

# Consumer Behaviour on Food Consumption and Treatment of Expiration Date Labels: A Case Study in Malaysia

Haswira Nor Mohamad Hashim<sup>1</sup>, Anida Mahmood<sup>2\*</sup>, Siti Sarah Sulaiman<sup>3</sup>, Ahmad Sabirin Zoolfakar<sup>4</sup>

<sup>1,2,3</sup> Faculty of Law, Universiti Teknologi MARA, Shah Alam, Malaysia.

<sup>4</sup> College of Engineering, Universiti Teknologi MARA, Shah Alam, Malaysia.

Email: <sup>1</sup> haswira648@uitm.edu.my, <sup>2</sup> anida131@uitm.edu.my, <sup>3</sup> siti\_sarah@uitm.edu.my, <sup>4</sup> ahmad074@uitm.edu.my

\*Corresponding Author: Prof. Anida Mahmood

Faculty of Law, Universiti Teknologi MARA, Shah Alam, Malaysia

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## Abstract

This study reports how Malaysian consumers treat and consume edible food that has passed the labelled date. Food date labelling, such as "Best Before", "Use Before", "Expired Before", and "Consume Before", aimed at protecting consumers, also led to edible food waste. Malaysians reportedly discarded 15,000 tons of food, with 60 per cent of the food still edible. International studies identified consumers' confusion and misinterpretation of the meaning of the food date labels as one of the causes of edible food waste. Different formats and terminologies used as date labels have caused consumers confusion. Despite the prevalence of edible food waste, there has yet to be a study on how Malaysian consumers treat and consume edible food that has passed the labelled date. This study fills in the gaps by conducting a survey involving 460 Malaysian household members. The respondents were asked how they treated and whether they consumed the food that had passed the labelled date. The survey finds a significant link between consumers' treatment and consumption of edible food based on their interpretation of the meaning of the labelled date. This study recommends simplifying and standardising terminologies used in food date labels, adopting smart labelling as part of dual method food date labelling, tax incentives to stimulate the adoption of smart date labels by the food industry and embracing secondary life-shelf practice to extend the shelf life of food. This study supports the UN Sustainable Development Goals on responsible consumption and production of food.

**Keywords:** consumer, consumption, date label, edible food waste, treatment.

## INTRODUCTION

Food information law aims to provide consumers with accurate and adequate information to enable consumers to make an informed choice about the food they consume. Food labelling is one of the methods used to protect consumers' right to information. The manufacturer and seller utilise food labelling to convey information pertaining to a particular good. It is a way to convey information to consumers on ingredients, storage, nutrients, date of expiry, place, or country of origin, among others. Labelling thus plays a crucial part in ensuring consumers are accorded the right to informed choice [1]. The information gained through labels influences the behaviour and decision of consumers in the economic market [2]. Consumers rely on labels to guide them in making an informed decision for various reasons, for instance, religious belief [3], dietary and health needs [4], and consumption and disposal of the food [5].

Date labelling is used as direct information to assist consumers in purchasing, consuming and discarding the food. Food safety regulations globally require food producers, manufacturers, and retailers to label their food products with date labels as an indicator of safety, fitness and quality. In Malaysia, the Food Act 1983 and its subsidiary, the Food Regulations 1985, govern the administration and enforcement of food-related matters such as contents and substance, labelling and packaging, advertisement and food premises. The objective of the food act 1983 and the food regulation 1985 is to guarantee food safety and food quality from the production stage to the point of sale with the aim to protect consumers from fraud and potential harm [6].

Regulation 14 of the Food Regulations 1985 imposes on the food producers/manufacturers to mark or label the food with the date to inform the consumers of the date of minimum durability of the food or the minimum storage life of the food. The regulated terms, formats or terminologies that shall be observed to label the food are 'expiry date' or 'exp date', 'use by', 'consume by', or 'best before'. Regulation 14(a) further defines the 'use by', 'consume by' and 'expiry date' means the date after which the

food may not hold the quality aspect usually expected by a consumer under recommended storage conditions. Further, Regulation 14(b) defines 'best before' as the date until which the food retains any specific qualities for which a tacit or express claim has been made, such as taste, size, nutrients and colours, under recommended storage conditions. Regulation 7 of the Food Regulations 1985 specifically prohibits food producers/manufacturers from producing or selling any food listed in the fifth schedule, e.g. biscuits, bread, fish cakes, milk, juice, canned foods, cereals, etc.) which does not bear a date marking on the food package. Mandatory date labelling, as imposed by the legislature, signifies the importance of food date labelling in providing the utmost protection for the consumers.

### The problem with food date labelling

The adoption of date labelling in a food safety regulation is problematic as the terms, format, or terminologies adopted for date labels in food safety regulations all over the world vary. Different formats or terminologies used as date labels may contribute to misunderstanding among consumers. The food may be marked as 'sell by'; 'best before'; 'use by'; 'display until'; 'expiry date'; 'expired by'; 'consume by'; or 'sell by', among others. The present regulatory regime of food date labelling has raised concern as studies across the globe disclose that one of the causes of edible food waste is due to consumer's confusion and misinterpretation of the meaning of date labels. The need to protect consumers with the enforcement of food date labelling is intertwined with the edible food waste phenomena. Consumers' ability to interpret date labels accurately has been subjected to discussions. The main concern with food date labelling is that consumers are often quick to discard food when a date label mark has passed. Unknown to the consumer, food manufacturers used the date label of 'best before' to indicate the peak of food quality and not as a safety indicator. Various studies also found that most food can last months or years after it is past the marked date.

While the foods may be safe and fit beyond the marked date, the foods were rated less favourably by the consumers when the date label suggests the food is close to, at or past the marked date over a fear of their safety [7]. According to Collart and Interis [8], a product should be safe to consume and in good condition and quality if handled and stored correctly, even if the 'best before' date has passed. Misunderstanding and confusion about date labels cause consumers to treat food as inedible, contributing to the massive edible food waste problem. In Malaysia, it was reported by the SWCorp that 7,000 tonnes of food waste are recorded daily, and of this figure, 24% or 4,005 tonnes are still edible [9].

Marking the food with a date label is a standard practice adopted by the food manufacturer to inform retailers and consumers about the safety and quality of the food. Food date labelling also assists the consumer in limiting up to when the product is purchasable and consumable at its best quality. As such, it is essential to note that the marked date should not be confused as a safety date but with how long the food will maintain its quality. The average shelf life of packed food before its optimal quality or nutritional content reduces based on the date labelled. Once the date labelled has passed, the quality of food is no longer guaranteed, but the food is still consumable, provided it is handled and stored properly [10, 8]. Consumer purchase power has been influenced by the date labelling terms when it comes to what they want to put in their mouth or discard [5]. Reliance on date labelling by the consumer at the point of purchase and consumption, however, could lead to edible food waste. Consumers tend to avoid making a distinction between the terms of date marking, which is mandatory upon a food package. All date labels are perceived as carrying the same meaning: expiry date. Zielińska et al. [11], who conducted a nationwide study in Poland, revealed that 42% of the Polish respondents believe that the expressions "use by" and "best before" signify the same thing. Similarly, Samotyja [12] reports that despite declared interest in date labelling, Polish consumers experienced difficulties with the date labelling system in force.

When the date label on food packages is being seen as an indication of food safety, consumers are likely to discard food based on the date labelled. Barone & Aschemann-Witzel [13] conducted an online focus group study with 18 consumers in the United Kingdom to investigate the consumers' food handling treatment practices within the household. Through the data collected, it was found that the 11 participants of the study made sure to consume food that was closer to the expiration date. They also consumed the food after the expiration date but never beyond a certain threshold (1-2 days). Fifteen participants revealed that they would dispose of the meat when the product reached its expiration date or max. 1-2 days after the expiration date. Although the study focuses on red meat, it discovers that date labelling emerged as the main factor affecting participants' decisions about what to cook and consume by the household. The study also finds that the respondents were cautious about consuming red meat that has the closest or has passed the expiration date. In another study by Zielińska et al. [11], they report that nearly half of all Polish respondents, regardless of age, admitted that they never consumed food after the expiry date on the label.

In Malaysia, little is known about how consumer treats and consumes food that has passed the labelled expiration date. Most previous studies focused on the importance of nutrition labels for consumers [14, 15, 16] and the importance of food date labels for grocery shoppers [17]. Prior literature on labelling has largely neglected to account for how consumers treat or consume the food that has passed the date labelled or expiration date. Hence, the objective of this study is two-fold: first, to investigate consumers' treatment and consumption with specific reference to the pantry, refrigerated and frozen foods that have passed the

date labelled and second, to provide recommendations in response to the findings. Pantry food is basic essentials that are generally kept by Malaysian households in the pantry, such as salt, sugar, flour, oil, rice, grains, UHT milk, pasta, snacks, cereals, canned goods, dried herbs/spices, tea, coffee, and others. On the other hand, refrigerated food and frozen food that are commonly kept by Malaysian households include dairy, fresh milk, eggs, fresh produce, condiments, ready to eat meals/cooked meals. In contrast, freezer food can include meat, fish, poultry, bread, ice cream, dough, and cooked meals.

## MATERIALS AND METHODS

The researchers conducted a month-long nationwide survey in April 2021 among Malaysian consumers to investigate consumers' treatment of food that has passed the date labelled. In achieving the first objective of the study, the respondents were asked to describe i) how long did they keep pantry, refrigerated and frozen food that has passed the date labelled, ii) whether they threw away food that has passed the date labelled though the food is still edible and the frequency of the conduct and iii) consumption of edible food that has passed date label. The study population is Malaysian household consumers across the country. The research sample was selected using the following inclusion criteria; 18 years old and above, resides in Malaysia, do grocery shopping at least once a month. The sample excluded tourists on holiday/business trips in Malaysia and Malaysians who could not understand Bahasa Malaysia or English. According to the Department of Statistics, Malaysia, as of 2020, there were 8 million households in Malaysia. The minimum required sample size based on the total population is 385 participants, calculated to have a 5% margin of error and 95% confidence level. The sample size was decided based on Krejcie & Morgan Table (1970).

A pilot study that involved 100 respondents was conducted and returned with a Cronbach alpha value  $>0.64$  indicating the reliability and consistency of all the statements contained in the survey questionnaire. A convenience sampling technique was used for data collection. This sampling technique was used as the survey questionnaire will be distributed by hand and online via email or social media. However, the online data collection method was employed due to the Movement Control Order (MCO) enforced in Malaysia. IBM SPSS software was used as a tool for quantitative data analysis. The online survey has collected data from 460 respondents, which is 20 per cent higher than the sample size recommended in the sampling schedule by Krejcie and Morgan (1970).

## RESULTS

**TABLE 1.** Demographic Analysis of the Respondents

Variable	Characteristic	Valid Percentage
Gender	Male	34.6
	Female	65.4
Age	18-24	22.4
	25-34	24.3
	35-44	22.2
	45-54	22.6
	55 and above	8.5
Household size	1 person	4.6
	2 persons	12.0
	3 persons	12.5
	4 persons	21.1
	5 persons or more	49.8
Monthly Gross Income	Less than RM2500	10.9
	RM2501-RM4849	15.9
	RM4850- RM7099	21.5
	RM7100-RM10959	18.5

	RM10960 and above	33.3
Frequency of Grocery Shopping	Everyday	3.3
	Once a week	41.7
	Twice a week	26.1
	Every two weeks	20.2
	Once a month	8.7
Place of Grocery Shopping	Market	6.3
	Grocery store	21.3
	Convenience store	8.0
	Hypermarket	64.3
Preferred Mode of Grocery Shopping	In store	68.3
	Online	3.0
	Both	28.7

Source: From the survey conducted by the Researchers

**TABLE 2.** Frequency Count of Consumers' Treatment of Food that Has Passed Date Labelled

Describe your treatment of food that passed date label	Less than 1 day	Less than 1 week	Less than 1 month	Less than 1 year	More than 1 year
How long do you keep pantry food that has passed the date label?	200	181	60	13	6
How long do you keep refrigerated food that has passed the date label?	158	213	70	12	7
How long do you keep frozen food that has passed the date label?	147	168	116	19	10
I throw away food that passed its date label even it is still edible.	Strongly Disagree	Disagree	Never	Agree	Strongly Agree
	9	54	36	214	147
How frequent you throw away food that passed date label even it is still edible.	Every day	Every week	Every month	Every six months	Once a year
	52	181	138	67	22

Source: From the survey conducted by the researchers

Based on Table 2 above, 200 respondents (43%) kept less than one day of the food has passed the date labelled for pantry food. Only six respondents (1%) kept more than one year of pantry food that has passed the date labelled. 181 respondents (39%), either kept them for less than one week, less than one month (60 respondents/13%), or less than one year (13 respondents/2.82%). As for refrigerated food, 213 respondents (46%) kept the food less than one week after the food had passed the date labelled. Only seven respondents (2%) kept them for more than one year. Other respondents either kept the refrigerated food for less than one day (158 respondents/34%), less than one month (70 respondents/15%), or less than one year (12 respondents/3%). Meanwhile, for frozen food, 168 respondents (37%) kept the food less than one week from the passed date labelled. Only 10 respondents (2%) kept the food for more than one year. Other respondents either kept the food for less than one day (147 respondents /32%), less than one month (116 respondents /25%), or less than one year (19 respondents /4%) from the passed date labelled.

The majority of the respondents (361respondents/78%) either agreed (214 respondents /47%) or strongly agreed (147 respondents /32%) that they threw away food that had passed its date label, even if it is still edible. Only 36 respondents (8%)

never throw away food that had passed its date label if it was still edible. Other respondents either disagreed (54 respondents/12%) or strongly disagreed (9 respondents /25%) that they threw away food that had passed its date label even if it was still edible. Most of the respondents (181 respondents /39%) reported that they threw away food that had passed the date label every week. Only 22 respondents (5%) reported that they threw away edible food that has passed the date label once a year. 52 respondents (11%) threw away edible food that had passed the date label every day, 138 respondents (30%) threw away the food every month and 67 respondents threw away the food every six months (15%).

**TABLE 3.** Descriptive Statistics for Consumers' Treatment in the Consumption of Food that has Passed Date Labelled

	N	Mean	Std. Deviation
Describe your consumption of edible food that has passed the date label			
I never consume food that has passed its date label.	460	3.67	1.187
I still consume food that has passed the date label	460	3.3543	1.21648
I will donate the food that has passed date label to the needy	460	4.2630	1.04909
I will feed the animal with the food that has passed the date label	460	2.66	1.327
I will turn it into compost food that has passed the date label, even if it is still edible	460	2.97	1.246
Overall mean for consumption of edible food.	460	3.3826	.56341
Valid N (listwise)	460		

Source: From the survey conducted by the researchers

Table 3 informed the mean and the standard deviation of consumers' treatment for food that has passed the date labelled. Five questions were asked to the respondents, and the response of each question is indicated on a 5-point Likert Scales strongly disagree, disagree, not sure, agree and strongly agree. The overall mean score of 3.38 implies that, on average, the consumers will not consume, use or utilise the food beyond its expiry date. The findings also showed that though the consumers were not willing to consume the food (3.67 mean score), they were more than willing to donate the food that had passed its expiry date (mean score of 4.26).

## DISCUSSIONS

### Non-Consumption of Food that has Passed the Labelled Date

This study's finding indicates that most of the respondents are not willing to consume, use or utilise pantry, refrigerated and frozen foods once the labelled date has passed, despite being edible. Non-consumption of edible food that has passed its labelled date provides evidence that confusion and misinterpretation of the meaning of the terminologies used in food date labels contribute to edible food waste in Malaysia. The way the respondents treated expired food shares a similar pattern with the UK consumers, as found out by Barone & Aschemann-Witzel [13]. Consumers in the United Kingdom would consume the food (red meat) only 1-2 days after the expiration date. Even though their study was limited to red meat stored in the refrigerator, similar treatment is found for pantry food which is durable. The respondent treatment is also similar to the Polish consumers who admitted they would never consume and would throw away food right after the expiry date on the label [11].

Food safety and quality testing on durable food product ( for example, jam, UHT milk, pasta, and mayonnaise) that has passed their labelled date showed that the products were safe and free of microbiological contamination on the "best before" date, as well as after 3 and 6 months of storage under the conditions recommended by the manufacturer. Microbiological tests confirm that jam, UHT milk, pasta, and mayonnaise can be safely consumed even six months after the date of minimum durability despite the change of colour, texture, odour and flavour. In another study by Maio et al. [18], 94 food products of animal origin purchased in two supermarkets in North Portugal were evaluated for the microbiological hygiene and spoilage indicators of foods on the expiry date. The foods were divided into raw products (beef, chicken, fish/fishery, meat products, pork) and processed products (cooked meal, pastry, ready-to-eat (RTE) dairy and RTE meat products). The results showed that the foods available at the end of the shelf life in supermarkets do not represent a risk for food poisoning due to the absence of foodborne pathogens.

The cited studies proved that from a microbiology point of view, durable food that has passed its labelled date is still edible, safe and does not pose a health risk to the consumers. The scientific study provides evidence that the length of storage after the

“best before” date may result in changes in quality characteristics but not in the safety aspect. Based on these results, it is reasonable and possible for consumers to still consume these foods beyond the 'best before' date, and this would create an opportunity to minimise edible food waste [11]. Consumers need to be educated not to stigmatise edible food that has passed the labelled date as scientific studies confirm that foods that passed their expiry, use before, best before or consume before date are still safe for consumption.

### Discarding Edible Food that has Passed the Labelled Date

The finding of this study also indicates that most of the respondents, who are Malaysian household consumers, threw away pantry, refrigerated, and frozen food that has passed its labelled date, despite the food is still edible. The findings further indicate that the respondents discarded the pantry food a day after they had passed the expiry date and threw them away less than a week after the expiry date. The common finding of these studies is that food date labels are an essential factor influencing consumers to discard edible food that has passed the labelled date. The similarities of the treatment in these three countries provide useful insight into the adverse effects of misinterpretation and confusion about the meaning of food date labels that result in food waste behaviour [19]. The practice of discarding edible food that has passed the labelled date can be attributed to the respondents' misinterpretation of food date label as an indicator of food safety rather than food quality [20, 21, 22]. To the consumers, what amounts to being unsafe, unfit and below the required standard is by referring to the date label on the food. International studies point out that confusion and misinterpretation of the meaning of food date labels have contributed to food waste in Malaysia. Hence, consumers must be educated on the meaning of date labels. Malaysian consumers can learn from international studies and avoid discarding edible food to prevent food waste. The scientific findings support the argument that the food manufacturer uses these labels to indicate the optimum quality, not the food's safety and fitness.

### Willingness to Donate Edible Food that has Passed the Labelled Date

The finding of this study further indicates that despite their adverse treatment and non-consumption of food date has passed the labelled date, most respondents are willing to donate the food that is still edible to needy people. The respondents' willingness to donate is in line with the Malaysian government's efforts to minimise edible food waste by introducing the Food Donors Protection Act 2020 (Act 826). The Act provides statutory protection for food donors from any civil liability in respect of any personal injury, disease suffered, or death of any person resulting from the consumption of the food donated or distributed by the food donor. This protection is subject to the injury, disease or death that was not caused by the negligence of the food donor, or the food donor has not complied with food safety and food hygiene requirements, the food was not safe for consumption or the donation was not made in good faith. The Act recognises a broad category of food donors comprising individuals, corporations, retailers, suppliers, manufacturers, volunteers, hotels, and other institutions and entities. Although the Act's primary purpose is to encourage food donation without fear of being sued and to ease the burden of the needy, the Act can potentially reduce food waste in Malaysia. Since various studies have confirmed that food that passed the labelled date is still safe and fit for consumption, despite their possible reduced quality, the introduction of the Act promotes and facilitates the donation of edible food that has passed the labelled date to needy people in Malaysia.

## RECOMMENDATIONS

This section provides recommendations to address Malaysian consumers' adverse treatment of food that has passed the labelled date.

Firstly, the current food date label should be simplified and standardised. Food producers and food manufacturers in Malaysia should simplify food date labels on their products or packaging. This move is in line with the worldwide movement since 2020 amongst significant food manufacturers, producers and retailers, i.e. Tesco, Kellogg, Walmart, Campbell Soup, Bimbo, Pick n Pay, Nestlé, Carrefour and Unilever, to simplify date labels [23]. The idea to simplify the date labels and reduce food waste was suggested by the Consumer Goods Forum (CGF), a network of 400 of the biggest consumer goods companies across 70 countries. The CGF suggests using one expiration date label for perishable food (e.g. 'Use by') and one food quality indicator date label for non-perishable (e.g., 'Best if used by'). It is anticipated that simplified, consistent and uniform food date labelling will help reduce food waste and confusion for consumers. For this recommendation, the Malaysian government should amend the Food Regulations 1985 that mandates the application of a single food date label for perishable and non-perishable foods produced or manufactured in Malaysia. An ancillary amendment should be made to Regulation 14 of the Food Regulations 1985 to abolish the remaining terminologies, i.e., 'expiry date' or 'exp date', or 'consume by' that are not mandated by the proposed amended Regulations.

Secondly, the current conventional date labelling system should be reformed by introducing a dual labelling method. In addition to the conventional date labelling method, a smart date labelling method should be used to determine the edibility of the food that has passed the labelled date. Compared to conventional food labelling, smart labelling uses chemical nano-sensory reaction that enables real-time food quality and food safety monitoring or remediation [24]. Smart labelling technology and real-time monitoring of food quality could potentially reduce food waste. The use of sensor labelling inside the food package enables the

consumers to be informed that the food is and/or about to spoil [25]. The electrochemical sensors embedded in the smart labels allow rapid detection of food safety and food contaminants, overcoming the limitations of the conventional date labelling method [26]. The chemical sensory device can be used in the pantry as well as refrigerated and frozen food such as milk and dairy products, fish, meat, beverages, and many others [27]. By adopting the dual method of date labelling, the consumer's treatment and consumption of food that has passed the date labelled are expected to improve as they are able to make an informed decision on when to discard the food based on actual information displayed or shown on the smart labelling. For this recommendation, the government should undertake a food labelling regulatory reform that provides a timeline for the gradual adoption of the dual method of food date labelling among the producers or manufacturers of food most commonly discarded by Malaysian households.

Thirdly, the government should provide incentives in the form of tax relief/tax deduction/rebate to the food manufacturers, wholesalers or retailers who adopt the smart labelling method. As the Malaysian food industry is moving towards Industry 4.0, food labelling and packaging that utilise smart sensor technologies can provide up-to-date product information on expiry date to the retailers who offer and display the pantry, refrigerated or frozen food for sale to Malaysian households. The government should introduce a national food waste tax incentive to support and stimulate the food producers and manufacturers' initiatives to adopt smart food date labelling and smart packaging that could prevent edible food waste. The existing tax policy should be adapted to reflect the government's initiative to reduce food waste through the adoption of smart date labelling and smart packaging technologies. For this recommendation, the Internal Revenue Board and the Royal Malaysian Customs Department could introduce tax relief/rebate orders for direct tax (individual or corporate income tax) and indirect tax (sales tax, import duty and excise duty).

Fourthly, this study recommends for the concept of secondary shelf life be introduced and promoted to the food industry players and consumers. Secondary shelf life refers to the period after the food is opened and stored under storage conditions during which it maintains an acceptable quality level [28]. Secondary shelf life can be by the hour, day and month, and food type can be raw meat, cold prepared food, vacuum packed food, opened canned/bottled milk, juice, hot prepared food, sugar, flour, rice, spices, condiments, and others. This study informs us that food waste mainly occurred at the household level as consumers threw away the food less than a day after it had passed the date labelled. Consumers need to be exposed to the practice of adopting a secondary shelf life based on storage methods, food type, and personal sensory experiences. Food storage can be in the chiller, pantry, and freezer. Practices by the hospitality industry, like hotels, restaurants, and hospitals, can be used as a starting point of reference for consumers to develop their own secondary shelf-life food labelling. For this recommendation, food nutritionists could collaborate with the Standard and Industrial Research Institute of Malaysia (SIRIM) to develop a secondary shelf-life best practice manual to guide Malaysian households on the secondary shelf-life practice for the pantry, refrigerated and frozen food.

## CONCLUSION

This study informs us that Malaysian households are inclined to discard and have deep reservations towards food that has passed the labelled date. The Malaysian households' reservations are evidenced by their act of not consuming the food that has passed the labelled date, although they are still edible. Following these findings, this study has proposed regulatory measures, tax incentives and secondary shelf-life practices to minimise Malaysian households' adverse treatment towards edible food that has passed the labelled date. Besides the regulatory measures and tax incentives, Malaysian households need to be educated on the purpose of food date labelling and the meaning of the terms "expiry", "best before", "use before", or "consume before dates" suggested by the food date labels. It is anticipated that an increase in the consumers' understanding of the purpose and meaning of the terminologies used in the food date labelling could prevent them from discarding edible food that has passed the labelled date.

The findings of this study are limited to pantry, refrigerated and frozen food in general without specific reference to the particular type of food (such as red meat, milk, juices, canned/bottled food, spices, and others). The findings are also limited to the terminology of date labels that are commonly used in Malaysia. It is suggested that future research be conducted to assess the consumers' treatment and consumption of specific types of the pantry, refrigerated, and frozen food that have passed the labelled dates. This study further suggests future research to broaden the sample of terminologies used on the date labels that are not common in Malaysia found on imported foods. Future research should also be undertaken to assess the efficiency of the measures to overcome edible food waste proposed in this study from environmental, economic, and social perspectives. Microbiological quality assessment, physic-chemical analysis and sensory analysis test should be conducted to test the quality and safety of the foods manufactured in Malaysia for their minimum durability for safe consumption irrespective of the labelled date.

While this study is limited to Malaysian household consumers, the proposed regulatory and non-regulatory measures can be adopted by other countries that face similar food waste phenomena arising from confusion and misinterpretation of the meaning of the food date label.

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## Conflict of Interest

The authors declare no conflict of interest.

## Ethics Statements

This study has obtained minimal risk research ethics approval from the Research Ethics Committee of the Universiti Teknologi MARA. (REC/03/2021 (MR/151))

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