

Knowledge of nutrition facts on food labels and their impact on food choices on consumers

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Abstract

Food labels are mandatory on all food products since they contain nutrition information to help consumers make informed dietary decisions. Although food labels are widely available, many consumers struggle to fully understand the information they provide. The primary goal of this study is to evaluate how knowledge of nutrition facts influences the food choices of residents in Batu Pahat, Johor. A descriptive research design was done, involving three hundred (n=300) consumers and three hundred (n=300) local food products. A structured questionnaire was distributed across four major supermarkets and hypermarkets. The questionnaire assessed awareness, attitudes, and use of food labels, while the compliance of food labels for local products has been evaluated using the Food Regulation 1985 guideline. The frequency and percentage of the data have been calculated using SPSS software. Findings revealed that 77.3% of consumers were aware of food labels, and 78.0% referred to ingredient lists when selecting products. However, only 20.7% understood complete food label information. Most local food products complied with major labeling requirements, although some products lacked allergen and distributor information. In conclusion, while consumers generally believe in and rely on food labels, there is a need to improve their understanding of the full range of nutritional information. Strengthening labeling policies and improving consumer education can support healthier food choices.

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1. Introduction

Food labels are usually required on every food packaging to provide essential information about the food to the consumers. The nutritional facts provide all the information necessary for the consumers to know regarding the food's ingredients and nutrients. It includes the calories contained per serving, carbohydrate, protein, and fat composition, and the presence of preservatives in the food. Certain consumers who are concerned and aware of nutritional facts often read the food label, so they are aware of what they are eating and to avoid any potential harmful ingredient. There are also some consumers who choose not to read food labels for reasons such as finding it time consuming, or they are not concerned about food ingredients. In this case, nutritional facts have little influence on these consumers' choices, as they tend to make purchases randomly without understanding the product's ingredients.

Food labels must comply with specific requirements as stated in Food Regulation 1985 and Food Hygiene Regulations 2009 to ensure the accuracy of the food labels and the quality and safety of food products. Other logos and certification on the food packaging also need to meet certain requirements before it can be used in food labels. The "Made in Malaysia" logo, issued by the Ministry of Domestic Trade and Consumer Affairs (KPDNHEP), indicate a local food product and other types of local products. It also signifies the origin country of the product when the products are imported to another country. Hazard analysis critical control point (HACCP) is a management system that can ensure food safety and hygiene in the food industry from production to consumption (U.S. Food and Drug Administration, 2018). By following HACCP principles, food manufacturers can minimize risks associated with biological, chemical, and physical contaminants, ensuring the safety of their products.

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Majority of the population in Malaysia are Muslim, so the JAKIM Halal certification issued by the Department of Islamic Development Malaysia (JAKIM) is a crucial indicator of compliance with Islamic dietary laws. The JAKIM certificate ensures that food products follow the halal standards, covering aspects such as ingredient sourcing, processing, and hygiene (Foreign Halal Certification Body, 2021). All these aspects are very strict about hygiene and safety in accordance with the concept of "halalan toyyiban", especially in ingredients used to determine the Halal compliance (Othman *et al.*, 2019). Another key certification in Malaysia is the "Makanan Selamat Tanggungjawab Industri" (MeSTI) established by the Ministry of Health Malaysia, which focuses on food safety management. The main aim of this certification is to verify that food products meet hygiene and safety standards before they reach consumers. Additionally, before applying for JAKIM Halal certification, any company needs to meet the requirements of MeSTI to achieve this certification, further emphasizing its importance in the food industry.

Despite the wide use and regulation of food labels, several studies have indicated that consumer understanding and appropriate utilization of label information is very limited (Kok and Radzi, 2017). Most of the consumers are informed about labels yet do not know how to understand some main nutritional elements like serving size, order of ingredients, or added sugar (Kok and Radzi, 2017). This gap between knowledge and understanding may cause unhealthy and ignorant food habits. Therefore, this study aims to assess consumers' awareness, knowledge, attitudes, and beliefs toward food labels in Batu Pahat, Johor, and to evaluate the completeness and regulatory compliance of food labeling on local products based on Food Regulation 1985.

2. Materials and methods

2.1 Design of study

This study used descriptive research design to collect data from food consumers. This design was chosen because it is appropriate for investigating awareness, beliefs, opinions, and attitudes regarding the food label (Edmonds and Kennedy, 2016). The advantages of using this approach include its simplicity, convenience, and cost-effectiveness in data collection (Siedlecki *et al.*, 2015). However, self-reported data may be subject to bias, and the accuracy of responses depends on participant honesty.

2.2 Methods

There are two main methods used in this study. The first method was distributing a structured questionnaire to food consumers to assess awareness, knowledge, and

use of food labels. The second method was checking the food labels for compliance with the Food Regulation 1985, targeting the local food products.

2.3 Distributing the questionnaire

2.3.1 Study population

A total of three hundred (n=300) food consumers in Batu Pahat, Johor (Parit Raja, Rengit, and Batu Pahat city) participated in the study.

2.3.2 Selection of subjects in research area

The study was conducted among the most popular and visited supermarkets and hypermarkets in the research area. To ensure representativeness and minimize selection bias, consumers were selected randomly from four locations: Target Supermarket and Lotus Hypermarket (Parit Raja), Dee-Mart Supermarket (Rengit), and Pacific Hypermarket (Batu Pahat city). At each site, 75 consumers were randomly approached to participate.

2.3.3 Data collection

After receiving permission from the person in charge of the supermarkets, the questionnaire was distributed to the food consumers. The questionnaire about food labelling was adapted from a previous case study in Koforidua, Ghana, that examined how consumers' knowledge of nutrition information on food labels influences the food choices (Darkwa, 2014). Random consumers were chosen to answer the questionnaire. Due to COVID19 pandemic, the questionnaire was conducted using Microsoft Form Office to avoid unnecessary contact. The consumers were given detailed briefings regarding the aim of this study before they start answering the questionnaire. The questionnaires include three sections: food consumers' demographics (Section A), awareness, knowledge, and understanding of food labels (Section B), and the utilization of food labels when choosing food products (Section C). The reliability and validity of the questionnaire were established through expert review and a pilot test involving 20 participants. Follow-up questions were asked to understand participants' reasoning for specific answers. All responses were anonymized to ensure confidentiality.

2.4 Reviewing the food labels for compliance with the Food Regulation 1985

2.4.1 The subjects of the study

A total of three hundred (n=300) different types of local products available in Batu Pahat, Johor were selected as the subjects for checking the food labelling requirements as stated in Food

Regulation 1985.

2.4.2 Selection of subjects in research area

The selection of the subjects was done at the same place as the questionnaire activity. The logo and the label of “Made in Malaysia” was used as a guide in search of local products. The local food products were randomly selected from the supermarket or hypermarket. It included canned food, frozen food, ready-to-eat food, bread, sauce, dairy products, snacks, biscuits and others.

2.4.3 Data collection

Each product was checked using a list based on the Food Regulation 1985. This list included important items like the product name, net weight, list of ingredients, nutrition facts, manufacturer or importer details, allergy warnings, and certification logos. Data was recorded manually, and photographs of the packaging were taken to support further visual analysis.

2.5 Statistical analysis using SPSS software

Statistical Package for Social Sciences (SPSS) was used to analyze quantitative data for both the consumer survey and food label reviews. Descriptive statistics, including frequency and percentage, are calculated to make a comparison between the answers given. Results are presented in tables and graphs to allow comparison and interpretation.

Table 1. Section A: Demographics of food consumers.

Variable	Frequency (f)	Percent (%)
Age		
15 - 25	79	26.3
26 - 35	66	22.0
36 - 45	58	19.3
46 - 55	52	17.3
56 - 65	30	10.0
66 - 75	13	4.3
76 and above	2	0.7
Gender		
Male	124	41.3
Female	176	58.7
Education		
Middle school	9	3.0
High school	44	14.7
Diploma	87	29.0
Degree	107	35.7
Master	15	5.0
Vocational school	19	6.3
Others	19	6.3
Marital status		
Single	118	39.3
Married	170	56.7
Divorced	12	4.0
Concerning about BMI		
Yes	226	75.3
No	74	4.0
Having chronic diseases		
Yes	97	32.3
No	203	67.7

3. Results

3.1 Distributing the questionnaire

3.1.1 Section A: Demographics of food consumers

A total of three hundred (n=300) food customers participated in the questionnaire. About 76% of them (n=228) had a tertiary education from colleges and universities. Most of the respondents were aged between 15 – 25 (26.3%) and 26 – 35 (22.0%) years and majority were female (58.7%). About 75.3% of food consumers (n=226) were concerned about their BMI and 32.3% of them have chronic diseases such as diabetes, hypertension, or heart disease. The results for Section A were as shown in Table 1.

3.1.2 Section B: Awareness, knowledge, attitude and belief of food label

The result from Table 2 shows that the majority (77.3%) of food consumers strongly agree that they are aware of food labels. However, only 65% (agree + strongly agree) reported reading the food label before making a purchase, and this number dropped to just 36.6% who always read food labels. Overall, the data indicates that majority of the consumers have poor knowledge of the complete information on food labels (20.7%) and a low understanding of the listed ingredients (38.7%).

However, many consumers still place importance on food labels when making decisions, where 63.7% reported relying on food labels, and 66.3% said they regularly compare ingredients across different products before purchasing. In terms of believing in products labels information, the result shows positive response from consumers. About 80.3% of consumers believed that product with “natural” label are truly natural. About 97.7% of them stated that the logos and other food certifications help them in making healthier choices. Most consumers also trust the food label information, acknowledging the macronutrients and micronutrients (85.3%) on food products and 88.0% expressing trust in the listed total amount of sugar.

3.1.3 Section C: The utilization of food labels when choosing food products

The result in Table 3 shows how consumers utilized food labels when choosing food products. The most used information guiding healthy choices were the ingredient list (78.0%), nutrition facts (75.7%), and calorie content (62.7%). Some challenges regarding food labels were also reported. Significant number of consumers (68.3%) claimed that they were not concerned about food

Table 2. Section B: Awareness, knowledge, attitude and belief of food label.

No.	Section B question	Strongly disagree		Disagree		Normal		Agree		Strongly agree	
		f	%	f	%	f	%	f	%	f	%
1	I am aware about the existence of the food label on the packing	0	0.0	0	0.0	7	2.3	61	20.3	232	77.3
2	I read the food label before purchasing	7	2.3	26	8.7	72	24.0	167	55.7	28	9.3
3	I always read the food label before buying	13	4.3	79	26.3	99	33.0	109	36.3	0	0.0
4	I know the complete food label information	14	4.7	102	34.0	122	40.7	33	11.0	29	9.7
5	I understand all the ingredient listed in the food label	12	4.0	70	23.3	102	34.0	87	29.0	29	9.7
6	I usually compare the ingredients of the same product with different brand	10	3.3	51	17.0	40	13.3	172	57.3	27	9.0
7	I think all foods labelled as “natural” are truly natural	0	0.0	3	1.0	56	18.7	204	68.0	37	12.3
8	Food label is the major reason for the choices of the food product	13	4.3	31	10.3	65	21.7	120	40.0	71	23.7
9	Other logos are appearing on foods to show that they meet certain guideline. These are also useful in making healthy choices	0	0.0	0	0.0	7	2.3	98	32.7	195	65.0
10	In food product there are two types of nutrients which are micronutrients and macronutrients	0	0.0	3	1.0	41	13.7	148	49.3	108	36.0
11	The simple way to measure actual amount of sugar in a product are by adding the total sugar and added sugar shown in the food label	0	0.0	3	1.0	33	11.0	119	39.7	145	48.3

labels and some state they would rather choose cheaper products over nutritious products (67.7%). These findings showed that the top three important information for the consumers were total calories (46%), nutrition table (54.7%), and ingredient list.

3.2 Reviewing the food labels for compliance with the Food Regulation 1985

The examination of 300 local food products revealed that most of the products contained basic information about the products such as product name, net weight, and nutrition facts on the product label, however, some pieces of information were absent (Table 4). For instance, only 58% of products include allergen statements like whether their products contain ingredients such as nuts or milk. Also, name and address

of the importer or distributor were not included in slightly over half of the products. There was also about 74% mention of food additives in their products. This information is often overlooked but is crucial for the sake of consumers.

4. Discussion

4.1 Distributing the questionnaire

Generally, the results obtained from the questionnaire shows positive level of awareness among food consumers in Batu Pahat with 77.3% strongly agreed and 20.3% agreed that they are aware of food labels. However, knowledge of food label content was limited where only 20.7% of consumers understand the complete information provided on food labels, and just

Table 3. Section C: The utilization of food labels when choosing food products.

No.	Section C questions	Yes		No	
		f	%	f	%
	How can food labels help guide consumers toward healthy choices?				
1	The amounts of calories on the food label	118	62.7	112	37.3
2	The present of net weight	38	12.7	262	87.3
3	The ingredient list in the food label	234	78.0	66	22.0
4	By showing the serving size for the product	72	24.0	228	76.0
5	The nutrition list for the product	227	75.7	73	24.3
	What mistakes do consumers make when looking at food label?				
1	Does not understand the ingredient list	141	47.0	159	53.0
2	Does not check the total calories	54	18.0	246	82.0
3	Does not check the amount of nutrition	145	48.3	155	51.7
4	Does not care about the food labels at all	205	68.3	95	31.7
5	Choose the cheaper product over the nutritious product	203	67.7	97	32.2
	What is/are the important information you always read before buying the product?				
1	Total calories	138	46.0	162	54
2	Nutrition table	164	54.7	136	45.3
3	Serving size	87	29.0	213	71.0
4	Ingredient list	160	53.3	140	46.7
5	Net weight	25	8.3	275	91.7
6	Natural or organic labels	66	22.0	234	78.0
7	Allergy alert	37	12.3	263	87.7
8	Does not read the food labels at all	67	22.3	233	77.7

38.7% understood the listed ingredient. This indicates that they only have basic knowledge about food labels. When asked about the information that can be found on food labels, most consumers answer list of ingredients, table of nutrition information, expired date, and halal logo. However, they were generally unaware that the origin country, name and address of manufacturer and distributor, and serving size, are also required component of a complete food label. The reason behind this poor comprehension may be due to lack of nutrition education or exposure to more detailed food label advice, especially among some age groups or level of education. In addition, cultural and religious issues also affect label-reading behavior. Consumers also stated that they usually focus on halal logo when selecting food products. This is especially significant for Muslim consumers, as it helps them identify which products fulfill their religious principles. Trust in food choices is often linked to religious beliefs, commitment, and cultural practices (Burgmann, 2007).

According to the result, 65.0% of food consumers reported reading the food label before purchasing but only 36.6% consistently read the food labels. This may be due to habitual purchasing patterns, as consumers tend to buy the same food product and assume they already know what they are consuming. This mindset needs to be improved because food labels are updated over time. According to the U.S. Food and Drug Administration (FDA), the reason for the changes in the labelling of nutrition facts on food packaging in 2016 was because of the improvement of the scientific

information update, including information about the relationship between the selection of foods and chronic illnesses, such as heart disease, diabetes, chronic allergic reaction, and obesity (U.S Food and Drug Administration, 2022). Besides, the results show that food consumers have positive beliefs toward food labels. This positive attitude can help consumers indirectly in practicing a balanced diet because nutrition labels provide ingredients content and nutritional amount to calculate their food intake (Hawkes, 2004).

Several previous investigations have proven the relationship between dietary habits and development and progression of chronic disease. The consumers that did not practice healthy dietary habits tend to have at least one chronic disease (Setayeshgar *et al.*, 2013). In this study, 78 over 97 (80.4%) consumers who are having chronic diseases read the food label first before purchasing the food products and 94 over 97 (96.9%) of them aged between 36 and above. It has been reported that consumers having chronic disease use nutrition labels more frequently than healthy people. The reason they chose to read the food label was because of the advice from the doctor to control and take consideration of their food intake to maintain their health. Evert *et al.* (2019) reported that many treatments of chronic disease such as diabetes prevention guidelines focus on the essential of a balanced and healthy diet for the management and prevention of these diseases. These behavior patterns can be understood through the Health Belief Model (HMB), where consumers who are aware of personal health risks tend to engage in preventive

Table 4. Assessing food label compliance with the Food Regulation 1985.

No.	Requirements of food label	Yes		No	
		<i>f</i>	%	<i>f</i>	%
1	Name of product	300	100.0	0	0.0
2	Language				
	i) Malay	300	100.0	0	0.0
	ii) English	283	94.3	17	5.7
3	List of ingredients				
	i) In descending order of proportion by weight	295	98.3	5	1.7
	ii) Using the common name of its principal ingredients	298	99.3	2	0.7
	iii) Declaration if the food contains ingredients known to cause hypersensitivity	174	58.0	126	42.0
	iv) A statement of the presence of food additive in that food if use it	224	74.7	76	25.3
4	Minimum net weight, volume of no. of the content of the package	298	99.3	2	0.7
5	Name of the manufacturer	264	88.0	36	12.0
6	Address of the manufacture	243	81.0	57	19.0
7	Name of the importer/distributor	155	51.7	145	48.3
8	Address of the importer/distributor	151	50.3	149	49.7
9	Name of the origin country of the food	294	98.0	6	2.0
10	Form and manner of labelling				
	i) The particulars that are required appear conspicuously and prominently in the label	298	99.3	2	0.7
	ii) Every label required legibly and durably marked	298	99.3	2	0.7
11	Expiry date in respect of any food in uppercase form (DD/MM/YY)/(DD/MM/YYYY)	295	98.3	5	1.7
12	Nutrition labelling				
	i) The amount of energy expressed in kilocalorie (kcal) or kilojoule (KJ) per 100 g or 100 ml per package	295	98.3	5	1.7
	ii) The amount of protein, carbohydrate and fat expressed in g per 100 g or per 100 ml per package	295	98.3	5	1.7

measures such as checking nutrition facts.

From the result in Section C, the number of calories (62.7%), the ingredient list (78.0%), and the nutrition list for the product (75.7%) were stated to be the important guide for the consumers to make a healthy choice. This shows the significant role of nutrition labels in managing and helping consumers with chronic diseases. These findings show that there is a need to improve public health strategies since lack of knowledge on food labels content could hinder consumers making informed decisions about their food intake, which could lead to potential risk of increasing chronic diseases. Awareness campaign can be done to empower the consumers to demand their right to have a proper label on the product they are purchasing. Doctors could help to educate their patients on how to understand food labels effectively to help them with their disease management plans.

4.2 Assessing food label compliance with the Food Regulation 1985

The compliance of the food label in local food products with Food Regulation 1985 were investigated. The required labeling elements were listed based on the regulation. Overall, the results show that most food products fulfilled requirements. However, several requirements have a lower compliance rate, indicating many local products still fall short in providing complete food label.

One of the most concerning aspects is the declaration of ingredients known to cause hypersensitivity such as nuts, lactose, or seafood. This information is only present in 58.0% of the food products. This declaration is important to consumers that have allergies, where even a small amount of certain ingredients can trigger severe reactions. In addition, the statement indicating the presence of food additives in food products also shows quite a low percent (74%). This statement is important to inform consumers what type of food additive that has been used in the food they consumed.

Furthermore, information about the name (51.7%) and address (50.3%) of the importer or distributor was low in percentage. These elements are required under the regulation, and the lack of this information on some food products reflects labeling oversight. The low consumer awareness of this information, as seen in the questionnaire responses, may be a result of it not being consistently included on food labels.

The low compliance with certain food labeling requirements observed may be due to factors such as low enforcement of regulation, absence of technical knowledge in the industry especially among small-scale producers and the inconsistency of regulation in the food industry. This is prevalent among the local

manufacturers where they might not fully understand the requirements stated in the Food Regulation 1985. There are also some manufacturers that do not prioritize complete labeling due to economic aspects or oversight. A study about pre-packaged foods in Malaysia reported that 34%–73% of products did not meet the requirement needed with tolerance limits for declared nutrient, indicating breaches in proper labelling and quality control (Kok and Radzi, 2017).

The absence of important information such as allergen declarations and food additive statements poses possible risk to consumers who have allergies or food sensitivity. Similarly, lack of importer or distributor details hinder traceability and accountability in case of food safety incidents. A study that reviewed a sample of 20,241 products found that while there is a significant overall compliance with labeling requirement, ambiguity in cautionary statements such as “may contain” or “shared equipment” created confusion among consumers. The study also revealed that most consumers are unaware that these missing elements are actually required in food labeling (Pieretti *et al.*, 2009). This suggests that there is a disparity between regulatory requirements and consumer knowledge. Action that can be taken to address this issue include, regulatory bodies should strengthen enforcement through regular audits and impose penalties for those that fail to comply with the law. Also, creating food label templates with clear visual standards could help consumers become more aware of the presence of certain food labeling which can help in improving label literacy and compliance.

Conclusion

This study showed that while consumer awareness of the presence of food labels in Batu Pahat was high, their knowledge concerning complete label information was limited. Most consumers only look out for familiar labels like halal logo and nutrition table. Details like allergen warning and distributor details which are also required in food labeling, are often overlooked. Furthermore, many local products still lack full compliance with Food Regulation 1985. The regulatory bodies in charge needs to strengthen the law regarding the food production and food labelling in order to create a society that has a good perception and knowledge of the importance of food nutrition. Integrating technology, such as QR codes or mobile apps, can help to increase accessibility and understanding of food labels, especially for younger or digitally connected consumers.

Conflict of interest

The authors declare no conflict of interest.

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