

Research Article

Consumers' Awareness, Knowledge, Attitudes, and Practices on Menu Calorie Tagging in Putrajaya Chain Restaurants

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ABSTRACT

This cross-sectional study aimed to assess consumers' awareness, knowledge, attitudes, and practices regarding menu calorie tagging in selected chain restaurants in Putrajaya. A total of 1,324 consumers were recruited through convenience sampling in the four purposely selected chain restaurants. A set of adapted and modified questionnaires was used to assess participants' sociodemographic factors, knowledge of calorie requirements, awareness, attitudes, and practices regarding menu calorie tagging. Nearly half of the respondents (45.1%) were in the age group of 18–29 years. Approximately two-third of them (61.4%) were aware of calorie tagging on menus and 45.4% used it to avoid high calorie items. A high level of knowledge about calorie requirements was demonstrated by 54.8% of the respondents, while 95.3% expressed a positive attitude towards menu calorie tagging. However, only 38.7% demonstrated good practice in menu calorie tagging. Nearly all participants (98.6%) reported that they would support the government implementing mandatory calorie tagging on menus. Younger adults demonstrated higher awareness of menu calorie tagging ($p < 0.001$). Furthermore, higher educational levels were associated with better knowledge, positive attitudes and better practices toward menu calorie tagging ($p < 0.05$). Findings also revealed that female showed more positive attitudes, whereas male reported engaging in the actual practices more towards calorie tagging. Overall, higher awareness, knowledge and positive attitudes were significantly associated with improved practices related to menu calorie tagging ($p < 0.01$). However, findings emphasize the needs of tools or programs that could be implemented to better translate it into actionable practices, enabling consumers to make healthier choices when eating out.

INTRODUCTION

Obesity has emerged as a significant global public health challenge, leading to various health complications worldwide, and no country has successfully reversed its obesity epidemic (Hruby & Hu 2015). In 2022, one in eight people worldwide had obesity, and overall 2.5 billion adults (43%) were overweight, including 890 million (16%) living with obesity. The World Obesity Federation (WOF) (2024) projected that

global obesity rates are expected to continue rising and further emphasises that the greatest number of people with obesity now live in Low-Middle Income Countries (LMICs). By 2030, it is estimated that 1 in 20 men and 1 in 11 women in Southeast Asia will have a Body Mass Index (BMI) of ≥ 30 kg/m² (WOF 2022). According to the National Health and Morbidity Survey (NHMS), 50.1% of Malaysian adults were classified as overweight or obese in 2019 (Institute of Public Health (IPH) 2019). On the other

hand, the prevalence of overweight and obesity in 2024 were 30.5% and 23.1% (IPH 2024).

The rising prevalence of overweight, obesity and diet-related diseases are largely driven by the growing popularity of out-of-home foods (Janssen *et al.* 2018). This trend is prominent in Malaysia as the 2014 Malaysian Adult Nutrition Survey showed that nearly half of the population (43% to 47%) obtained their daily meals from food establishments such as restaurants, cafeterias and stalls (IPH 2016).

In recent years, policymakers have increasingly included nutritional information on restaurant menus as a vital tool to steer consumer towards healthier dietary choices. This push is seen in the fast food restaurants where calorie tagging on menus has been implemented to encourage consumers in choosing lower-calorie options (AlShehri & AlMarzooqi 2022). Petimar *et al.* (2021) highlight that fast food establishment were among the first to adopt calorie tagging with the goal of providing consumers with comprehensive nutritional information for better decision making. Research indicates that the implementation of calorie tagging on fast food menus leads to positive changes in dietary behaviour such as reduced calorie intake and increased selection of healthier options (Cleveland *et al.* 2020; Jeacle & Carter 2023; Bailey *et al.* 2022; Murphy *et al.* 2020).

Several nations that recognize the importance of providing consumers with access to calorie and nutrient content on menus have move beyond suggestion in turning the requirements into regulation. Several countries, including the United States, Australia, Saudi Arabia, and the United Kingdom, have implemented menu calorie labelling regulations. In Asia, voluntary initiatives such as Singapore's Healthier Dining Programme, which covers over 3,100 outlets, and South Korea's voluntary labelling in various food outlets have been introduced to support healthier food choices (Kim *et al.* 2022). Despite these regional efforts, consumer response across the region remains complex. Studies show mixed findings on consumer attitudes and practices where Marina *et al.* (2020) in Malaysia found that attitudes were associated with using menu calorie information, whereas Liao & Yang (2023) in China reported no significant association among consumers.

Despite the prevalence of eating out across Malaysia, consumers often have limited

awareness of calorie requirements and nutritional knowledge, highlighting a critical gap in informed food choices. To address this, menu calorie tagging has been suggested as a strategy not only to enhance nutrition transparency and encourage healthier eating among consumers, but also to encourage food establishments to reformulate menu items to reduce calories and improve nutritional quality.

Although calorie tagging is globally recognized as a tool for healthier eating, there is a scarcity of data on Malaysian consumers actually perceive, understand and use this information. The lack of insights is critical as Malaysia does not currently mandate calorie labelling in chain restaurants, making it important to understand consumer's awareness and utilisation of this information. This research fills that gap by empirically mapping consumers' awareness, knowledge, attitudes, and practices regarding menu calorie tagging. By examining these factors with sociodemographic data, the study aims to provide a strategic framework for policymakers and industry players in promoting healthier choices, supporting product reformulation, and developing targeted interventions to improve consumer utilisation of calorie information, thereby contributing to public health initiatives against obesity.

METHODS

Design, location, and time

Data collection for this cross-sectional study was carried out from June to August 2023. Prior to data collection, ethical approval for the study protocol was obtained from the Ethics Committee for Research Involving Human Subjects Universiti Putra Malaysia (Reference Number: JKEUPM-2022-444) and National Medical Research Register (RSCH ID-23-02647-9VR). This study employed purposive site selection to focus on outlets with active operations that permitted on-site data collection and written consent from the restaurant management. Four chain restaurants met these conditions and were selected as the study sites in Putrajaya, Malaysia.

Sampling

Consumers of these chain restaurant outlets were invited to participate in this study through convenience sampling. Eligible participants were Malaysian adults aged 18 to 60 years, who dined

in or ordered takeaway from the front counter at any of the four selected foodservice outlets that had provided prior approval and consented to participate. For the study, calorie information was made available at all four outlets, displayed at the point of order along with the recommended daily intake of 2,000 kcal for a general healthy population. Consumers who were unable to understand Malay or English, restaurant employees and their immediate family members, and customers using drive-through or food delivery services were excluded from the study.

The sample size of the present study was calculated based on the prevalence formula by Cochran (1977): $n = (Z^2 \times p \times (1-p)) / E^2$. Where: Z=Z-score for the desired confidence level=1.96 for 95%, p=the estimated proportion or probability of an event occurring in the population=25.8% (Marina *et al.* 2020) and E=margin of error=5%. After considering the response rate of 44.1% of online surveys based on a meta-analysis study (Wu *et al.* 2022), a total of 670 respondents were required in this study. However, since the data collection was conducted on-site, all consenting respondents during the collection period were included to avoid selective participation, thus achieved a final sample of 1,324 respondents. At 95% confidence with the same assumed proportion (p=25.8%), the approximate margin of error improves from about $\pm 3.3\%$ at n=670 to about $\pm 2.4\%$ at n=1,324. The larger sample size increases the statistical power, reduces the margin of error, and allows for more reliable analysis.

Data collection

The online questionnaire consisted of sociodemographic background, awareness and use of menu calorie tagging, knowledge, attitudes, and practices toward menu calorie tagging. To gauge awareness and use of menu calorie tagging, participants were asked simple yes or no questions about whether they had noticed the calorie information on the menu (Green *et al.* 2015). Following an affirmative response, subjects were then asked how they used this information in their dining decisions (Green *et al.* 2015). This study further measured the respondents' understanding of the concept of caloric needs through a series of ten multiple choice questions. This section was adapted modified from a previous study by Marina *et al.* (2020) and aligned with the calorie requirement information from Malaysian Recommended

Nutrient Intake (RNI) (2017). Each correct answer was given 1 point while the wrong answer was 0. The knowledge score range (ranging from 0 to 10) were subsequently classified into three tiers which poor (0–3 points), moderate (4–6 points) and high (7–10 points) (Marina *et al.* 2020). The internal consistency is reliable with Cronbach's alpha of 0.700.

To evaluate attitudes toward menu tagging, a three-item instrument were adapted from Marina *et al.* (2020). This section consisted of 3 items each rated on a 5-point Likert scale ranging from 'Strongly Disagree' (1) to 'Strongly Agree' (5). This produced a total score range of 3 to 15. Participants who scored 9 and above were categorised as positive attitudes while those who scored less than 9 categorised as negative attitudes. This section proved high internal consistency with a Cronbach's alpha of 0.819.

The final section evaluated consumer practices related to the menu calorie tagging through 3 items adapted from AlShehri and AlMarzooqi (2022). Each item was rated on a 4-point Likert scale (always=4, usually=3, rarely=2 and never=1). Total scores ranged from 3 to 12, in which a score of 8 and below was categorised as poor practice and a score of above 8 was categorised as good practice. The Cronbach's alpha value of the practice section in this study was 0.881, indicating good internal consistency reliability.

Data analysis

The statistical analysis was performed by using the IBM SPSS Statistics 26 (IBM Corp., Armonk, NY). For the descriptive statistics, categorical variables were expressed in the form of frequencies and percentages, while continuous variables were expressed in means and standard deviations. Chi-square test was performed to determine the associations between consumers' demographic characteristics, awareness, knowledge, attitudes, and practices regarding menu calorie labeling. A p value of <0.05 was set as the significance level.

RESULTS AND DISCUSSION

Table 1 shows the sociodemographic and calorie label awareness of 1,324 respondents from four chain restaurant outlets in Putrajaya, Malaysia. The demographic profile of the respondents were predominantly females (59.2%),

Malay (86.1%), in the age between 18–29 years (45.1%), completed tertiary education (84.9%) and employed (93.9%). In terms of utilisation, 61.4% (813 respondents) acknowledged noticing the calorie tagging. Among this group, 45.4% used it to avoid high-calorie menu items, while 12.7% used it to choose smaller portion sizes. These results align with the research findings by Alassaf *et al.* (2020), who observed that among the respondents who noticed menu calorie tagging. This supports previous studies suggesting that consumers place significant value on information that aids in calorie reduction when ordering (Cawley *et al.* 2020; Liu *et al.* 2020).

This study indicate a clear demand for policy action on menu calorie labelling as approximately 98.6% of respondents supported the government’s initiative to require calorie tagging on restaurant menus. This level of support is consistent with the high acceptance rates reported by Radwan *et al.* (2017), where the majority of consumers found menu calorie labelling as a useful tool in Saudi Arabia. Kwon *et al.* (2019) highlighted almost similar findings on positive public support towards policies that provide information such as menu calorie tagging as it is less intrusive.

Table 2 presented the findings on the knowledge of the consumers toward calorie requirements. Data shows that more than half of the respondents answered each knowledge statement correctly, except for the statement “The calorie required for sedentary (physically inactive) women is 2,000 kcal per day”, which 85.4% of the respondents answered incorrectly. Overall, 54.8% of the respondents had high knowledge of calorie requirements. Although more than half of the respondents were female (59.2%), there's a substantial lack of knowledge regarding the daily calorie needs for sedentary women. In this study, women’s knowledge may be constrained not only by their understanding of the calorie requirement but also possibly by limited awareness, which could be influenced by the low visibility of calorie tagging in restaurants.

Attitudes of the consumers towards calorie tagging are presented in Table 3. The majority of the consumers agree and strongly agree that the calorie menu tagging is worth reading before buying any food (94.8%) and the calorie menu tagging is useful (94.3%). In total, 95.3% of the respondents in this study expressed positive attitudes with menu calorie labels. Radwan *et al.*

Table 1. Demographic characteristics of the consumers and awareness on calorie labelling on food menu

Variables	n=1,324 n (%)
Food outlet*	
Premise A	231 (17.4)
Premise B	410 (31.0)
Premise C	311 (23.5)
Premise D	372 (28.1)
Age	
18–29 years old	597 (45.1)
30–39 years old	426 (32.3)
40–49 years old	247 (18.7)
50–59 years old	54 (4.1)
Gender	
Male	540 (40.8)
Female	784 (59.2)
Ethnicity	
Malay	1,140 (86.1)
Non-Malay	184 (13.9)
Highest education level	
Tertiary education	1,124 (84.9)
Secondary education	175 (13.2)
Primary education	25 (1.9)
Employment	
Working	1,243 (93.9)
Not working	81 (6.1)
Did you notice any calorie information listed for menu items at the restaurant today?	
Yes	813 (61.4)
No	511 (38.6)
If you answered yes, how did you use that calorie information when deciding what to order? (n=813)	
Used to avoid high-calorie menu items	369 (45.4)
Not using the calorie information	246 (30.3)
Used to decide on smaller portion sizes	103 (12.7)
Used to decide on larger portion sizes	48 (5.9)
Used to avoid ordering something that would leave you hungry	47 (5.7)
If the Malaysian government required calorie label to appear on the menu, would you...	
Strongly support-somewhat support	1,305 (98.6)
Strongly oppose-somewhat oppose	19 (1.4)

*Premise A, B, C and D are the four selected foodservice outlets in Putrajaya, Malaysia

(2017); Cooke & Papadaki (2014); Turkistani & Saaty (2020), suggested a linear path of increased awareness and knowledge leads to positive attitudes and dietary intentions, which consistent

Table 2. Assessment of consumers' knowledge towards calorie requirement

Items	Answered correctly (n=1,324) n (%)
I know my calorie requirement.	740 (55.9)
I can understand the calorie labels on the menu.	1,040 (78.5)
Calorie is the measure of energy in food.	1,140 (86.1)
The higher the fat content in the food, the higher the calorie content.	1,015 (76.7)
The calorie required for sedentary (physically inactive) women is 2,000 kcal per day.	193 (14.6)
The calorie required for physically active men is 2,500 kcal per day.	711 (53.7)
Adults require approximately 2,000 kcal per day on average.	786 (59.4)
Individuals' daily calorie requirements are similar from one another.	793 (59.9)
Calories are found in carbohydrates and fats only.	676 (51.1)
Keeping track of the number of calories taken in food can help to achieve optimum weight.	1,188 (89.7)
mean±SD*	6.26±2.11
Poor (≤3)	151 (11.4)
Moderate (4–6)	448 (33.8)
High (>6)	725 (54.8)

*SD: Standard Deviation

with the findings from this study. However, the core issues remain a concern of whether these positive attitudes are effectively translated into actual practices.

Table 4 shows that 53.3% of the respondents reported rarely or never paying attention to the calorie labels when choosing their orders, and 53.7% expressing a lack of preference for eating at restaurants that display calorie information. Despite this, 50.8% disclosed that they always or usually avoid food items that are visibly posted with high calorie content. Overall, 61.3% of the respondents showed poor menu calorie tagging practices. This discrepancy between high positive attitudes (95.3%) and poor practices (61.3%)

reflects the well-documented “intention-action gap” (Heiman & Lowengart 2014). Additionally, this pattern may be influenced by the limited food and beverage establishments displaying calorie information in Putrajaya.

A chi-square analysis, as presented in Table 5, was performed to examine the associations between consumers' demographic characteristics, awareness, knowledge, attitudes, and practices regarding menu calorie tagging. The results revealed that younger individuals and non-Malays showed higher awareness of menu calorie tagging ($p < 0.05$). Results also demonstrated a significant association ($p < 0.001$) between respondents with tertiary education and high awareness with consumers' knowledge. Similarly, a significant association ($p < 0.05$) was found between respondents who are working with consumer's knowledge on calorie requirements. Females aware of calorie labels, and high knowledge on calorie requirements were significantly associated ($p < 0.05$) with positive attitudes toward menu calorie tagging. In terms of consumers' practices, younger individuals, males, non-Malays, aware of menu labeling, high knowledge of calorie requirement, and having positive attitudes were more likely to practice menu calorie tagging ($p < 0.05$).

Interestingly, age appeared as a significant factor in relationship with both awareness and practices. This result contradicts with the findings of the study by Larson *et al.* (2018) and Bawazeer *et al.* (2022) where age is not significant with the awareness of the calorie labels, $p = 0.10$ and $p = 0.71$, respectively. A possible explanation is that younger individuals are more educated and more exposed to health campaigns on social media. The association between age and practices of menu calorie labelling were proven significant ($p = 0.00$) (Radwan *et al.* 2017).

Ethnicity emerged as a significant factor in both awareness and practice. While awareness

Table 3. Consumers' attitudes towards calorie labelling on food menu

Items n=1,324	Strongly agree n (%)	Agree n (%)	Neither n (%)	Disagree n (%)	Strongly disagree n (%)
I found the calorie menu label helpful	737 (55.7)	511 (38.6)	62 (4.7)	11 (0.8)	3 (0.2)
It is worth reading the calorie menu label before buying any food	729 (55.1)	526 (39.7)	46 (3.5)	20 (1.5)	3 (0.2)
The calorie information provided affects my decision to purchase	601 (45.4)	487 (36.8)	121 (9.1)	101 (7.6)	14 (1.1)
mean±SD*	13.14±1.94				
Positive (>9)	1,262 (95.3)				
Negative (<9)	62 (4.7)				

*SD: Standard Deviation

Table 4. Consumers' practices towards calorie labelling on food menu

Items n=1,324	Always n (%)	Usually n (%)	Rarely n (%)	Never n (%)
I pay attention to the calorie labels when choosing my order	347 (26.2)	272 (20.5)	586 (44.3)	119 (9.0)
I prefer to eat at restaurants that post calorie information	333 (25.2)	281 (21.2)	521 (39.4)	189 (14.3)
I avoid food posted with high calorie content	349 (26.4)	323 (24.4)	517 (39.0)	135 (10.2)
mean±SD*	7.88±2.66			
Good (>8)	513 (38.7)			
Poor (≤8)	811 (61.3)			

*SD: Standar Deviation

among Malay respondents was relatively high (59.7%), the differences between aware and unaware groups were not substantial. The ethnicity factors also extended to practices related to menu calorie tagging. The significant association requires further investigation, given the uneven distribution of races in Putrajaya, where the majority of residents identify as Malay (Department of Statistics Malaysia 2020).

In the present study, chi-square analysis further confirmed a statistically significant association between education level and menu calorie tagging practices ($p=0.044$). However, the distribution was not linear, which the respondents with secondary education exhibited the highest proportion of poor practices (65.7%), followed by those with tertiary education (61.0%). Meanwhile, respondents with primary education showed a higher proportion of good practices (60.0%), although this result should be interpreted cautiously due to the small sample size in this subgroup. These findings suggest that higher educational attainment does not automatically translate into better menu calorie labelling practices, reinforcing the notion that education alone may be insufficient to drive behavioural change.

Beyond education, awareness demonstrated a significant correlation with consumers' knowledge, supporting the framework proposed by Cooke & Papadaki (2014), where individuals with higher nutrition knowledge and more positive attitudes are more inclined towards healthier dietary habits. The act of noticing menu calorie labels often act as behaviour catalyst that could drive actual utilisation of these labels, thereby contributing to measurable improvements in overall dietary intake. According to Jia *et al.* (2023), this transition is essential as it might contribute to better diet quality and a stricter control over calorie intake. Likewise, simply being aware of the availability of calorie information can motivate consumers to

seek out and better comprehend nutrition details, highlighting its usefulness to a broader audience (Fernandes *et al.* 2015).

Despite this evidence, the current findings confirm the persistence of the knowledge-practice gap. While a higher education is associated with a better nutrition literacy, it does not guarantee healthier dietary behaviours. Individuals may be aware of calorie labelling but fail to apply it when actually making a food selection over the counter. The tendency to have fast food among highly educated individuals may be explained by contextual factors such as time constraints arising from demanding academic or professional commitments, accessibility, and prevailing social influences.

The study highlighted a significant bridge between gender and attitudes toward calorie tagging, as well as consumer's practices. This aligns with the study by Radwan *et al.* (2017), reporting that gender has a significant association with attitudes toward menu calorie labelling ($p=0.02$). Women tend to display stronger confidence in healthy nutrition and are more involved in managing their body weight (Grzymisławska *et al.* 2020).

However, present study showed that males participants portrayed significantly good practice ($p=0.003$) towards menu calorie tagging utilisation than females. This interesting result reflects the awareness of menu calorie tagging from this study, which is higher among males compared to females. Previous study has reported that although females are more health-conscious and have a stronger preference for healthier foods, the attribute of food tastiness is more observable and may cause females to reverse their preferences and switch to the tastier choice (Heiman & Lowengart 2014). These results suggest that individuals with positive attitudes toward menu tagging may or may not put it into practice by incorporating it into their decision-making process before purchasing meals at restaurants.

Table 5. Associations between consumers' awareness, knowledge, attitude and practices with demographic characteristics

Variables (n=1,324)	Awareness, n (%)			Knowledge, n (%)			Attitude, n (%)			Practice, n (%)			
	Yes	No	p	High	Moderate	Poor	p	Positive	Negative	p	Good	Poor	p
Age	<0.001						0.280				0.725	<0.001	
18–29 years	422 (70.7)	175 (29.3)		372 (54.8)	211 (35.3)	59 (9.9)		570 (95.5)	27 (4.5)		277 (46.4)		
30–39 years	237 (55.6)	189 (44.4)		244 (57.3)	128 (30.0)	54 (12.7)		408 (95.8)	18 (4.2)		140 (32.9)		
40–49 years	123 (49.8)	124 (50.2)		130 (52.6)	86 (34.8)	31 (12.6)		234 (94.7)	13 (5.3)		81 (32.8)		
50–59 years	31 (57.4)	23 (42.6)		24 (44.4)	23 (42.6)	7 (13.0)		50 (92.6)	4 (7.4)		15 (27.8)		
Gender	0.461						0.124				0.041	0.003	
Male	338 (62.6)	202 (37.4)		302 (55.9)	168 (31.1)	70 (13.0)		507 (93.9)	33 (6.1)		235 (43.5)	305 (56.5)	
Female	475 (60.6)	309 (39.4)		423 (54.0)	280 (35.7)	81 (10.3)		755 (96.3)	29 (3.7)		278 (35.5)	506 (64.5)	
Ethnicity	0.002						0.753				0.370	<0.001	
Malay	681 (59.7)	459 (40.3)		623 (54.6)	384 (33.7)	133 (11.7)		1,089 (95.5)	51 (4.5)		415 (36.4)	725 (63.6)	
Non-Malay	132 (71.7)	52 (28.3)		102 (55.4)	64 (34.8)	18 (9.8)		173 (94.0)	11 (6.0)		98 (53.3)	86 (46.7)	
Educational level	0.122						<0.001				<0.001	0.044	
Tertiary	682 (60.7)	442 (39.3)		643 (57.2)	371 (33.0)	110 (9.8)		1,077 (95.8)	47 (4.2)		438 (39.0)	686 (61.0)	
Secondary	111 (63.4)	64 (36.6)		71 (40.5)	68 (38.9)	36 (20.6)		166 (94.9)	9 (5.1)		60 (34.3)	115 (65.7)	
Primary	20 (80.0)	5 (20.0)		11 (44.0)	9 (36.0)	5 (20.0)		19 (76.0)	6 (24.0)		15 (60.0)	10 (40.0)	
Employment	0.862						0.019				0.667	0.205	
Working	764 (61.5)	479 (38.5)		690 (55.5)	409 (32.9)	144 (11.6)		1,184 (95.3)	59 (4.7)		487 (39.2)	756 (60.8)	
Not working	49 (60.5)	32 (39.5)		35 (43.2)	39 (48.1)	7 (8.6)		78 (96.3)	3 (3.7)		26 (32.1)	55 (67.9)	
Awareness							<0.001				0.001	<0.001	
Yes	-	-		489 (60.1)	252 (31.0)	72 (8.9)		787 (96.8)	26 (3.2)		394 (48.5)	419 (51.5)	
No	-	-		236 (46.2)	196 (38.4)	79 (15.5)		475 (93.0)	36 (7.0)		119 (23.3)	392 (76.7)	
Knowledge							-				<0.001	<0.001	
High	-	-		-	-	-		711 (98.1)	14 (1.9)		390 (53.8)	335 (46.2)	
Moderate	-	-		-	-	-		424 (94.6)	24 (5.4)		106 (23.7)	342 (76.3)	
Low	-	-		-	-	-		127 (84.1)	24 (15.9)		17 (11.3)	134 (88.7)	
Attitude							-				-	<0.001	
Positive	-	-		-	-	-		-	-		506 (40.1)	756 (59.9)	
Negative	-	-		-	-	-		-	-		7 (11.3)	55 (88.7)	

Chi-square test was performed to determine the associations between consumers' demographic characteristics, awareness, knowledge, attitudes, and practices regarding menu calorie labeling; A p value of <0.05 was set as the significance level

The ethnic homogeneity of the study samples in Putrajaya does not perfectly mirror the broader multi-ethnicity of Malaysian landscape, hence it is not suitable to generalize the results to other states or population. Another constraint was the absence of data on dining frequency and time-specific patronage. For instance, working adults may eat out during office hours, while evening

visits may reflect habitual practices. Capturing these distinctions in future work would provide deeper insights into the reasons on why consumers choose certain foods and the importance of being equipped with calorie information

While acknowledging these constraints, the study provides critical empirical evidence regarding consumer interaction with calorie

tagging in a context where it is not widely implemented in Malaysia. Beyond theory, the findings act as a blueprint for policymakers and food service industry in crafting interventions that target actual behaviour and supporting potential implementation of menu calorie tagging. Moving forward, future studies should incorporate diverse populations and detailed eating-out behaviour to better understand variations in awareness and use of calorie information.

CONCLUSION

The data from this study presents a clear paradox in emphasizing high levels of awareness, good knowledge, and positive attitudes toward menu calorie tagging among participants even though the actual practice remains discouragingly low. Despite good awareness and positive attitudes, the critical next step is to design intervention that translate knowledge into actionable practices. This will then help consumers to make healthier choices and enhance diet quality when eating out. To bridge this gap, more efficient interventions and health education programs are needed to educate the public on the importance of understanding calorie requirements, applying this knowledge into practice, and clearly communicating the objectives of menu calorie tagging to promote healthier food choices and improved diet quality when dining out.

The consumer's feedback for the policy implementation of menu calorie tagging clearly indicates a positive demand from consumers which shows that the public is ready for the policy. As the modern diet has moved toward out-of-home meals, advocating for the implementation of menu calorie tagging in food outlets becomes the primary mechanism for ensuring informed and healthier food choices. However, the disconnection between consumer's demand and actual practice of utilizing the calorie tagging remains a puzzle that requires a deeper investigation. Future studies are needed not only to uncovers the root causes of the poor practice but also to gain clearer insights with the scaling up of this research to a national level. Nationwide study would be an advantage as it will provide baseline data to aid governmental action, ensuring the new policies effectively support the national strategy against obesity.

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DECLARATION OF CONFLICT OF INTEREST

The authors have no conflict of interest during the preparation of the manuscript.

DECLARATION OF GENERATIVE AI IN SCIENTIFIC WRITING

OpenAI's ChatGPT was used to assist in language editing and clarity improvement. All outputs were reviewed and approved by the authors.

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