency of street food consumption, using "2–3 times per year" as the reference category. The overall model was statistically significant ($\chi^2 = 99.599$, $p < 0.001$), indicating that the predictors reliably distinguished between the consumption frequency categories. As

shown in Table 5, three predictors were found to significantly influence consumption frequency – food attribute, time, and fat content.

Food attribute significantly predicted the likelihood of consuming street food every day (B = -0.616, Exp(B) = 0.540, p = 0.023), indicating that as preference for food attributes increased, the odds of daily consumption decreased.

Time was a strong positive predictor of higher consumption frequency, particularly among those consuming 1 time per week (B = 0.297, Exp(B) = 1.345, p = 0.014), 2–3 times per week (B = 0.342, Exp(B) = 1.407, p = 0.006), and every day (B = 0.913, Exp(B) = 2.492, p < 0.001). This suggests that convenience or limited preparation time substantially increases the likelihood of frequent consumption.

Fat content was also positively associated with consumption frequency, significantly predicting consumption ≤ 1 time per month (B = 0.257, Exp(B) = 1.292, p = 0.034), 1 time per week (B = 0.316, Exp(B) = 1.372, p = 0.009), 2–3 times per week (B = 0.341, Exp(B) = 1.406, p = 0.005), and every day (B = 0.756, Exp(B) = 2.129, p = 0.002). These findings indicate that perceptions of fat content and time convenience are key determinants driving higher frequency of street food consumption.

4. Discussion

This study showed that street food consumers had a different frequency of street food consumption: once a week, once a month, or twice to thrice a week. This was similar to the findings of a previous study (Chang et al., 2020) conducted among street food consumers in a particular town of Selangor, Malaysia. They were reported to purchase street food with different frequencies that ranged from twice a week (39.9%), once a week (28.9%), more than three times a week (15.6%), and once a month (12.6%). The sociodemographic profile of the

participants involved in the study by Chang et al. (2020) was also similar to the current study, in which nearly half of them were aged between 18-25 years old, had the lowest monthly income, and were either students or working in the government sector. The majority of them were also single and tertiary-educated. Compared to a population-based survey (Institute for Public Health, 2014), more than half (70%) of Malaysian adults regularly consume out-of-home foods. However, the proportion according to different types of out-of-home food settings and demographics has not been studied. Therefore, more studies are needed to determine the prevalence of street food consumption and frequency of consumption across different demographic profiles in Malaysia.

This study also found that nearly half of the consumers studied mostly preferred to eat street food as their afternoon tea and the least as their morning tea. This contrasted with the findings of Chang et al. (2020), where the majority of street food consumers in the study consumed street food during the evening as dinner. Around half of the consumers in the current study were found to prefer consuming street foods in the snack and main meal categories. Only a few preferred street foods belonged to the dessert category. The snacks purchased were probably eaten during afternoon tea, as snacks seemed to be purchased in the afternoon (Sousa et al., 2022). Globally, the types of street foods sold range from food eaten as breakfast, lunch, and dinner (Bouafou et al., 2021). These findings imply that the street food options available in Malaysia are so versatile that they can be consumed at any time of the day; hence, the provision of street foods that are both safe and nutritious is important.

Regarding the influencing factors of street food purchasing, cleanliness was found to be the most agreed upon factor among the consumers in this study. Cleanliness has remained the most influential factor among street food consumers in previous studies as well (Abd Hanan et al., 2021; Chang et al., 2020). This may be due to consumers' perceptions of food hygiene, which had a positive and direct influence on their purchase intentions. This perception also

drives consumer trust (Ratasuk, 2023). Consumers in the current study agreed that they prefer to buy food from a clean stall and vendors that practice proper hygiene practices, which support the findings from a previous study (Azrol et al., 2023) conducted among street food consumers in a town in Kuala Lumpur, Malaysia. These findings support the importance of applying proper hygiene practices among street food vendors to encourage consumer purchases.

Followed by cleanliness were other influencing factors including food attributes, price, practice and tradition, quantity, and time. Specifically, consumers agreed that taste, aroma, and texture of food influenced their food purchases. Food attributes were also an agreeable factor in street food purchasing among consumers in India (Ahlawat et al., 2024), as they prioritized food attributes the most, such as taste, followed by cleanliness and reasonable price of the food. This may be due to consumers' sensory experiences that have a positive influence on delight and place attachment, which drives consumer satisfaction (Su & Li, 2023). Food attributes were found to be positive predictors of consumer behavior (Jeaheng & Han, 2020).

Regarding time as an influencing factor of street food purchasing in this study, consumers preferred to purchase quick-prepared foods and food from stalls located within their distance. This may be because consumers often perceive street foods as preferable out-of-home food options owing to their time-saving nature (Chang et al., 2020). In contrast, for street food consumers in India (Ahlawat et al., 2024), the location of street food stalls was not a concern if other influencing factors such as cleanliness and price were taken care of. Aside from food attributes and time factors, consumers in the current study preferred affordable and reasonably priced food. This may be because perceived reasonable prices mediate the repurchase intention of quality street food (Jeaheng & Han, 2020).

Meanwhile, high energy content, environment, and high sugar content were neither agreed nor disagreed factors. The only factor that consumers disagreed with was high fat content. It could be said that high fat content, sugar content, and energy content were not the

most agreeable factors for street food purchasing among consumers. This may be because street food consumers are concerned about their health status when purchasing street food (Azrol et al., 2023; Chang et al., 2020). This also implies that there is room for street food vendors in Malaysia to prepare street foods with lower fat, sugar, and energy contents. To the best of our knowledge, there are few scientific studies that have incorporated nutrition factors as an influencing factor of street food purchasing. Therefore, more studies should be conducted, as street foods generally possess nutritional components associated with unhealthy diets (Nonato et al., 2016). This would aid in further understanding other factors, such as nutrition, that may influence consumers' behavior to purchase street food.

Another section of this study examined the relationship between the influencing factors and the frequency of street food consumption. The Kruskal–Wallis and post-hoc analyses revealed that time, environment, and nutritional attributes—particularly fat, sugar, and energy content—differed significantly across frequency groups. Consumers who purchased street food more frequently placed greater importance on these factors than those who consumed less often. This finding aligns with earlier studies which suggest that convenience and time constraints are major motivators for frequent street food consumers (Chang et al., 2020; Mohamad et al., 2022). In urban areas, where long working hours and commuting times are common, consumers often prefer quick and accessible food options, explaining why time emerged as a significant determinant of frequent consumption.

The influence of environment was also pronounced among frequent consumers, consistent with previous findings that highlight the social and experiential nature of street food consumption (Morano et al., 2018; Tacardon et al., 2023). Street food environments are often vibrant and communal, offering an affordable social dining experience that appeals to both regular consumers and tourists. This suggests that the sensory and social context of eating—beyond the food itself—plays a critical role in sustaining frequent patronage.

Interestingly, nutritional factors such as fat, sugar, and energy content also influenced consumption frequency. Consumers who ate street food more often placed greater emphasis on these nutritional aspects, possibly reflecting an increased awareness or concern about food healthfulness even among regular consumers. This contrasts with earlier perceptions that street food is predominantly chosen for taste and price rather than nutritional value (Alimi, 2016; Nonato et al., 2016). One possible explanation is the growing public discourse in Malaysia surrounding healthy eating and the government's initiatives on reducing sodium and fat intake, which may have heightened consumer consciousness toward the nutritional content of ready-to-eat foods.

The multinomial logistic regression analysis further supported these findings by identifying time and fat content as significant predictors of consumption frequency. Specifically, higher importance placed on time increased the likelihood of being a more frequent consumer, while higher concern for fat content also predicted greater frequency. The latter finding may indicate that frequent consumers are not necessarily indifferent to health issues; rather, they may be more discerning and evaluate their choices based on both convenience and perceived nutritional value. In contrast, food attributes such as taste or appearance were less influential, suggesting that the basic appeal of street food may be taken for granted by most consumers, regardless of frequency.

These results collectively indicate that strategies to promote healthier street food options should consider both practical and perceptual factors. Vendors could leverage the convenience appeal of street food while gradually improving the nutritional profile of their offerings—for instance, by reducing fat content or offering smaller portion sizes without compromising taste and affordability. Interventions aimed at modifying the food environment, such as cleaner and more organized stalls or improved seating areas, may also enhance consumer satisfaction and trust, further supporting sustained patronage of healthier choices.

From a broader policy perspective, this study underscores the need to integrate nutrition education and vendor training into Malaysia's informal food sector. Since the street food economy plays a substantial role in employment and local tourism, collaborative efforts between public health authorities and local councils could help ensure that health-promoting practices do not undermine the economic sustainability of street vendors.

5. Limitations, future research, and implications

5.1.Limitations of study and future research

This study was strengthened by the large sample size of street food consumers recruited from all states in Malaysia. However, this study was limited by the skewed sociodemographic distribution of the sample, particularly an overrepresentation of young adults and female consumers. Therefore, the findings could not represent the general demographics of street food consumers.

5.2.Implications on street food vendors, authorities, and tourism

Given that cleanliness, food attributes, and price were the most agreed factors that could influence street food purchasing, street food vendors are encouraged to offer foods at a clean and enticing state with an affordable price to be favorable to current and potential consumers. Aside from that, street food vendors selling lower fat, energy, and sugar foods could use hygiene factor, food attributes and price as key components in designing marketing strategies to attract consumers towards healthier foods. On the other hand, local authorities should continuously monitor street food stalls to ensure that hygiene aspects are taken care of.

The findings also hold significant implications for Malaysia's food tourism sector. Street food represents a critical touchpoint in the tourist experience, particularly in heritage

destinations like Penang and Malacca where food tourism drives visitation (Abd Rahman et al., 2023; Noradzhar et al., 2021). Our finding that cleanliness ranks as the most influential factor aligns with tourism literature suggesting that food safety perceptions directly impact destination image and revisit intentions (Mohamad et al., 2022). This extends the application of TPB by demonstrating that perceived behavioral control—manifested through hygiene confidence—is paramount in street food contexts.

The importance of environmental factors among frequent consumers suggests that the social and atmospheric dimensions of street food consumption contribute to experiential tourism value. This finding supports previous research indicating that street food environments offer authentic cultural experiences that tourists seek (Lee et al., 2020; Chavarria & Phakdee-auksorn, 2017). However, our study reveals that consumers prioritize hygiene alongside authenticity. This dual demand creates an opportunity for destination managers to enhance street food zones through improved infrastructure and vendor training programs, thereby elevating Malaysia's competitive position in regional food tourism markets.

Theoretically, this study contributes by demonstrating that the Food Choice Model applies across consumption frequencies. Our finding that time convenience and fat content predict higher consumption frequency suggests that habitual consumers develop different decision-making heuristics compared to occasional consumers. This extends existing food choice theory by showing that influencing factors are not static but vary systematically with consumption patterns (Mak et al., 2012; Jeaheng & Han, 2020). The significant role of nutritional factors (fat, sugar, and energy content) among frequent consumers challenges the assumption that street food choices are driven primarily by hedonic motives (taste, price) rather than health considerations (Alimi, 2016; Nonato et al., 2016).

From a tourism perspective, the practice and tradition factor – which includes access to multi-ethnic food options – emerged as significant across consumption frequencies. This

finding underscores street food's role as a medium for cultural expression and intercultural exchange (Bouafou et al., 2021). For destination marketers, this suggests positioning street food not merely as convenient sustenance but as cultural heritage experiences. The finding that frequent consumers place greater importance on environmental factors (social influence, atmosphere) supports the experiential nature of street food tourism and suggests that street food zones function as social gathering spaces that enhance destination attractiveness (Morano et al., 2018; Su & Li, 2023).

6. Conclusion

This study reveals that while cleanliness remains paramount for all consumers, the relative importance of other factors – particularly time convenience, food attributes, and nutritional considerations – varies systematically with consumption frequency.

This study makes three key contributions. First, it integrates the Theory of Planned Behavior and the Food Choice Model to explain street food consumption patterns, demonstrating that frequent consumers prioritize both convenience and nutritional content. This challenges the prevailing assumption that habitual street food consumption is driven solely by hedonic motives or necessity (Alimi, 2016; Nonato et al., 2016), revealing that consumers make informed trade-offs between convenience and health.

Second, the multinomial logistic regression analysis identified food attributes, time convenience, and fat content as significant predictors of consumption frequency, moving beyond descriptive assessments toward predictive models that can inform targeted interventions.

Third, this study demonstrates that nutritional factors – often overlooked in street food literature emphasizing food safety – play a significant role in purchase decisions, with frequent consumers showing greater awareness of fat, sugar, and energy content.

Practically, these findings suggest that street food vendors should maintain impeccable hygiene while offering time-efficient service and transparently communicating nutritional information. For policymakers, continuous hygiene monitoring should be complemented by programs supporting product reformulation and infrastructure improvements in street food zones. From a tourism perspective, the importance of practice and tradition factors highlights street food's role as cultural heritage experiences (Bouafou et al., 2021), suggesting destination managers should position street food as showcasing Malaysia's multicultural identity rather than merely affordable dining.

In conclusion, Malaysian street food consumers are sophisticated decision-makers balancing multiple considerations. Time efficiency, food attributes, and nutritional factors drive purchasing behavior, with relative importance varying by consumption frequency. By grounding findings in established theoretical frameworks and examining patterns quantitatively, this research advances street food scholarship toward predictive models informing evidence-based interventions. As Malaysia develops its food tourism sector and addresses public health challenges, these insights provide a foundation for policies supporting both vendor economic sustainability and consumer health and wellbeing. The path forward lies in collaboratively enhancing street food quality – hygienically, nutritionally, and experientially – ensuring that Malaysia's vibrant street food culture remains a source of national pride, economic opportunity, and visitor satisfaction.

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Declaration of interest statement

The authors report there are no competing interests to declare.

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Author contributions statement

Zainorain Natasha Zainal Arifen: Carried out the literature review, data collection, data cleaning, data analysis, data interpretation, and writing the original draft. Suzana Shahar: Assisted in the data interpretation, reviewed and edited the draft. Kathy Trieu: Conceptualized the study, reviewed and edited the draft. Hazreen Abdul Majid: Assisted in the data interpretation, reviewed and edited the draft. Norhasniza Yaacob: Assisted in the data interpretation, reviewed and edited the draft. Hasnah Haron: Conceptualized the study, acquired the funding, reviewed and edited the draft. All authors have read and approved the final work.

Data availability statement

The data in a collective manner are available from the corresponding author, [HH], upon reasonable request.

References

Abd Hanan, F., Sadri, N. B., & Yusup, N. Q. B. (2021). Customers' perception of Malaysian street food quality. *International Journal of Academic Research in Business and Social Sciences*, *11*(13), 73–87.

Abd Rahman, N. N. S. N., Abdullah, S. K., Yildirim, N. S., Ab Aziz, W. S. N. A., & Hamzah, S. A. S. (2023). The influence of Penang's street food on customers' intention to return. *Asian Journal of Research in Education and Social Sciences*, *5*(3), 524–537.

Ahasanul, H., Sabbir, R., S., Ismail, S. A., Farzana, Y., & Almas, A. (2011). Assessing the impact of advertisement towards Malay consumers: An empirical study of fast food restaurants in Malaysia. *Business Management Dynamics, 1*(2), 39–53.

Ahlawat, R., Chander, A., Kumar, D., Dutt, P., Ahlawat, B., & Verma, V. (2024). Factors affecting consumers' purchase intention of street food. In Ahlawat, R., Chander, A., Kumar, D., Dutt, P., Ahlawat, B., & Verma, V. (Eds.), *Interdisciplinary Research in Technology and Management* (pp. 363–369). CRC Press.

Ahmad Suraini, M. Z. S., Bibit, N. S., Mashuri, M. A., & Mohamed Apandi, S. R. (2023). Causes influencing consumer purchasing satisfaction: A study on street food at Penang, Malaysia. *Journal of Tourism, Hospitality and Culinary Arts*, *15*(1), 89–102.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179–211.

Albuquerque, G., Morais, I., Gelormini, M., Casal, S., Damasceno, A., Pinho, O., Moreira, P., Jewell, J., Breda, J., Lunet, N., & Padrão, P. (2019). Street food in Dushanbe, Tajikistan: Availability and nutritional value. *British Journal of Nutrition, 122*(9), 1052–1061.

Alimi, B. A. (2016). Risk factors in street food practices in developing countries: A review. *Food Science and Human Wellness*, *5*(3), 141–148.

Azrol, M. A. F. M., Zairie, M. A. M., Azeman, A. S., Latip, M. S. A., & Sulong, S. N. (2023). Determinant attributes in the purchase decision of street food: A case study in Cheras Kuala Lumpur. *International Journal of Business and Technology Management*, *5*(S1), 63–75.

Block, J. P., Condon, S. K., Kleinman, K., Mullen, J., Linakis, S., Rifas-Shiman, S., & Gillman, M. W. (2013). Consumers' estimation of calorie content at fast food restaurants: Cross sectional observational study. *BMJ, 346*: 2907.

Bouafou, K. G. M., Beugré, G. F. C., & Amani, Y. C. (2021). Street food around the world: A review of the literature. *Journal of Service Science and Management*, *14*(6), 557–575.

Chang, F. S., Chu, C. H., & Shahril, A. M. (2020). Consumer's perception towards street food in Malaysia. *International Journal of Research and Development*, *5*(2), 343–352.

Chavarria, L. C. T., & Phakdee-auksorn, P. (2017). Understanding international tourists' attitudes towards street food in Phuket, Thailand. *Tourism Management Perspectives, 21*, 66–73.

Choi, J., Lee, A., & Ok, C. (2013). The effects of consumers' perceived risk and benefit on attitude and behavioral intention: A study of street food. *Journal of Travel & Tourism Marketing, 30*(3), 222–237.

Cochran, W. G. (1963). *Sampling techniques* (2nd ed.). John Wiley and Sons.

Dammann, K. W., & Smith, C. (2009). Factors affecting low-income women's food choices and the perceived impact of dietary intake and socioeconomic status on their health and weight. *Journal of Nutrition Education and Behavior, 41*(4), 242–253.

Department of Statistics Malaysia (2024, August 5). Economic census 2023: Food and beverage services sector. https://www.dosm.gov.my/portal-main/release-content/economic-census-2023-food-and-beverage-services-sector

Food and Agriculture Organization. (2007). *Promises and challenges of the informal food sector in developing countries.* http://www.fao.org/3/a1124e/a1124e00.htm.

Furst, T., Connors, M., Bisogni, C. A., Sobal, J., & Falk, L. W. (1996). Food choice: a conceptual model of the process. *Appetite*, *26*(3), 247–266.

Gupta, V., Khanna, K., & Gupta, R. (2019). Preferential analysis of street food amongst the foreign tourists: A case of Delhi region. *International Journal of Tourism Cities*.

Hu, P., Wu, T., Zhang, F., Zhang, Y., Lu, L., Zeng, H., Shi, Z.M., Sharma, M., Xun, L., & Zhao, Y. (2017). Association between eating out and socio-demographic factors of university students in Chongqing, China. *International Journal Of Environmental Research And Public Health, 14*(11), 1322.

Institute for Public Health. (2014). *National Health and Morbidity Survey (NHMS) 2014: Malaysian Adult Nutrition Survey (MANS) vol. II: Survey findings* (Report No. NMRR-12-815-13100).

Institute for Public Health. (2019). *Population-based salt intake survey to support the national salt reduction programme for Malaysia (Malaysian Community Salt Survey-MyCoSS)* (Report No. NMRR-17-423-34969).

Ismawati Sharkawi, Z. M., & Rezai, G. (2014). Healthy eating: The preventive factors among Malaysians. *Age*, *18*(20), 150.

Jeaheng, Y., & Han, H. (2020). Thai street food in the fast growing global food tourism industry: Preference and behaviors of food tourists. *Journal of Hospitality and Tourism Management*, *45*, 641–655.

Lima, J. P., Costa, S. A., Brandão, T. R., & Rocha, A. (2021). Food consumption determinants and barriers for healthy eating at the workplace—a university setting. *Foods*, *10*(4), 695.

Lee, S., Park, H., & Ahn, Y. (2020). The influence of tourists' experience of quality of street foods on destination's image, life satisfaction, and word of mouth: the moderating impact of food neophobia. *International Journal of Environmental Research and Public Health, 17*(1), 163.

Long-Solís, J. (2007). A survey of street foods in Mexico city. *Food and Foodways: Explorations in the History and Culture of Human Nourishment, 15*, 213–236.

Mak, A. H., Lumbers, M., Eves, A., & Chang, R. C. (2012). Factors influencing tourist food consumption. *International Journal of Hospitality Management, 31*(3), 928–936.

Mensah, J. O., Aidoo, R., & Teye, A. N. (2013). Analysis of street food consumption across various income groups in the Kumasi Metropolis of Ghana. *International Review of Management and Business Research, 2*(4), 951.

Mohamad, N., S. Palan, D., Roslan, M. A., & Nasron, N. A. (2022). Predictors of behavioral intention among tourist: The case of revisiting street food spots in Penang, Malaysia. *Journal of Foodservice Business Research*, *25*(4), 475–497.

Morano, R. S., Barrichello, A., Jacomossi, R. R., & D'Acosta-Rivera, J. R. (2018). Street food: Factors influencing perception of product quality. *RAUSP Management Journal*, *53*, 535–554.

Nonato, I. L., Minussi, L. D. A., Pascoal, G. B., & De-Souza, D. A. (2016). Nutritional issues concerning street foods. *J Clin Nutr Diet*, *2*(1), 1–7.

Noradzhar, B., Zuliah, A. H., Fatihin, N. A. A., Nursyafiqa, M. R., & Syazwana, S. (2021). International tourists' attitudes towards street food in Malacca, Malaysia. In *IOP Conference Series: Earth and Environmental Science,* 756(1), 012016, IOP Publishing.

Ohiokpehai, O. (2003). Nutritional aspects of street foods in Botswana. *Pakistan Journal of Nutrition, 2*(2), 76–81.

Paakki, M., Kantola, M., Junkkari, T., Arjanne, L., Luomala, H., & Hopia, A. (2022). "Unhealthy= tasty": How does it affect consumers'(un) healthy food expectations?. *Foods*, *11*(19), 3139.

Phurungrit, N., Ru-Zhue, J., & Aujirapongpan, S. (2023). Tourist behavior in selecting street food: A case study of Mueang District, Surat Thani province, Thailand. *International Journal of Multidisciplinary Research and Growth Evaluation, 4*(5), 236–244.

Rajagopal, P. (2010). *Coexistence and conflicts between shopping malls and street markets in growing cities: analysis of shoppers' behavior*. Mexico: Monterrey Institute of Technology and Higher Education.

Ratasuk, A. (2023). Impact of Food Hygiene On Purchase Intentions And Its Mechanism In Bangkok Street Food Under The Influence Of COVID-19. *Medical Research Archives*, *11*(8).

Rishad, R. H. (2018). The conceptual framework of determinant factors of food emotional experience and outcomes of international tourist satisfaction: Empirical study on Malaysian street food. *International Journal of Business, Economics and Law, 15(*2), 44–50.

Rishad, R. H., Raju, V., & Kassim, R. N. M. (2019). Factor influencing consumers' satisfaction towards malaysian street food: Special emphasis on international tourists' emotion. *South East Asia Journal of Contemporary Business, Economics and Law*, *18*(2), 22–30.

Rheinländer, T., Olsen, M., Bakang, J. A., Takyi, H., Konradsen, F., & Samuelsen, H. (2008). Keeping up appearances: Perceptions of street food safety in urban Kumasi, Ghana. *Journal of Urban Health, 85*(6), 952–964.

Sekar, D. M., & Thamilselvi, M. R. (2016). Factors influencing consumers to prefer the street vended foods. *Asia Pacific J Res ISSN (Print)*, 2320–5504.

Sezgin, A. C., & Şanlıer, N. 2016. Street food consumption in terms of the food safety and health. *Journal of Human Sciences, 13*(3), 4072–4083.

Sin Chew Daily (2023, December 20). The informal sector is the Achillies heel of the Malaysian economy. https://mysinchew.sinchew.com.my/news/20231220/mysinchew/5210974#:~:text=As%20was%20seen%20during%20the,the%20Malaysian%20way%20of%20life.

Sousa, S., de Morais, I. L., Albuquerque, G., Gelormini, M., Filipović-Hadžiomeragić, A., Stojisavljevic, D., Damasceno, A., Moreira, P., Breda, J., Lunet, N., & Padrão, P. (2022). Street food and takeaway food purchasing patterns in Bosnia and Herzegovina. *International Journal of Environmental Research and Public Health*, *19*(15), 9086.

Stern, D., Blanco, I., Olmos, L. A., Valdivia, J. J., Shrestha, A., Mattei, J., & Spiegelman, D. (2021). Facilitators and barriers to healthy eating in a worksite cafeteria: A qualitative study. *BMC Public Health*, *21*(1), 973.

Steyn, N. P., Labadarios, D., & Nel, J. H. (2011). Factors which influence the consumption of street foods and fast foods in South Africa-a national survey. *Nutrition Journal, 10*(1), 104.

Su, Q., & Li, F. (2023). The influence of tourists' sensory experiences of street food on destination loyalty: The mediating roles of delight and place attachment. *Journal of China Tourism Research*, 1–25.

Tacardon, E. R., Ong, A. K. S., & Gumasing, M. J. J. (2023). The perception of food quality and food value among the purchasing intentions of street foods in the capital of the Philippines. *Sustainability*, *15*(16), 12549.

Thatchinamoorthy, C., & Meenambigai, J. (2018). Customer relationship management and retention in street food sector. *International Journal of Food and Nutrition Science, 5*(1), 25–29.

Trafialek, J., Drosinos, E. H., & Kolanowski, W. (2017). Evaluation of street food vendors' hygienic practices using fast observation questionnaire. *Food Control*, *80*, 350–359.

Ursachi, G., Hordnic, I. A., & Zait, A. (2015). How reliable are measurement scales? External factors with indirect influence on reliability estimators. *Procedia Economics and Finance*, 20, 679–686.

Table 1. Sociodemographic profile of consumers (*n* = 1434).

Sociodemographic Characteristics	*n*	%
Age group (years)		
18-29	740	51.6
30-39	262	18.3
40-49	211	14.7
50-59	221	15.4
Gender		
Female	996	69.5
Male	438	30.5
Race		

Malay	894	62.3
Chinese	419	29.2
Indian	83	5.8
Others	38	2.6
Marital status[a]		
Single	787	54.9
Married	622	43.4
Others	25	1.7
Level of education		
Primary education	35	2.4
Secondary education	232	16.2
Tertiary education	1167	81.4
Employment		
Government Sector	312	21.8
Private Sector	255	17.8
Self-employed	145	10.1
Student	571	39.8
Unemployed	151	10.5
Monthly household income		
≤ RM 4850	836	58.3
RM 4851-RM 10,970	456	31.8
≥ RM 10,971	142	9.9

[a]Marital status: ‘Divorced’ and ‘widow’ categories recoded into ‘others.'

Table 2. Descriptive information on habits of street food consumption among consumers (*n* = 1434).

Habits of Street Food Consumption	*n*	%
Frequency of street food consumption		
2-3 times per year	168	11.7
≤ 1 time per month	402	28.0
1 time per week	431	30.1
2-3 times per week	400	27.9
Every day	33	2.3
Preference of mealtime for street food consumption		
Breakfast	292	20.4
Morning tea	37	2.6
Lunch	135	9.4
Afternoon tea	590	41.1
Dinner	316	22.0
Supper	64	4.5
Preference of street food categories		
Main meal	534	37.2
Snack	713	49.7
Dessert	187	13.0

Table 3. Mean scores of factors and items that influence street food purchasing among consumers (n = 1434).

Factors	Items	Average Score ($M \pm SD$)	
		Per Item	Per Factor
Cleanliness	I often buy street food at a clean stall.	4.24 ± 0.92	4.10 ± 0.88
	I often buy street food from the vendor who practices hygiene.	4.15 ± 0.98	
	I often buy street food that is covered.	3.92 ± 1.03	
Food attribute	I often buy street food because of its delicious taste.	4.12 ± 0.92	3.68 ± 0.86
	I often buy street food because of its specific texture (soft, crispy, fluffy etc).	3.69 ± 1.03	
	I often buy street food because of its aroma.	3.62 ± 1.07	
	I often buy street food because of its appearance.	3.29 ± 1.18	
Price	I often buy street food that is within my budget.	3.92 ± 1.00	3.64 ± 0.89
	I often buy street food because it is cheaper than other outside food.	3.62 ± 1.07	
	I often compare prices of street food before buying.	3.37 ± 1.20	
Practice and tradition	I can get multi-ethnic street food.	3.76 ± 1.09	3.64 ± 0.89

	I often buy street food because I can get a lot of traditional food of my own ethnic.	3.68 ± 1.10	
	I have been familiar with buying street food since I was a kid.	3.48 ± 1.17	
Quantity	I often buy street food because its portion size is reasonable with the price.	3.90 ± 0.92	3.53 ± 0.88
	I often buy street food because of the large portion size.	3.15 ± 1.08	
Time	I often buy street food because the food is fast to be prepared.	3.81 ± 1.01	3.50 ± 0.91
	I often buy street food because the location is near to my house.	3.59 ± 1.09	
	I often buy street food because I have no time to cook.	3.11 ± 1.21	
High energy content	I often buy street food which uses the frying method as compared to the boiling method.	3.22 ± 1.08	3.20 ± 0.94
	I often buy street food because it provides adequate energy as well as making me full.	3.19 ± 1.10	
Environment	I often buy street food because of the influence from my family members, friends and relatives.	3.42 ± 1.15	3.14 ± 0.94

	I often buy street food because the environment is lively.	3.16 ± 1.15	
	I often buy street food because I am attracted by the advertisement.	2.83 ± 1.14	
High sugar content	I often buy street food that is sweet because it makes me feel happy.	2.79 ± 1.18	2.53 ± 0.99
	I often buy street food that is sweet like ice-cream, doughnut, *apam balik* and so on.	2.71 ± 1.14	
	I often add sweet toppings (colourful chocolate rice/ glaze etc) on top of dessert that I buy.	2.10 ± 1.08	
High fat content	I like to buy coconut milk based street food.	2.50 ± 1.05	2.47 ± 0.93
	I often add cheese on top of street food that I buy.	2.43 ± 1.14	

Table 4. Kruskal–Wallis tests for differences in influencing factor scores across frequency of street food consumption.

Factor	χ^2 (df)	*p*-value
Food attribute	13.495 (4)	0.009
Price	11.360 (4)	0.023
Cleanliness	3.553 (4)	0.470
Quantity	11.111 (4)	0.025
Practice & tradition	13.721 (4)	0.008
Time	42.041 (4)	<.001
Environment	30.754 (4)	<.001
Sugar content	15.233 (4)	0.004
Fat content	34.005 (4)	<.001
Energy content	20.693 (4)	<.001

Frequency of consumption categories: (1) 2–3 times per year, (2) ≤1 time per month, (3) once per week, (4) 2–3 times per week, (5) every day. Significance level set at $p < 0.05$.

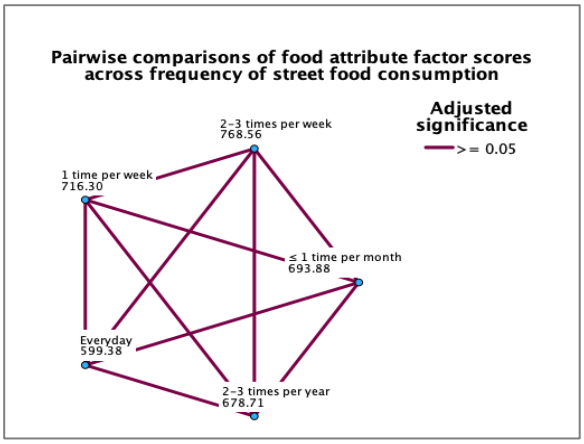

Figure 1(a). Food attribute factor

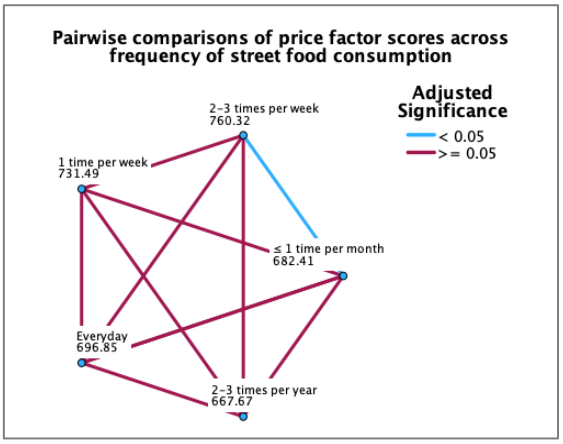

Figure 1(b). Price factor

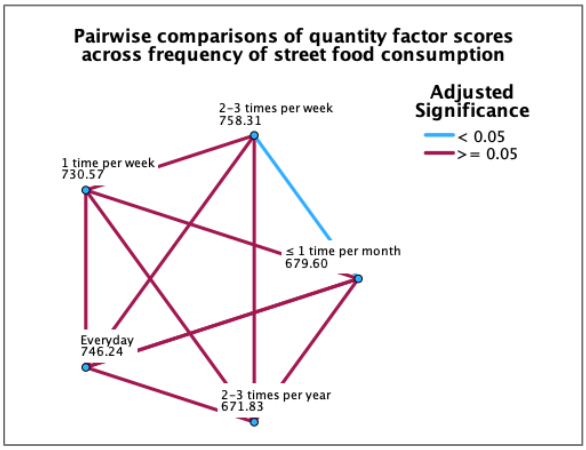

Figure 1(c). Quantity factor

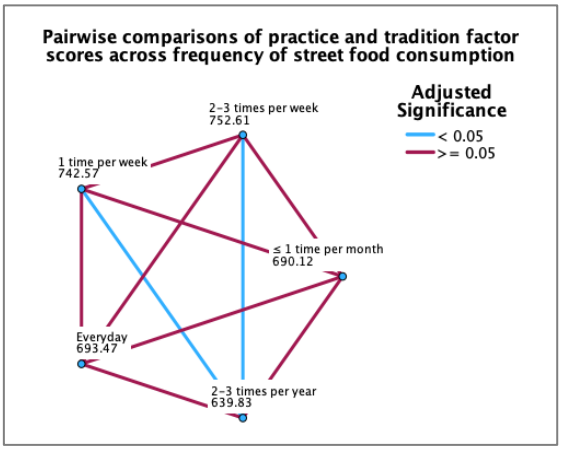

Figure 1(d). Practice and tradition factor

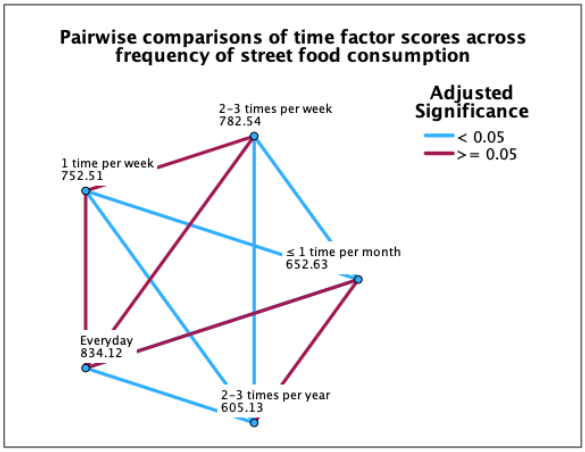

Figure 1(e). Time factor

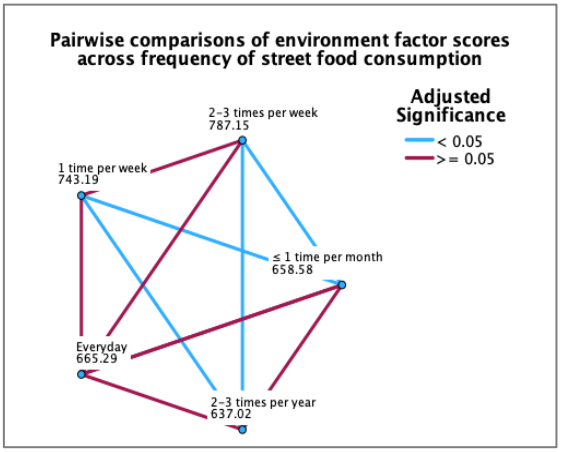

Figure 1(f). Environment factor

Figure 1. Pairwise comparisons of influencing factor scores between frequency of street food consumption groups.

Each node shows the sample mean rank of the factor scores for each frequency category. Blue lines indicate significant differences ($p < 0.05$, Bonferroni adjusted).

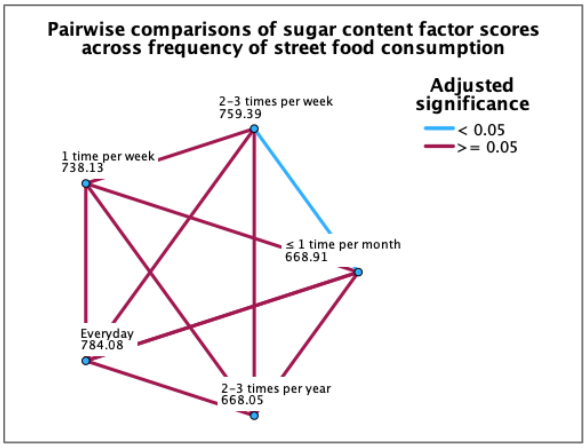

Figure 1(g). Sugar content factor

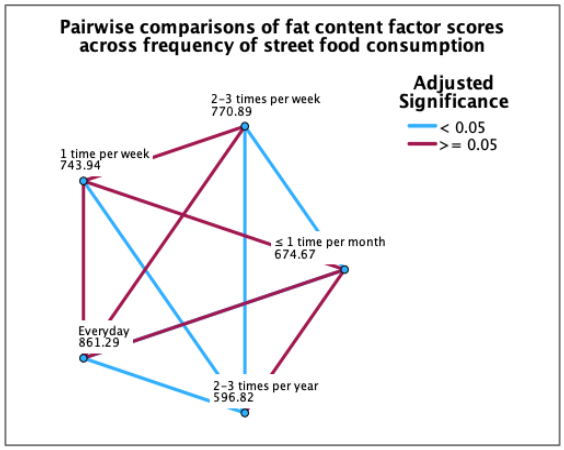

Figure 1(h). Fat content factor

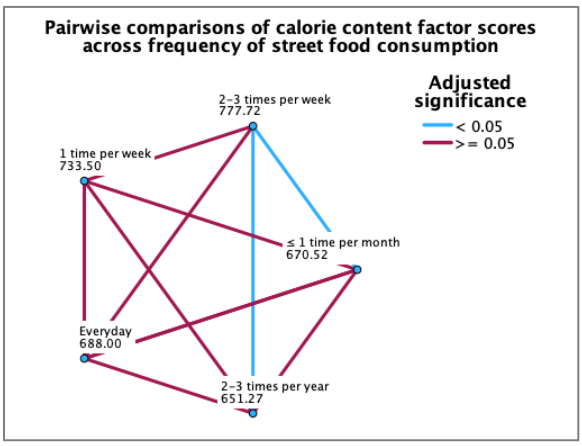

Figure 1(i). Energy content factor

Figure 1. Pairwise comparisons of influencing factor scores between frequency of street food consumption groups.

Each node shows the sample mean rank of the factor scores for each frequency category. Blue lines indicate significant differences ($p < 0.05$, Bonferroni adjusted).

Table 5. Multinomial logistic regression analysis of factors influencing frequency of street food consumption.

Predictor	Category for frequency of street food consumption	B	SE	OR (Exp (B))	95% CI	*p*-value
Cleanliness	≤ 1 time per month	-0.006	0.112	0.994	0.797–1.239	0.956
	1 time per week	0.032	0.114	1.033	0.827–1.291	0.776
	2-3 times per week	-0.154	0.115	0.857	0.684–1.073	0.178
	Every day	-0.267	0.234	0.766	0.484–1.211	0.254
Food attribute	≤ 1 time per month	0.047	0.133	1.048	0.807–1.359	0.726
	1 time per week	-0.108	0.134	0.898	0.690–1.167	0.421
	2-3 times per week	-0.003	0.138	01.003	0.765–1.314	0.983
	Every day	-0.616	0.270	0.540	0.318–0.918	0.023
Price	≤ 1 time per month	-0.038	0.124	0.963	0.754–1.228	0.760

	1 time per week	-0.030	0.125	0.971	0.759–1.242	0.814
	2-3 times per week	0.043	0.128	1.044	0.812–1.342	0.738
	Every day	-0.043	0.270	0.958	0.565–1.625	0.875
Practice and tradition	≤ 1 time per month	0.165	0.125	1.180	0.923–1.508	0.187
	1 time per week	0.142	0.126	1.152	0.900–1.475	0.261
	2-3 times per week	0.061	0.129	1.063	0.826–1.368	0.636
	Every day	0.037	0.266	1.037	0.616–1.747	0.890
Quantity	≤ 1 time per month	-0.070	0.135	0.933	0.716–1.205	0.605
	1 time per week	-0.050	0.136	0.951	0.729–1.241	0.713
	2-3 times per week	-0.048	0.138	0.953	0.727–1.250	0.729
	Every day	0.293	0.292	1.341	0.756–2.377	0.316
Time	≤ 1 time per month	0.094	0.119	1.099	0.870–1.387	0.429

	1 time per week	0.297	0.120	1.345	1.063–1.703	0.014
	2-3 times per week	0.342	0.123	1.407	1.105–1.792	0.006
	Every day	0.913	0.269	2.492	1.472–4.220	<.001
Energy content	≤ 1 time per month	-0.029	0.118	0.972	0.771–1.225	0.807
	1 time per week	0.003	0.119	1.003	0.795–1.266	0.979
	2-3 times per week	0.069	0.121	1.071	0.845–1.358	0.569
	Every day	-0.241	0.249	0.786	0.482–1.280	0.333
Environment	≤ 1 time per month	-0.079	0.121	0.924	0.729–1.171	0.512
	1 time per week	0.074	0.121	1.077	0.849–1.366	0.540
	2-3 times per week	0.192	0.124	1.212	0.951–1.544	0.119
	Every day	-0.267	0.257	0.766	0.462–1.268	0.299
Sugar content	≤ 1 time per month	-0.152	0.120	0.859	0.678–1.087	0.206

	1 time per week	-0.090	0.119	0.914	0.724–1.154	0.450
	2-3 times per week	-0.158	0.120	0.854	0.675–1.081	0.189
	Every day	-0.028	0.243	0.972	0.604–1.566	0.908
Fat content	≤ 1 time per month	0.257	0.121	1.292	1.019–1.639	0.034
	1 time per week	0.316	0.120	1.372	1.083–1.736	0.009
	2-3 times per week	0.341	0.122	1.406	1.107–1.785	0.005
	Every day	0.756	0.244	2.129	1.321–3.432	0.002

Reference category = "2-3 times per year." OR = odds ratio; CI = confidence interval. Significance level set at $p < 0.05$.