Nutrition Label Engagement in Food Selection among Working Adults in Sabah: Knowledge, Attitudes and Reported Practices

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ABSTRACT

Nutrition information on food packages may help consumers compare products, but reading a label does not necessarily mean that its information is understood or used. This study examined nutrition-label knowledge, attitudes and reported practices among working adults in Sabah, Malaysia, and explored differences across demographic groups. A cross-sectional survey was conducted over two months with 400 respondents aged 18 to 60 years recruited through convenience and snowball sampling. The questionnaire comprised seven knowledge items, eight attitude items and nine nutrition-label practice items. Data were analysed using descriptive statistics, independent-samples t-tests, analysis of variance and Pearson correlations. Respondents showed substantial variation in understanding specific label statements: only 28.3% correctly identified the distinction between serving size and net package weight, while 60.8% answered the energy-source item correctly. Mean agreement was high for the perceived usefulness of nutrition labels in making healthier choices (4.29 ± 0.93), whereas reported use of labels at home was less frequent (2.88 ± 1.27). Knowledge scores differed by age, educational attainment, employment status, marital status and employment sector. Attitude scores were positively associated with reported practices ($r = 0.740$, $p < 0.001$), but knowledge scores were not significantly correlated with either attitudes ($r = -0.003$, $p = 0.956$) or practices ($r = -0.049$, $p = 0.324$). The results point to a difference between factual understanding, favourable views and reported use of nutrition information. As the measures rely on self-report and some attitude items refer to label-reading behaviour, the correlations should not be interpreted causally. Practical education may benefit from teaching consumers how to compare serving sizes and apply label information to everyday purchasing decisions.

Keywords: Nutrition Labelling; Consumer Behaviour; Food Selection; Nutrition Knowledge; Working Adults

INTRODUCTION

Food labels carry several kinds of information. A consumer choosing between two packaged foods may check the product name, a nutrition information panel, a health claim or the serving size, yet each of these requires a different judgement. Nutrition labelling is intended to make the nutritional composition of products more accessible and to assist comparisons at the point of purchase. The Codex guidance and Malaysia's food-labelling framework place nutrition information within this broader consumer information function (Codex Alimentarius Commission, 1985; Ministry of Health Malaysia, 2023). Whether that information changes food selection is a separate empirical question.

Research on nutrition labels has repeatedly found that reported attention to labels is not the same as being able to interpret them. In their review, Cowburn and Stockley (2005) described difficulties with numerical information and comparisons between products; Campos et al. (2011) similarly distinguished consumers' stated use of labels from the evidence on food choices. Hieke and Taylor (2012) argued that label effects depend on how information is presented and how consumers process it. These findings matter for packaged-food purchasing, where a label may be visible without being consulted, understood or applied.

In Malaysia, population studies have documented differences in label reading and comprehension across consumer groups (Ambak et al., 2018). Earlier work with adults with obesity examined which elements of food packages were noticed and understood (Ambak et al., 2014), while Hussain and Sahudin (2019) discussed labelling within the wider context of obesity and type 2 diabetes prevention. Studies among students have reported uneven knowledge and use of nutritional information (Nurliyana et al., 2011; Loo et al., 2022; Md Zaini et al., 2022). Together, these findings suggest that the importance consumers attach to a label may not be matched by their ability to work with the information it provides.

The reasons for this mismatch may be practical as well as cognitive. Studies involving Malaysian adolescents described time constraints, familiar products and difficulties interpreting information as barriers to label use (Jefrydin et al., 2019; Md Nor et al., 2023). Baharuddin and Ali (2023) examined knowledge and perceptions of nutrition and health claims, drawing attention to the distinction between the claims used to promote foods and the nutritional information used to evaluate them. Malaysian consumer research has also reported associations between attitudes towards nutrition labels and perceived healthy food choice, although the direction and strength of relationships vary according to the measures employed (Ramdan et al., 2018; Zainol et al., 2019).

Evidence from outside Malaysia further illustrates this variation. Among Lebanese shoppers, Hoteit et al. (2022) reported relationships among label knowledge, attitudes and practices, but noted that other product information, such as price and expiry date, commonly attracted attention. Riaz et al. (2022) examined food labelling and expiry-date practices in a different, student-based population. These studies offer comparisons, though neither provides a direct estimate of the way employed adults in Sabah engage with nutrition labels.

Working adults make food purchasing decisions within circumstances that may differ from those of students. Work schedules, household responsibilities, income and familiarity with packaged products may influence the opportunity to read or compare labels, but the present survey did not measure these explanations directly. It therefore asks a narrower set of questions: what working adults know about nutrition labels, how they view the information, how often they report using it, and whether their scores vary across demographic groups. The study also examines correlations among knowledge, attitudes and reported practices. The outcome is self-reported nutrition-label engagement, not observed purchasing behaviour or the nutritional quality of food bought.

METHODOLOGY

Study design and recruitment

This cross-sectional study surveyed 400 working adults aged 18–60 years in Sabah, Malaysia. Eligible respondents were employed full time or part time, including those working in government, private employment and self-employment. The questionnaire was distributed through Microsoft Forms links shared on WhatsApp and Telegram, supplemented by in-person recruitment and forwarding of the invitation to eligible acquaintances. Data collection took place over two months.

The sample-size calculation followed Krejcie and Morgan (1970). Based on the planning population of 2,109,000, a 95% confidence level, an assumed population proportion of 0.50 and a 5% margin of error, the estimated minimum was approximately 384 respondents. The 400 valid responses exceeded this planning target. However, the population used in the calculation covered Sabah as a whole and did not correspond exactly to the accessible working-adult population. The sample size does not correct for the selection bias inherent in convenience and snowball recruitment (Wright, 2005).

Questionnaire and measurement

The survey collected demographic and employment information, self-reported height and weight, and responses concerning nutrition labels. Body mass index (BMI) was calculated from self-reported weight and height. The main measures comprised seven factual knowledge questions, eight attitude statements, and nine nutrition-label practice statements. Knowledge items were marked correct (1) or incorrect (0), giving a raw score from 0 to 7. Attitude items used a five-point agreement scale: 1 = strongly disagree, 2 = disagree, 3 = Neutral, 4 = agree, and

5 = strongly agree. Practice items P1–P9 used a five-point frequency scale: 1 = never, 2 = rarely, 3 = sometimes, 4 = often, and 5 = always. Domain scores were converted to percentages for group comparisons in the original analysis. Five-point responses are treated as ordered self-reports rather than verified purchasing events (Joshi et al., 2015).

Before the main survey, 30 adults with characteristics similar to the intended participants completed a pilot questionnaire. Minor wording changes were made following feedback. The reported Cronbach's alpha coefficients were 0.703 for the seven knowledge items, 0.903 for the eight attitude items and 0.859 for the nine-item practice items. These figures describe internal consistency in the pilot group and should not be regarded as independent evidence of content or construct validity (Tavakol & Dennick, 2011).

Statistical analysis

Analyses were performed in IBM SPSS Statistics 30.0. Frequencies and percentages were used for categorical variables, while domain scores were summarised as means and standard deviations. Distributional checks included Shapiro–Wilk tests, skewness and kurtosis (Mishra et al., 2019). Independent-samples t-tests and one-way analysis of variance (ANOVA) compared scores across demographic groups. The Welch t-test result was used for the knowledge comparison by marital status because the equal-variance assumption was not met, Tukey post-hoc tests were used where appropriate. Pearson correlations assessed linear associations among the knowledge, attitude and practice scores, using two-sided tests and $p < 0.05$ as the significance criterion.

Ethics

Ethical approval was granted by the Medical Research Ethics Committee, Faculty of Medicine and Health Sciences, Universiti Malaysia Sabah (JKEtika 5/25 (1)). The questionnaire provided study information, stated that participation was voluntary, and required informed consent before respondents continued. Responses were treated confidentially.

RESULTS

Respondent profile

Table 1 summarises the characteristics of the 400 respondents. Women constituted 62.8% of the sample (n = 251), and 48.0% were aged 21–30 years (n = 192). Most respondents were Sabahan Bumiputera (72.3%, n = 289) and single (62.3%, n = 249). A bachelor's degree was the most frequently reported qualification (42.5%, n = 170). More than half worked in the private sector (51.5%, n = 206), and 68.8% were employed full time (n = 275). Monthly income was below RM2,500 for 269 respondents (67.3%).

Table 1. Sociodemographic and employment characteristics (N = 400)

Characteristic	Category	n	%
Age (years)	18-20	56	14.0
	21-30	192	48.0
	31-40	76	19.0
	41-50	45	11.3
	51-60	31	7.8
Gender	Male	149	37.3
	Female	251	62.8
Ethnicity	Malay	62	15.5
	Chinese	20	5.0

Characteristic	Category	n	%
	Indian	3	0.8
	Sabahan Bumiputera	289	72.3
	Sarawakian Bumiputera	5	1.3
	Others	21	5.3
Marital status	Single	249	62.3
	Married	148	37.0
	Divorced	1	0.3
	Widowed	2	0.5
Highest educational level	UPSR	3	0.8
	PMR/PT3	6	1.5
	SPM	118	29.5
	Pre-university	35	8.8
	Diploma	54	13.5
	Bachelor's degree	170	42.5
	Master's degree	8	2.0
	PhD	6	1.5
Employment sector	Government	110	27.5
	Private	206	51.5
	Self-employed	84	21.0
Employment status	Part-time	125	31.3
	Full-time	275	68.8
Monthly income (RM)	<1,500	139	34.8
	1,500-2,500	130	32.5
	2,500-4,000	53	13.3
	>4,000	78	19.5
BMI category	Underweight	43	10.8
	Normal weight	207	51.8
	Overweight	104	26.0
	Obese	46	11.5

Knowledge, attitudes and reported nutrition-label practices

The seven knowledge statements revealed large differences in respondents' understanding (Table 2). The best answered question concerned the source of energy reported on food labels: 243 respondents (60.8%) answered correctly. In contrast, only 113 (28.3%) distinguished serving size from a product's net weight. The lowest correct-response rate concerned whether all vitamins and minerals must be declared on the nutrition label (n = 60, 15.0%). These results identify the particular statements that were difficult for respondents, rather than measuring their ability to interpret an actual nutrition panel.

Table 2. Correct responses to nutrition-label knowledge questions (N = 400)

Item	Knowledge statement	Correct, n	Correct, %
K1	Nutrition labels list polyunsaturated and monounsaturated fatty acids as nutrients consumers should reduce.	88	22.0
K2	Serving size is the net weight of a food product.	113	28.3
K3	Unsaturated fat should be reduced in the diet because of its possible harmful effects.	126	31.5
K4	A product labelled sugar-free contains no sugar at all.	219	54.8
K5	Calories on nutrition labels come only from carbohydrates.	243	60.8
K6	Nutrition labels state only macronutrients such as carbohydrates, protein and fat.	184	46.0
K7	All vitamins and minerals must be listed on nutrition labels without exception.	60	15.0

Attitude scores were generally favourable for the perceived usefulness of labels. Respondents gave the highest mean agreement to the statement that reading labels helps them make healthier food choices (mean = 4.29, SD = 0.93), followed by the usefulness of labels in maintaining a healthy diet (mean = 4.21, SD = 0.92). Confidence in understanding labels was somewhat lower (mean = 3.85, SD = 0.99).

Reported practices showed a different pattern (Table 3). The mean for reading nutrition labels when buying a product was 3.76 (SD = 1.06), while comparing food brands using nutrition information scored 3.58 (SD = 1.12). Using labels at home received the lowest practice mean (2.88, SD = 1.27). The higher rating for choosing products displaying health claims (mean = 3.86, SD = 1.04) describes a purchasing cue, not evidence that respondents selected nutritionally preferable products.

Table 3. Attitude and reported nutrition-label practice item scores (N = 400)

Item	Statement	Mean	SD
A1	I believe reading nutrition labels helps me make healthier food choices.	4.29	0.928
A2	I am confident in understanding nutrition-label information.	3.85	0.994
A3	I consider nutrition labels before buying food products.	3.82	1.051
A4	I prefer buying products that have nutrition labels.	4.17	0.991
A5	I believe nutrition labels influence my eating habits.	3.80	1.117
A6	I often read nutrition labels because I care about my health.	3.82	1.073
A7	I think reading nutrition labels is easy and does not take much time.	3.88	1.049
A8	I find nutrition labels useful for maintaining a healthy diet.	4.21	0.915
P1	I read nutrition labels when buying products.	3.76	1.061
P2	I use nutrition labels to compare food brands.	3.58	1.123
P3	I use label information to calculate my calorie intake.	3.38	1.200
P4	I choose food products with health claims on the front of the package.	3.86	1.044
P5	I use nutrition labels to plan my daily diet.	3.43	1.137
P6	I read nutrition labels even when I am familiar with the product.	3.32	1.264

Item	Statement	Mean	SD
P7	I refer to nutrition information to check that food meets my dietary needs.	3.55	1.125
P8	I use nutrition labels at home.	2.88	1.269
P9	Nutrition labels influence my purchasing decisions.	3.50	1.104

Differences across demographic groups

Knowledge scores varied across several demographic groups (Table 4a). Part-time workers scored higher than full-time workers (41.83 ± 29.10 versus 34.65 ± 28.30; $t(398) = 2.331$, $p = 0.020$). Respondents who were single also had higher scores than those who had ever married (40.39 ± 30.24 versus 31.13 ± 25.02; Welch $t(361.779) = 3.313$, $p = 0.001$). Differences were found by age ($F(4,395) = 3.841$, $p = 0.004$), education ($F(7,392) = 8.301$, $p < 0.001$) and employment sector ($F(2,397) = 3.042$, $p = 0.049$).

Post-hoc comparisons indicated higher knowledge scores among the 18–20 and 21–30 age groups than the 51–60 age group, with mean differences of 17.92 (95% CI 0.56 to 35.29; $p = 0.039$) and 16.13 percentage points (95% CI 1.11 to 31.14; $p = 0.028$), respectively. Respondents with a bachelor's degree scored higher than those with SPM (mean difference 21.51; 95% CI 11.64 to 31.38) and diploma qualifications (mean difference 18.53; 95% CI 5.67 to 31.40), both $p < 0.001$. These results relate to unadjusted comparisons and do not isolate independent effects of age or education.

Table 4a. Knowledge score comparisons by demographic characteristics (percentage scores)

Factor	Group (n)	Knowledge mean ± SD	p
Gender	Male (149)	35.95 ± 27.97	0.615
	Female (251)	37.45 ± 29.18	
Employment status	Part-time (125)	41.83 ± 29.10	0.020
	Full-time (275)	34.65 ± 28.30	
Marital status	Single (249)	40.39 ± 30.24	0.001
	Ever married (151)	31.13 ± 25.02	
Age (years)	18-20 (56)	42.35 ± 29.96	0.004
	21-30 (192)	40.55 ± 29.56	
	31-40 (76)	32.33 ± 28.13	
	41-50 (45)	30.79 ± 25.29	
	51-60 (31)	24.42 ± 20.60	
Ethnicity	Malay (62)	30.88 ± 30.52	0.101
	Chinese (20)	44.29 ± 27.77	
	Indian (3)	33.33 ± 29.74	
	Sabahan Bumiputera (289)	37.67 ± 28.38	
	Sarawakian Bumiputera (5)	62.86 ± 23.91	
	Others (21)	31.29 ± 26.19	
BMI category	Underweight (43)	46.51 ± 31.50	0.104
	Normal weight (207)	34.64 ± 29.50	

Factor	Group (n)	Knowledge mean ± SD	p
	Overweight (104)	36.95 ± 25.70	
	Obese (46)	37.89 ± 27.80	
Highest educational level	UPSR (3)	4.76 ± 8.25	<0.001
	PMR/PT3 (6)	21.43 ± 19.69	
	SPM (118)	26.39 ± 27.30	
	Pre-university (35)	35.10 ± 27.79	
	Diploma (54)	29.37 ± 24.73	
	Bachelor's degree (170)	47.90 ± 27.34	
	Master's degree (8)	46.43 ± 34.78	
	PhD (6)	48.57 ± 27.11	
Employment sector	Government (110)	42.60 ± 28.83	0.049
	Private (206)	34.54 ± 28.47	
	Self-employed (84)	35.20 ± 28.44	
Monthly income (RM)	<1,500 (139)	38.95 ± 27.93	0.077
	1,500-2,500 (130)	32.86 ± 30.64	
	2,500-4,000 (53)	33.42 ± 26.86	
	>4,000 (78)	42.31 ± 27.19	

Attitude scores differed overall by educational level ($F(7,392) = 2.048$, $p = 0.048$), although the post-hoc analysis reported no significant individual educational contrasts. Attitudes also differed by monthly income ($F(3,396) = 4.499$, $p = 0.004$; Table 4b). Respondents earning RM1,500–RM2,500 scored higher than those earning below RM1,500 (difference 6.54 percentage points; 95% CI 1.52 to 11.55; $p = 0.005$) and those in the RM2,500–RM4,000 group (difference 6.88; 95% CI 0.18 to 13.57; $p = 0.042$). This was not a consistent increase with income.

Table 4b. Attitude score comparisons by demographic characteristics (percentage scores)

Factor	Group (n)	Attitude mean ± SD	p
Gender	Male (149)	78.51 ± 17.32	0.294
	Female (251)	80.26 ± 15.26	
Employment status	Part-time (125)	80.80 ± 14.99	0.319
	Full-time (275)	79.06 ± 16.63	
Marital status	Single (249)	78.39 ± 16.69	0.053
	Ever married (151)	81.61 ± 15.02	
Age (years)	18-20 (56)	75.22 ± 14.84	0.082
	21-30 (192)	79.36 ± 16.70	
	31-40 (76)	81.94 ± 16.70	
	41-50 (45)	79.06 ± 14.39	
	51-60 (31)	84.11 ± 14.50	
Ethnicity	Malay (62)	79.23 ± 17.35	0.112
	Chinese (20)	74.13 ± 12.70	
	Indian (3)	73.33 ± 12.33	
	Sabahan Bumiputera (289)	79.47 ± 16.25	

	Sarawakian Bumiputera (5)	92.50 ± 9.35	
	Others (21)	85.60 ± 13.08	
BMI category	Underweight (43)	81.40 ± 11.81	0.662
	Normal weight (207)	78.82 ± 16.56	
	Overweight (104)	80.72 ± 15.18	
	Obese (46)	78.97 ± 19.64	
Highest educational level	UPSR (3)	71.67 ± 18.09	0.048
	PMR/PT3 (6)	84.17 ± 16.18	
	SPM (118)	79.39 ± 15.07	
	Pre-university (35)	73.29 ± 17.40	
	Diploma (54)	82.04 ± 18.61	
	Bachelor's degree (170)	79.38 ± 15.48	
	Master's degree (8)	90.63 ± 12.73	
	PhD (6)	90.00 ± 16.73	
Employment sector	Government (110)	81.02 ± 16.36	0.387
	Private (206)	79.59 ± 15.75	
	Self-employed (84)	77.80 ± 16.77	
Monthly income (RM)	<1,500 (139)	76.94 ± 16.13	0.004
	1,500-2,500 (130)	83.48 ± 14.91	
	2,500-4,000 (53)	76.60 ± 17.96	
	>4,000 (78)	79.94 ± 15.74	

Practice scores did not differ significantly across most respondent groups (Table 4c). The income comparison was at the reporting threshold ($F(3,396) = 2.631$; reported $p = 0.050$). The Tukey result indicated a higher practice score in the RM1,500–RM2,500 group than in the group earning below RM1,500 (74.03 ± 17.92 versus 68.30 ± 16.78; mean difference 5.73, 95% CI 0.33 to 11.13; $p = 0.033$). This contrast should be interpreted cautiously given the number of tests performed. The reported overall BMI comparison was non-significant ($p = 0.893$).

Table 4c. Practice score comparisons by demographic characteristics (percentage scores)

Factor	**Group (n)**	**Practice mean ± SD**	**p**
Gender	Male (149)	71.11 ± 17.75	0.706
	Female (251)	70.44 ± 17.00	
Employment status	Part-time (125)	72.32 ± 16.75	0.203
	Full-time (275)	69.95 ± 17.47	
Marital status	Single (249)	70.67 ± 18.07	0.972
	Ever married (151)	70.73 ± 15.90	
Age (years)	18-20 (56)	68.96 ± 15.26	0.927
	21-30 (192)	70.88 ± 18.23	
	31-40 (76)	71.61 ± 18.58	
	41-50 (45)	70.09 ± 15.00	
	51-60 (31)	71.29 ± 14.80	
Ethnicity	Malay (62)	70.97 ± 17.28	0.167
	Chinese (20)	66.80 ± 11.40	
	Indian (3)	72.00 ± 16.00	

Factor	Group (n)	Practice mean ± SD	p
	Sabahan Bumiputera (289)	70.31 ± 17.59	
	Sarawakian Bumiputera (5)	89.20 ± 11.54	
	Others (21)	74.19 ± 17.03	
BMI category	Underweight (43)	70.60 ± 17.17	0.893
	Normal weight (207)	74.77 ± 17.94	
	Overweight (104)	75.86 ± 17.09	
	Obese (46)	73.21 ± 14.88	
Highest educational level	UPSR (3)	62.00 ± 3.46	0.309
	PMR/PT3 (6)	76.67 ± 22.22	
	SPM (118)	70.19 ± 16.33	
	Pre-university (35)	67.71 ± 16.73	
	Diploma (54)	73.11 ± 21.61	
	Bachelor's degree (170)	70.07 ± 16.14	
	Master's degree (8)	82.50 ± 16.62	
	PhD (6)	76.33 ± 22.57	
Employment sector	Government (110)	71.25 ± 17.25	0.785
	Private (206)	70.84 ± 17.85	
	Self-employed (84)	69.57 ± 15.92	
Monthly income (RM)	<1,500 (139)	68.30 ± 16.78	0.050
	1,500-2,500 (130)	74.03 ± 17.92	
	2,500-4,000 (53)	69.96 ± 17.88	
	>4,000 (78)	69.87 ± 16.00	

Correlations among scores

Table 5 presents the Pearson correlations based on 400 responses per comparison. Knowledge had virtually no linear relationship with attitudes ($r = -0.003$, $p = 0.956$) or reported practices ($r = -0.049$, $p = 0.324$). The correlation between attitude and practice scores was positive and comparatively large ($r = 0.740$, $p < 0.001$). This pattern was observed within the questionnaire scores; it does not demonstrate that favourable attitudes preceded or caused more frequent label use.

Table 5. Pearson correlations among knowledge, attitude and practice scores (N = 400)

Score pair	Pearson r	p
Knowledge-attitude	-0.003	0.956
Knowledge-practice	-0.049	0.324
Attitude-practice	0.740	<0.001

DISCUSSION

This survey draws attention to a distinction that matters in food purchasing: a label can be valued without being fully understood, and it can be understood in principle without being regularly consulted. Among the working adults surveyed, agreement with favourable statements about nutrition labels was relatively high, but the item-level responses showed uneven familiarity with label concepts and variation in when respondents reported consulting the information. The correlations also differed across domains. Knowledge was not associated with either attitudes or practices, while attitudes and reported practices were closely related.

The item on serving size is especially informative. Fewer than one in three respondents correctly distinguished serving size from net package weight. This distinction is central to comparing the energy or nutrient content of packaged foods because the declared nutritional values may refer to a serving rather than to the entire package. Reviews by Cowburn and Stockley (2005), Campos et al. (2011) and Hieke and Taylor (2012) have reported similar difficulties with the interpretation and practical application of label information. The present result is an item-response finding, not a direct test of whether respondents could compare two products correctly, but it points to a skill that consumer education could address.

This may also help explain why knowledge did not correlate with the reported practice score. The knowledge measure consisted of seven factual statements covering different rules and nutrition concepts, whereas the practice measure asked about the frequency of reading and using labels in ordinary situations. These measures need not vary together. In Malaysian tertiary-student research, Loo et al. (2022) also reported that knowledge was not consistently related to attitude or practice, whereas other studies found associations among aspects of label understanding and behaviour (Md Zaini et al., 2022; Zainol et al., 2019). The difference does not establish that knowledge is irrelevant. Rather, the content of a knowledge test may be different from the skills consumers use while shopping. Md Nor et al. (2023) and Jefrydin et al. (2019) described practical constraints among Malaysian adolescents that factual questions alone would not capture.

The positive attitude–practice relationship was the most prominent statistical result ($r = 0.740$). It resembles the direction of relationships reported in Malaysian student samples and among Lebanese shoppers (Loo et al., 2022; Hoteit et al., 2022), although the populations and instruments are not directly comparable. There is also a specific measurement consideration in this study. Attitude items include considering labels before buying food and reading labels for health reasons, which are close to behaviours assessed in P1–P9. Respondents who endorse one such statement may also endorse the related practice item, creating overlap between the scores. Because both were completed in the same survey, the observed correlation should not be presented as evidence that attitudes independently determine nutrition-label use.

A second distinction is between nutrition information and other packaging cues. Respondents expressed favourable views of labels, but they reported using nutrition labels at home less frequently than reading them during purchasing. They also reported selecting products with front-of-pack health claims, although such claims are not equivalent to the nutrition panel. Baharuddin and Ali (2023) studied Malaysian consumers' responses to nutrition and health claims, highlighting a related but distinct aspect of information processing. Earlier work in Malaysia and Saudi Arabia likewise identified differences between reading nutrition information and checking general package details, including expiry dates (Ambak et al., 2014; Nurliyana et al., 2011; Riaz et al., 2022). Future surveys should distinguish label attention, interpretation, claimed health benefits and actual purchasing outcomes more clearly.

The demographic comparisons provide useful descriptive context but are not evidence of independent determinants. The higher knowledge scores among respondents with bachelor's degrees, and the differences across age and marital-status groups, could reflect overlapping characteristics. Educational attainment, age and working arrangements are likely to be related within this sample. Similarly, the finding that the middle-income group had higher attitude scores than both adjacent categories does not support a straightforward income gradient. The comparison for practice was also close to the significance threshold. Prior Malaysian population studies have shown demographic variation in reported label reading (Ambak et al., 2018), but their measures

and sampling designs differ from this study. Multivariable analysis would be required to separate these relationships.

For consumer education, the practical implication is to move from awareness messages towards tasks that resemble purchasing decisions. Instead of only telling consumers to read labels, a short workplace or community-based session could ask participants to compare serving sizes, calculate quantities for the whole package and identify differences between a nutrition claim and the nutrition information panel. Such activities are proposals for further evaluation, not interventions tested in this survey. Research on simplified front-of-pack formats suggests that label design can influence selection under some conditions (Song et al., 2021), but the current data cannot establish which label format would work best for the respondents in Sabah.

Strengths and limitations

This study provides insights into nutrition-label knowledge, attitudes, and reported practices among 400 working adults in Sabah. The inclusion of respondents from different employment sectors and sociodemographic backgrounds offers useful perspectives on consumer engagement with nutrition information. Furthermore, the assessment of both overall domain scores and individual questionnaire items allows for a more detailed understanding of nutrition-label use and identifies specific areas where consumer knowledge and practices could be strengthened. The questionnaire also underwent pilot testing, with acceptable internal consistency demonstrated across the three domains.

Nevertheless, several methodological considerations should be acknowledged. The use of convenience and snowball sampling may limit the generalisability of the findings to the wider working population in Sabah. Additionally, the cross-sectional design and reliance on self-reported responses do not permit causal conclusions or direct assessment of actual purchasing behaviour. Future studies involving more diverse populations and observational approaches could build upon these findings and provide further insights into how nutrition-label engagement relates to food selection.

CONCLUSION

Nutrition-label engagement among the surveyed working adults was uneven. Respondents generally viewed nutrition information favourably, yet item-level responses identified gaps in factual understanding, particularly the distinction between serving size and net package weight. Attitude scores were positively correlated with self-reported label-use practices, while the knowledge score was not significantly associated with either domain. The findings support further evaluation of practical label-reading education that teaches consumers to compare products using nutrition information. Studies incorporating observed interpretation and purchasing tasks would provide stronger evidence about whether such understanding changes food selection.

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Declarations

Ethics approval: Medical Research Ethics Committee, Faculty of Medicine and Health Sciences, Universiti Malaysia Sabah (JKEtika 5/25 (1)).

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