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Food safety and evaluation of intention to practice safe eating out measures during COVID-19: Cross sectional study in Indonesia and Malaysia

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ABSTRACT

The COVID-19 pandemic has altered consumers' relationship with food, whether through shopping, increased home cooking, taking pre-cautionary measures during food shopping, food delivery and whilst dining out. This study aims to examine the impact of COVID-19 pandemic on consumers' food safety knowledge, attitude and practices and to identify the predictors of food safety practices during COVID-19. An online survey was conducted and received valid responses from 987 respondents. Data were analysed using descriptive statistics, non-parametric tests, Spearman's rho correlation and multiple regression. The Theory of Planned Behaviour (TPB) model was used to investigate the intention to practice safe eating out measures during COVID-19. The mean food safety knowledge score was 6.37 ± 1.37 (9.00 = highest score) of which 91.3% of total respondents from Indonesia and Malaysia scored ≥5 points. Consumers also demonstrated positive food safety attitude (4.06 ± 0.99) and reported high frequencies in conducting food safety practices (4.03 ± 0.82) during COVID-19. The TPB has provided valuable framework for understanding consumers' intention to practice safe eating out measures during COVID-19. The multiple regression model explained 63% and 73% of the variance in adherence to safe eating out practices in Indonesia and Malaysia and ($p < 0.05$) respectively. All the TPB antecedents i.e. attitude, subjective norms and perceived behavioural control were identified as significant predictors on consumers' eating out practices. This suggests that consumers with positive food safety attitude and strong family norms were more likely to adhere to safe eating out measures (e.g. selection of clean and less crowded restaurants, practicing hand hygiene, wearing masks and practising social distancing). The findings also suggest that to fully adhere to the safe practices, it is important to have sufficient support from restaurant staff to ensure social distancing and to provide adequate handwashing facilities. This is the first study to provide new empirical findings on consumers' intention to practice safe eating out measures during COVID-19.

1. Introduction

The COVID-19 pandemic and lockdown had caused tremendous disruptions and impacts on society, public health and economy. Social distancing and safety mandates have altered businesses standard operating procedures and consumers' buying and eating habits. Consumers are learning to learn and adapt such new habits (Sheth, 2020). During COVID-19 outbreak, consumers' relationship with food and their consumption habits changed due to the lockdown restrictions. Gerritsen et al. (2020) revealed that consumers had increased home cooking and baking from scratch. Similarly, consumers in United States of America reported increased confidence in cooking and spending more time trying new recipes and wasting less food (Hunter, 2020). Adults in North America, Australia, Ireland and United Kingdom reported increased home cooking and eating out less during the pandemic (Flanagan et al., 2020). Changes in dietary and food preparation practices will have an impact on food safety practices. There is currently no evidence that COVID-19 is foodborne (European Commission, 2020; WHO, 2020a) however it is imperative to note that early findings suggest a high possibility the source was from food of animal origin (wild animals) (Wang,

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Anderson, Mackenzie, & Merson, 2020; Zhou et al., 2020) and could be carrier of the virus (Duda-Chodak, Lukasiewicz, Ziec, Florkiewicz, & Filipiak-Florkiewicz, 2020). COVID-19 has altered consumers' relationship with food, whether through shopping, increased home cooking, taking pre-cautionary measures during food shopping, food delivery and whilst dining out.

A recent study incubated SARS-CoV-2 in meat, poultry and fish products stored at 4 °C, −20 °C and −80 °C and found infectivity remained for 3 weeks in the chilled (4 °C) and frozen samples (−20 °C and −80 °C) (Fisher et al., 2020 [Unrefereed preprint, please note this study is still subjected to peer review]). Although food is not a vehicle of viral transmission, coronavirus may contaminate food products or food packaging through an infected person who sneezed or coughed directly on them. SARS-CoV-2 was found to remain for hours or days depending on the physical characteristics of surfaces and viable virus was detected on plastic or stainless-steel surfaces (up to 72 h), cardboard (up to 24 h) and copper (up to 4 h) (Kampf, Todt, Pfaender, & Steinmann, 2020; Van Doremalen et al., 2020). Hirose et al. (2020) found SARS-CoV-2 was able to survive for 9 h on human skin. Pung et al. (2020) reported that it was through physical contact and sharing of meals during a conference which led to a cluster outbreak in Singapore. Although COVID-19 can in principle be transmitted by touching contaminated surfaces and then touching the nose, eyes or mouth, this is not the main mode of transmission (CDC, 2020). The persistence of SARS-CoV-2 on inanimate surfaces and human skin reiterate the importance of hand hygiene and regular disinfection of surfaces. Retailers and hospitality venues have responded by introducing social distancing measures, carried out vigilant cleaning and disinfection of contact surfaces and providing hand sanitisers and wipes to customers (Hawthorne, 2020). SARs-CoV-2 is stable at 4 °C but is sensitive to heat and was found to be inactive in 5 min when incubation temperature increased to 70 °C (Carraturo et al., 2020; Chin et al., 2020). Hence coronavirus is susceptible to traditional cooking temperature (e.g. 70 °C) and this reiterates the importance of food safety and good hygiene practices such as avoiding consumption of raw and undercooked food of animal origin and periodic cleaning and sanitation of surfaces (WHO, 2020b).

Multiple studies had been conducted to assess the impact of COVID-19 on food businesses (Bucak & Yigit, 2021; Djekic et al., 2021; Nakat & Bou-Mitri, 2021; Rizou, Galanakis, Aldawoud, & Galanakis, 2020; Wang, Wang, & Wang, 2020). However, the impact of COVID-19 on consumers' food safety knowledge, attitude and practices remain limited. How has the pandemic affected consumers' perceptions of risks and food safety practices? Two studies focusing on consumers' perception of food and food safety awareness during COVID-19 had been published to date. Faour-Klingbeil, Osaili, Al-Nabulsi, Jemni, and Todd (2021) conducted a study on public perception of food and non-food related risks of infection during COVID-19 in the Arab region (Lebanon, Jordan and Tunisia). Seventy percent (n = 1074) were concerned about the risk of transmission of COVID-19 through food. Up to 27% of the respondents were extremely concerned about touching contaminated surfaces while food shopping and 34% were very concerned about being infected by others during shopping. In China, the impacts of COVID-19 were found to have a significantly positive effect on residents' food safety knowledge and behaviour (Shi, Cheng, & Zhang, 2020). Studies found that consumers tend to eat out less during the pandemic and closure of food services (Flanagan et al., 2020; Toffolutti, Stuckler, & McKee, 2020). However, during recovery periods, food services were allowed to operate under strict food safety, hygiene and COVID-19 restrictions (Lim, 2020). Consumers were allowed to visit hospitality businesses, but no studies had been conducted to examine their food safety practices whilst eating out. The exploration of consumers' perceptions and potential modification of food safety practices at home and when shopping or eating out would help to understand public response of food safety during exogenous shocks like COVID-19. The aim of this study is twofold: to examine the impact of COVID-19 pandemic on consumers' food safety knowledge, attitude and practices and (ii) to identify the predictors to practice safe eating out measures during COVID-19.

2. Methodology

2.1. Questionnaire development

An online survey was developed to determine how COVID-19 has affected South East Asian consumers' food safety knowledge, attitude and practices and factors affecting their eating out behaviour. The survey was modified from Faour-Klingbeil et al. (2021), Shi et al. (2020) and Soon, Abdul Wahab, Hamdan, and Jamaludin (2020). The survey is divided into three sections (i) demographics (3 questions); (ii) knowledge, attitude and food safety/shopping practices during COVID-19 (27 questions); and (iii) Theory of Planned Behaviour (TPB) (attitude, subjective norms and perceived behavioural control) in relation to eating out practices (17 questions). Food safety knowledge refers to the understanding of information about food safety acquired through experience or education while attitude is a feeling or opinion about food safety and practice refers to the action or application of safe handling of food (Cambridge Dictionary, 2019a, b, c). The study utilised TPB to identify the influences that predict and change food safety behaviours where behavioural intention is influenced by attitude (individual's positive or negative evaluation of performing a particular behaviour), subjective norms (perception of the social pressure to perform or not perform the behaviour) and perceived behavioural control (perception of the ease or difficulty in performing the target behaviour) (Fishbein & Ajzen, 1975; Shapiro, Porticella, Jiang, & Gravani, 2011; Soon & Baines, 2012).

The survey was translated into Bahasa Malaysia (Malay language) and Bahasa Indonesia (Indonesian language) by the first and second authors and back translated into English. The survey was reviewed by four food safety experts for content validity and pilot tested among 20 respondents (they did not participate in the actual study) to ensure clarity, reliability and time to completion. Minor changes such as the correct usage of local terms i.e. transmission was made upon receiving feedback from the expert reviewers and respondents. The internal consistencies of the food safety knowledge, attitude and practices questions were acceptable (Cronbach's alpha = 0.91, 0.96 and 0.89 respectively). Food safety knowledge was assessed using nine items. Each correct item was scored 1 while an incorrect or uncertain answer was scored 0. The total score ranged from 0 to 9 where a high score indicated high knowledge level in food safety. Food safety attitudes were assessed using nine items and were scored using Likert scale of 1–5 where 1 = strongly disagree and 5 = strongly agree. Food safety practices were assessed using nine items and participants were asked to score the frequency of the practices where 1 = never and 5 = always. The food safety attitude and practices questions were further divided into (i) shopping; (ii) cleaning and sanitising and (iii) eating out/ordering takeaways categories. TPB (attitude, subjective norms and perceived behavioural control) were assessed using Likert scale of 1–5 where 1 = strongly disagree and 5 = strongly agree. Intention were measured using Likert scale of 1–5 where 1 = very unlikely to happen and 5 = very likely to happen. The online survey was hosted on Online survey (www.onlinesurvey.ac.uk) platform.

3. Subject recruitment

Subjects were recruited mainly through convenience sampling of general consumers and snowball sampling technique where initial respondents further recommend additional subjects to participate in the study. Studies measuring consumers' food safety knowledge and trust had utilised convenience and snowball sampling techniques to increase the number of responses (Bearth, Cousin, & Siegrist, 2014; Faour-Klingbeil et al., 2021). All responses were anonymised, and data stored at the first author's university secured network. Prior to completing the survey, participants were provided with an explanation of the study, and

assured that participation was entirely voluntary. Participants had the option to withdraw from the study simply by closing or exiting the survey browser. Participants were assured of data confidentiality and no personal data were collected. Participants provided their consent to participate by clicking the 'Proceed' button in the survey.

4. Statistical analysis

Data were exported into SPSS 27.0 (IBM) for statistical analysis. Tests of normality were conducted, and the Kolmogorov-Smirnov test values were significant, indicating data is not normally distributed. Hence, non-parametric tests were used. Descriptive statistics, Mann-Whitney *U* test, Kruskal-Wallis H, Spearman's rho correlation and multiple regression were conducted. Multiple linear regression was conducted to determine the predictive ability of attitudes, subjective norm and perceived behavioural control on the intention to perform food safety practices during COVID-19. Negative statement in Theory of Planned Behaviour (TPB Question 4: Wearing masks before and after eating in restaurant is not important) was reverse scaled prior to analysis. Results with p value < 0.05 were considered statistically significant.

5. Results

A total of 1001 responses were received of which 987 were valid. Almost two third of the respondents came from Indonesia (62.2%) and more females (54.5%) participated in the survey compared to males. Generation Y (age between 26 and 35 years) and Generation Z (age between 18 and 25 years) represent the highest categories of age groups. The younger respondents coincide with the high number of participants who had completed or are in tertiary level education (Table 1).

6. Food safety knowledge

The average food safety knowledge score was 6.37 ± 1.37 (9.00 = highest score). 91.3% scored ≥5 and 6.5% answered all food safety knowledge questions correctly. Among the questions, 98.1% were aware that handwashing with water and soap before preparing their meals and practicing social distancing measures in restaurants help to reduce risks of transmission of COVID-19. A high number of correct responses (97.7%) were received for K2, demonstrating high level of awareness and importance of wearing masks whilst shopping. Most respondents (88.2%) also agreed that staying at least 2m apart from others help to reduce risks of transmission of COVID-19. However, slightly more than half (50.3%) were uncertain or unaware that food handlers who are asymptomatic with COVID-19 symptoms are infectious and could transmit COVID-19 to others. Similarly, up to 58% were not aware that cooking at >70 °C can destroy coronavirus and that bleach is effective against coronavirus (64.3%) (Table 2).

Table 1
Demographic characteristics of consumers.

Item	Demographics	Frequency (%)
Country	Malaysia	373 (37.8)
	Indonesia	614 (62.2)
Gender	Male	449 (45.5)
	Female	538 (54.5)
Age	18–25 years old	336 (34.0)
	26–35 years old	345 (35.0)
	36–45 years old	201 (20.4)
	46–55 years old	75 (7.6)
	56–65 years old	57 (2.7)
	66 years old and above	3 (0.3)
Education	Primary	2 (0.2)
	Secondary	51 (5.2)
	Tertiary	934 (94.6)

Table 2
Food safety knowledge of consumers in Indonesia and Malaysia during COVID-19 (n = 987).

Item	Questions	True	False	Uncertain
K1	Coronavirus could potentially be transmitted by food and food packaging.	**574 (58.2)**	108 (10.9)	305 (30.9)
K2	Wearing masks while shopping help to reduce risks of transmission of coronavirus.	**964 (97.7)**	4 (0.4)	19 (1.9)
K3	Enclosed markets with no ventilation help to prevent spread of coronavirus.	126 (12.8)	**698 (70.9)**	163 (16.2)
K4	Handwashing with water and soap before meal preparation helps to reduce risks of transmission of coronavirus.	**968 (98.1)**	5 (0.5)	14 (1.4)
K5	Cooking (>70 °C) can destroy coronavirus.	**407 (41.2)**	112 (11.3)	468 (47.4)
K6	Bleach is effective against coronavirus.	**352 (35.7)**	158 (16.0)	477 (48.3)
K7	Food handlers who have no COVID-19 symptoms could not transmit COVID-19 to staff and customers.	254 (25.7)	**490 (49.6)**	243 (24.6)
K8	A crowded restaurant with no social distancing measures increase risks of transmission of COVID-19.	**968 (98.1)**	9 (0.9)	10 (1.0)
K9	If I'm sat at least 2 m apart from others in a restaurant, this helps to reduce risks of transmission of COVID-19.	**871 (88.2)**	31 (3.1)	85 (8.6)

Note: Bold responses represent the correct answers.

7. Food safety attitude and practices

Respondents in general reported positive food safety attitudes during COVID-19. More than half strongly agreed that they wash all fresh fruits and vegetables prior to meal preparation (59.2%), wash hands with water and soap before and after meal preparation (56.7%) and choose to avoid crowded restaurants and eat at home (57.2%). This was reflected in their self-reported practices where 72.4% always wash fruits and vegetables before consumption and 71.1% always wash their hands before meal consumption at the restaurant. Up to 61% always follow social distancing measures when shopping and 57.4% always opt to choose well-ventilated restaurants that follow social distancing rules when dining out. Slightly more than 20% of the respondents did not or very rarely sanitise trolley or basket handles when shopping. Approximately 24% never or seldom disinfect their kitchen surfaces after meal preparation (Table 3).

Although food safety knowledge did not differ significantly between countries ($U = 115374.00$, $p = 0.84$), consumers from Indonesia demonstrated slightly higher food safety knowledge than Malaysians. Similarly, there were no significant differences in food safety attitude ($U = 120629.50$, $p = 0.16$) and food safety practices ($U = 120473.50$, $p = 0.17$). Indonesians also demonstrated positive food safety attitude and reported higher frequencies in conducting food safety practices during COVID-19. Meanwhile females were also more likely to exhibit positive food safety attitude ($U = 141397.00$, $p < 0.05$) and practices ($U = 140645.5$, $p < 0.05$) during the pandemic. There was no significant difference in food safety knowledge across gender ($U = 113653.50$, $p = 0.10$) and education level ($U = 25945.50$, $p = 0.54$). Those educated to tertiary level were found to have more positive attitude compared to primary and secondary level ($U = 29006.00$, $p = 0.04$) but did not differ significantly in their practices ($U = 25409.50$, p-0.74). Food safety knowledge ($H = 57.40$, $p < 0.001$) and food safety practices ($H = 19.48$, $p < 0.001$) were found to differ significantly between age groups while food safety attitude did not ($H = 9.26$, $p = 0.06$) (Table 4).

Table 5 shows the correlation among food safety knowledge, attitudes and practices of consumers from Indonesia and Malaysia. A significant positive correlation was found between attitudes with practices among Malaysians ($rs = 0.649$, $p < 0.05$). Responses from Indonesia

Table 3
Food safety attitude and practices of consumers in Indonesia and Malaysia during COVID-19 (n = 987).

No.	Attitude[a]	Strongly disagree	Disagree	Uncertain	Agree	Strongly agree
A1	When shopping, I will select visibly clean food and food packaging.	72 (7.3)	12 (1.2)	49 (5.0)	380 (38.5)	474 (48.0)
A2	When shopping, I will sanitise surfaces such as shopping trolleys or baskets before using them.	70 (7.1)	62 (6.3)	159 (16.1)	384 (38.9)	312 (31.6)
A3	I shop as quickly as possible to minimise contact with staff and customers.	71 (7.2)	45 (4.6)	85 (8.6)	411 (41.6)	375 (38.0)
A4	I wash all fresh fruits and vegetables before preparation and serving them.	74 (7.5)	6 (0.6)	31 (3.1)	292 (29.6)	584 (59.2)
A5	I remove all food packaging carefully to avoid contamination with coronavirus.	74 (7.5)	80 (8.1)	180 (18.2)	408 (41.3)	245 (24.8)
A6	I wash hands with water and soap before and after food preparation.	79 (8.0)	3 (0.3)	28 (2.8)	317 (32.1)	560 (56.7)
A7	I will avoid crowded restaurants and choose to eat at home.	73 (7.4)	19 (1.9)	42 (4.3)	288 (29.2)	565 (57.2)
A8	I will order takeaways or deliveries where possible.	71 (7.2)	40 (4.1)	81 (8.2)	381 (38.6)	414 (41.9)
A9	If possible, I will use apps to order food at restaurants to minimise contact with other people.	76 (7.7)	39 (4.0)	71 (7.2)	373 (37.8)	428 (43.4)
No.	**Practices[b]**	**Never**	**Seldom**	**Sometimes**	**Often**	**Always**
P1	I shop from well-ventilated supermarkets or stalls.	40 (4.1)	67 (6.8)	232 (23.5)	361 (36.6)	287 (29.1)
P2	I follow social distancing measures while shopping.	38 (3.9)	9 (0.9)	75 (7.6)	267 (27.1)	598 (60.6)
P3	I sanitise surfaces such as trolley or basket handles with sanitising wipes before using them in shops.	98 (9.9)	111 (11.2)	217 (22.0)	241 (24.4)	320 (32.4)
P4	I wash or wipe food jars and cans before using them.	63 (6.4)	77 (7.8)	169 (17.1)	286 (29.0)	392 (39.7)
P5	I disinfect kitchen surfaces after meal preparation.	106 (10.7)	126 (12.8)	250 (25.3)	275 (27.9)	230 (23.3)
P6	I wash fruits and vegetables before cooking or eating.	37 (3.7)	7 (0.7)	31 (3.1)	197 (20.0)	715 (72.4)
P7	If I'm eating out, I will choose well-ventilated restaurants that follow social distancing rules.	36 (3.6)	20 (2.0)	87 (8.8)	277 (28.1)	567 (57.4)
P8	I wash my hands at the restaurant.	33 (3.3)	16 (1.6)	44 (4.5)	192 (19.5)	702 (71.1)
P9	I sanitise the utensils and table surfaces before dining at restaurants.	66 (6.7)	77 (7.8)	198 (20.1)	275 (27.9)	371 (37.6)

Notes: a = Attitude where 1 = strongly disagree; 5 = strongly agree. b = Practices where 1 = never; 5 = always.

showed significant and positive correlation between knowledge with attitudes ($rs = 0.137$, $p < 0.05$), knowledge with practices ($rs = 0.141$, $p < 0.05$) and attitudes and practices ($rs = 0.515$, $p < 0.05$).

8. Components of Theory of Planned Behaviour (TPB)

Table 6 shows the proportion of consumers' response to statements measuring Theory of Planned Behaviour (TPB) components related to eating out practices during COVID-19. Respondents demonstrated positive attitude towards social distancing measures (73.5%), hand hygiene (72.6%), avoiding eating out if suffering from COVID-19 symptoms (73.9%) and wearing masks (65%). Respondents were in general agreement that social norms and pressure from family members (79.4%) would influence their handwashing practices when eating out. In terms of perceived behavioural control, majority of respondents agreed that insufficient policing from restaurant staff to ensure social distancing measures would make it difficult for them to dine out (77.4%) while inadequate hand washing facilities would make it difficult to practice hand hygiene (83.8%). Most respondents intend to carry out safe dining practices when eating out.

9. Multiple regression analysis for intention to practice safe eating out measures during COVID-19

Figs. 1 and 2 show the multiple regression analysis of the TPB models for the intention to carry out safe eating out practices in Indonesia and Malaysia. Fig. 1 explained 63% of the variance of the model of which attitude, subjective norm and perceived behavioural control (PCB) were significant predictors of intention to perform safe eating out practices in Indonesia during COVID-19. TPB model in Fig. 2 explained 73% of the variance and similarly, all factors (attitude, subjective norm and PCB) were significant predictors of the intent to perform safe eating out practices among Malaysian consumers during the pandemic.

10. Discussion

This study investigated the food safety knowledge, attitude and practices of consumers in Indonesia and Malaysia during COVID-19. The findings revealed that respondents demonstrated good level of food safety knowledge (average score was higher than 6) and more than 90% achieved more than 5 (out of maximum of 9 points). These findings reflect previous studies by Odeyemi et al. (2019); Ruby, Abidin, Lihan, Jambari, and Radu (2019a); Soon et al. (2020) in Malaysia and Ellinda-Patra, Dewanti-Hariyadi, & Nurtama, 2020 in Indonesia. Food safety knowledge, attitude and practices were found to be affected by gender, age and education level and the results were consistent with Taha, Osaili, Saddal, et al. (2020) and (Taha, Osaili, Vij, Albloush, & Nassoura, 2020b). Table 5 revealed insignificant correlations between food safety knowledge → food safety attitude and food safety knowledge → food safety practices among Malaysians. This could potentially be characterised by the optimistic bias (OB) phenomenon where consumers felt protected against food safety risks or 'it won't happen to me' (Soon et al., 2020; Weinstein, 1984) or 'he is worse than I am' (Da Cunha, Stedefeldt, & de Rosso, 2014) perceptions. Meanwhile, food safety knowledge significantly correlates with food safety attitudes and practices among Indonesians. Since 2015, the Government of Indonesia had initiated

Table 4
Summary of food safety knowledge, attitude and practices during COVID-19.

Items	Knowledge	Attitude	Practices
Country			
Malaysia (n=373)	6.37[a] ± 1.35	4.00[a] ± 1.03	3.97[a] ± 0.88
Indonesia (n=614)	6.38[a] ± 1.38	4.11[a] ± 0.94	4.07[a] ± 0.76
Gender			
Male (n=449)	6.44[a] ± 1.41	3.95[a] ± 1.03*	3.91[a] ± 0.87*
Female (n=538)	6.32[a] ± 1.33	4.18[b] ± 0.91*	4.14[b] ± 0.75*
Age			
18–25 years old (n=336)	5.97[ac] ± 1.26**	4.11[a] ± 0.86	3.98[a] ± 0.75**
26–35 years old (n=345)	6.51[bc] ± 1.39**	3.99[a] ± 1.04	3.97[a] ± 0.89**
36–45 years old (n=201)	6.61[bc] ± 1.36**	4.13[a] ± 1.00	4.16[ac] ± 0.77**
46–55 years old (n=75)	6.96[bc] ± 1.20**	4.21[a] ± 0.92	4.28[bc] ± 0.62**
56 years old and above (n=30)	6.33[c] ± 1.54**	3.86[a] ± 1.21	3.91[ac] ± 0.99**
Education level			
Primary and Secondary (n=53)	6.30[a] ± 1.17	3.87[a] ± 1.04*	3.92[a] ± 1.02
Tertiary (n=934)	6.38[a] ± 1.38	4.08[b] ± 0.97*	4.04[a] ± 0.78

Notes: Knowledge range from 0 to 9 where 9 = all correct answers; Attitude (strongly disagree to strongly agree: 1–5) and Practices (never to always: 1–5). Columns with different superscripts and asterisks (*$p < 0.05$; **$p < 0.001$) indicate significance difference.

Table 5
Correlation among food safety knowledge, attitudes and practices of consumers in Indonesia and Malaysia.

Level	Spearman's rho	Sig.
Malaysia (n = 373)		
Knowledge – Attitudes	0.03	0.52
Knowledge – Practices	0.08	0.14
Attitudes – Practices	0.65	0.00***
Indonesia (n=614)		
Knowledge – Attitudes	0.14	0.00**
Knowledge – Practices	0.14	0.00**
Attitudes – Practices	0.52	0.00**
Total (n=987)		
Knowledge – Attitudes	0.10	0.00**
Knowledge – Practices	0.12	0.00***
Attitudes – Practices	0.57	0.00***

Note: **$p < 0.01$; ***$p < 0.001$.

community-based food safety empowerment programmes to increase the food safety knowledge of consumers (Ellinda-Patra et al., 2020).

Questions on handwashing with water and soap and practicing social distancing measures in restaurants could help to reduce risks of transmission of COVID-19 received the highest accurate responses. This is due to strict measures implemented in restaurants such as limited seating capacity, social distancing measures, sanitising tables, chairs and cutleries before the next group of diners are seated and wearing face masks at all times except when eating (Ting, Perimbanayagam, & Babulal, 2020). In fact, Lu et al. (2020) recently found that droplet transmission of coronavirus was potentially aided by air-conditioning in a restaurant. Although large respiratory droplets of more than 5um remain in air for a short period of time and travel only short distances (<1 m) (Anderson, Turnham, Griffin, & Clakre, 2020; Tellier, Li,

Table 6
Proportion of consumers' response to statements related to eating out practices during COVID-19 (n = 987).

No.	Statements	Scale				
	Attitude[a]	1	2	3	4	5
1	I consider the cleanliness and social distancing measures of restaurants as very important to reduce transmission of COVID-19.	28 (2.8)	4 (0.4)	12 (1.4)	216 (21.9)	725 (73.5)
2	Following proper handwashing steps before eating is important to prevent COVID-19.	18 (2.8)	2 (0.2)	19 (1.9)	221 (22.4)	717 (72.6)
3	If I have COVID-19 symptoms (fever, cough, breathing difficulty), it is important that I do not eat out.	33 (3.3)	4 (0.4)	17 (1.7)	204 (20.7)	729 (73.9)
4	Wearing masks before and after eating in restaurant is not important[1].	642 (65.0)	176 (17.8)	41 (4.2)	61 (6.2)	67 (6.8)
	Subjective norm[b]					
5	My family will disapprove if I don't wash or sanitise my hands properly before eating at restaurants.	70 (7.1)	40 (4.1)	93 (9.4)	331 (33.5)	453 (45.9)
7	It is required of me to wash my hands before eating at restaurants.	27 (2.7)	15 (1.5)	24 (2.4)	215 (21.8)	706 (71.5)
	Perceived behavioural control[c]					
8	It is up to me to select clean restaurants that follow social distancing rules.	81 (8.2)	57 (5.8)	52 (5.3)	332 (33.6)	465 (47.1)
9	Not having enough support from restaurant staff to ensure social distancing measures would make it difficult for me to eat out at restaurants.	61 (6.2)	53 (5.4)	109 (11.0)	375 (38.0)	389 (39.4)
10	It is entirely up to me to wash my hands at the restaurants.	359 (36.4)	189 (19.1)	85 (8.6)	184 (18.6)	170 (17.2)
11	Not having enough handwashing facilities at the restaurant would make it difficult for me to wash my hands.	58 (5.9)	52 (5.3)	50 (5.1)	325 (32.9)	502 (50.9)
12	It is completely up to me to sanitise utensils and table surfaces at the restaurant.	219 (22.2)	164 (16.6)	148 (15.0)	283 (28.7)	173 (17.5)
13	Not having support from staff would make it difficult for me to clean surfaces before eating.	81 (8.2)	89 (9.0)	96 (9.7)	362 (36.7)	359 (36.4)
	Intention[d]					
14	I will always wash my hands before eating at a restaurant.	27 (2.7)	11 (1.1)	39 (4.0)	245 (24.8)	665 (67.4)
15	I will always avoid eating out if have COVID-19 symptoms (fever, cough).	37 (3.7)	5 (0.5)	27 (2.7)	215 (21.8)	703 (71.2)
16	I will always choose restaurants that look clean and follow social distancing measures.	30 (3.0)	3 (0.3)	29 (2.9)	262 (26.5)	663 (67.2)

(*continued on next page*)

Table 6 (*continued*)

No.	Statements	Scale				
	Attitude[a]	1	2	3	4	5
17	I will always sanitise utensils and table surface before eating in restaurants.	47 (4.8)	50 (5.1)	153 (15.5)	331 (33.5)	406 (41.1)

Notes: a – c use scale 1–5 where 1 = strongly disagree and 5 = strongly agree. d uses scale of 1–5 where 1 = very unlikely to happen and 5 = very likely to happen. 1 = negative statement.

Cowling, & Tang, 2019), however airflow from air-conditioning could potentially propagate the spread of aerosols to greater distances. (WHO, 2021) advice for the public in South East Asia and the utilisation of '**Avoid the 3Cs'**: spaces that are closed, crowded or involve close contact and provision of transparent and up-to-date information through the official portal of Malaysia Ministry of Health and creation of a special Facebook account called Crisis Preparedness and Response Centre (CRPC) (Md Shah et al., 2020; My Government, 2020) may have helped to increase consumers' awareness to avoid crowded or indoor settings, wear masks and practice social distancing measures.

Consumers in general reported positive food safety attitudes and were more likely to practice frequent hand hygiene, sanitisation of surfaces and following social distancing measures. Kahar, Dirawan, Samad, Qomariyah, and Purlinda (2020) revealed that many innovative behaviours i.e. discipline in wearing masks, maintaining social distancing and hand hygiene emerged in the Java province, Indonesia during the COVID-19 outbreak. Mercy Malaysia – a non-governmental organisation also launched a COVID-19 awareness campaign to instil good hygiene and safe practices among residents (The Star, 2020). In Malaysia, customers have been asked to shop alone (BBC, 2020a) and in some supermarkets, wipes are provided to sanitise trolley and basket handles (Martin-Neuninger & Ruby, 2020; TESCO, 2020). More than 70% of the respondents frequently washed fruits, vegetables and their hands prior to eating. It is a cultural norm in Indonesia and Malaysia, especially among Malays and Indians to eat with one's hands (Cultural Atlas, 2020). This eating practice and hand hygiene habit is common among consumers. Although there is no evidence of food or food packaging being associated with transmission of COVID-19 (European Commission, 2020; US FDA, 2020; WHO, 2020a), the respondents generally agreed that they would remove any food packaging carefully and would also wipe food jars or cans before using them. Chinese newspapers had reported that coronavirus was found on chopping boards used for imported salmon in local markets and this may have sparked further concerns among consumers. However, it is important to note that there was no trace of the virus on the salmon before reaching the market suggesting that the virus was present in the market and it is highly unlikely the salmon was the host (BBC, 2020b; Morrison, 2020). COVID-19 has caused fear and anxiety among consumers (Md Shah et al., 2020) and it is possible that this had driven further precautions among consumers to minimise cross contamination.

The TPB models successfully explained 63–73% of the variance in the influence of attitudes, subjective norm and perceived behavioural control in the intention of safe eating practices when dining out in Indonesia and Malaysia. All factors were identified as significant predictors in both countries. Attitude was identified as the strongest

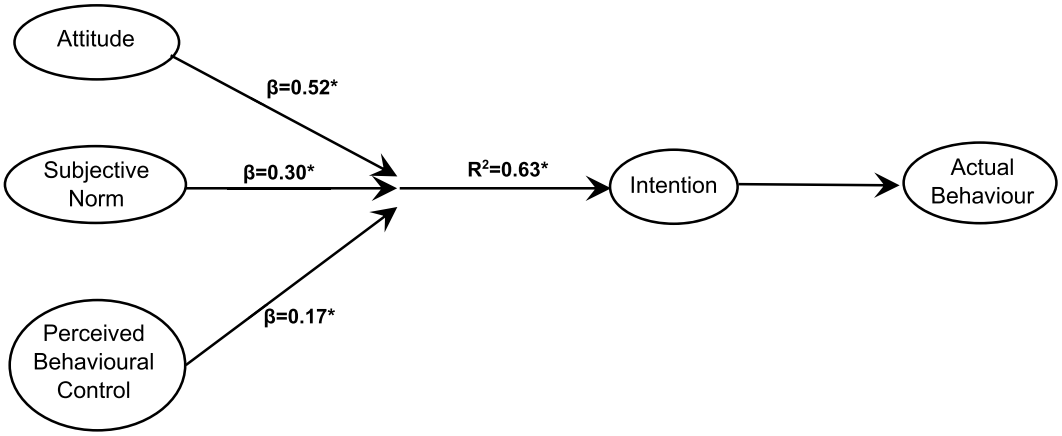

Fig. 1. Multiple regression analysis of TPB components of intention to practice safe eating out measures in Indonesia during COVID-19. * Significance at $p < 0.05$.

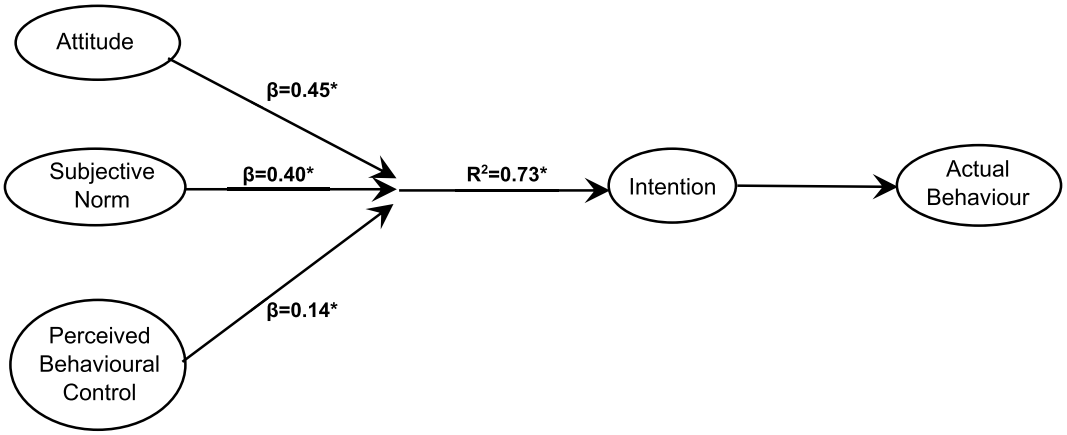

Fig. 2. Multiple regression analysis of TPB components of intention to practice safe eating out measures in Malaysia during COVID-19. * Significance at $p < 0.05$.

predictor in Indonesia (β = 0.52) and Malaysia (β = 0.45). This agrees with previous studies conducted by Lim, Chye, Sulaiman, Mohd Suki, and Lee (2016), Soon (2018) and Soon et al. (2020) (prior to COVID-19 pandemic) where attitude among consumers in Malaysia were found to significantly affect food safety practices. Sihombing, Padmawati, and Kristina (2018) also reported a significant correlation between food safety attitude and safe food handling practices in Indonesia. A positive attitude reflects the consumers' level of motivation and care to prevent transmission of COVID-19. According to the Prevention and Control of Infectious Diseases Act, wearing face masks are mandatory in public spaces in Malaysia. Failure to comply with the rule could result in a fine up to RM1,000 (US$246) (The Straits Times, 2020). In Indonesia, up to 86% of Indonesian respondents in a recent survey stated that they were wearing face masks when in public places (Hirschmann, 2020). Local police had intensified spot checks and surveillance in public areas including conducting random checks in restaurants to ensure full compliance of rules (Perimbanayagam, 2020).

Subjective norms were significant predictors in both countries and were consistent with previous study by Ruby, Abidin, Lihan, Jambari, and Radu (2019b). Collectivism is a significant value practiced in Indonesia and Malaysia. Both societies embrace the culture of interdependence, obedience, maintaining harmonious relationships and hence family expectations play an integral part in daily lives (Kurniawan, Dewi, Maulatsih, & Gunadi, 2020; Sumari, Baharudin, Md Khalid, Ibrahim, & Tharbe, 2019). Consumers including food handlers are more likely to listen to advise of family members or people close to them (Ruby et al., 2019b). Hence it is not uncommon for consumers to seek approval from family members or referents to avoid any risk associated with a practice such as minimising risk of spreading or catching coronavirus.

Although perceived behavioural control significantly predicted the intention to practice safe eating out measures, however, it was ranked lowest among all factors. Respondents strongly agreed that having support from staff to provide safe and limited seating capacity in restaurants and having adequate handwashing facilities would enable them to dine out safely. Time, number and location of sinks and lack of staff had been identified as barriers to hand hygiene (Clayton & Griffith, 2008; Jenner, Watson, Miller, Jones, & Scott, 2002; O'Boyle, Henly, & Larson, 2001). Hence, the lack of provision of working handwashing facilities including water and soap are beyond consumers' control and would be perceived as potential barrier to wash hands.

11. Limitations

There are several limitations associated with the study. Since the study was conducted online, this may have excluded marginalised groups with no or limited internet access. The online survey was shared on social media and utilised a convenience sampling approach and willingness of respondents to participate. This may have introduced selection bias among respondents who are motivated in food safety and COVID-19 topics. The study was based on cross-sectional data and only represent a snapshot of Indonesia and Malaysia residents' self-reported attitudes and practices. Since the study was based on self-reported answers, it would be valuable to conduct qualitative studies in future in observe consumers' food safety practices. There is a possibility that consumers may be giving optimistic responses in self-reported answers. The change in food safety knowledge, attitude and practices over time (e.g. during and after COVID-19) should be measured.

12. Conclusion

Consumers in Indonesia and Malaysia revealed good level of food safety knowledge, positive attitudes and reported frequent practices of hand hygiene, cleaning & sanitising and adherence to social distancing measures while shopping or eating out. Findings from this study revealed that attitude, subjective norms and perceived behavioural control were significant predictors in consumers' intention to practice safe eating out measures. The multiple regression models explained between 63 and 73% ($p < 0.05$) of the variance and provided valuable frameworks to understand consumers' adherence to practice safe eating out measures. Hence, governmental campaigns in raising awareness and providing easy to follow guidelines (e.g. via infographics) and ensuring compliance among consumers helped to increase consumers' knowledge and to adopt positive attitudes while shopping, preparing meals and eating out to minimise spread of COVID-19. Infographics and creating awareness through official social media and better communication could further stress on the potential of transmission of COVID-19 via asymptomatic individuals, the effectiveness of bleach against coronavirus and cooking at >70 °C to destroy coronavirus. Family norms are crucial and should be emphasised when raising awareness since consumers value the culture of collectivism highly. Having adequate support from restaurant staff and provision of adequate handwashing facilities are critical to the success of adherence to hand hygiene and social distancing measures when eating out.

CRediT authorship contribution statement

Jan Mei Soon: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Writing. **Iwan Vanany:** Data curation, Investigation, Writing. **Ikarastika Rahayu Abdul Wahab:** Data curation, Investigation, Writing. **Ruhil Hayati Hamdan:** Data curation, Investigation, Writing. **Mohd Hafiz Jamaludin:** Data curation, Investigation, Writing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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