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# การวิจัยเชิงคุณภาพความยากลำบากและอุปสรรคต่อการเข้าใจข้อมูลฉลากโภชนาการในกลุ่มผู้บริโภคไทย

## Thai Consumer Difficulties and Barriers in Understanding Nutrition Labels : A Qualitative Study

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**บทคัดย่อ**

**วัตถุประสงค์การวิจัย**

การปรับปรุงฉลากโภชนาการไทยเป็นไปได้จำกัดเนื่องจากการวิจัยความเข้าใจของผู้บริโภคไทยต่อข้อมูลฉลากโภชนาการยังมีไม่เพียงพอ งานวิจัยนี้มุ่งศึกษาความยากลำบากและอุปสรรคต่อการเข้าใจข้อมูลฉลากโภชนาการบนผลิตภัณฑ์อาหารทั้งตารางโภชนาการและแบบจีดีเอ

**วิธีดำเนินการวิจัย**

ทำการสัมภาษณ์เชิงลึกผู้บริโภค 34 คน ที่มีลักษณะทางสังคมและประชากรที่แตกต่างกัน ได้แก่ ระดับมหาวิทยาลัยในจังหวัดกรุงเทพฯ และต่ำกว่าระดับมหาวิทยาลัยในจังหวัดระนอง โดยบันทึกการสัมภาษณ์ทั้งแบบเสียงและวิดีโอเพื่อเก็บคำพูดท่าทาง บทสนทนาจะถูกนำไปวิเคราะห์โดยโปรแกรมเพื่อจำแนกความถี่ของคำ ข้อความ เหตุการณ์ร่วมหรือแตกต่างกัน

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**ผลการวิจัย**

งานวิจัยนี้พบความยากลำบากต่อการเข้าใจฉลากโภชนาการมี 4 สาเหตุหลักคือ การรับรู้น้อยเกินไป เคลือบแคลงความถูกต้องข้อมูล ความสามารถเชิงภาษาและตัวเลขน้อยเกินไป และความรู้ทางโภชนาการไม่เพียงพอ และอุปสรรคต่อการเข้าใจฉลากโภชนาการมี 5 ลักษณะคือ ความสับสนต่อฉลาก การซ้ำของคำศัพท์ ตัวอักษรขนาดเล็ก ตำแหน่งฉลากไม่เด่นชัด คำศัพท์เฉพาะทาง แม้จะเป็นปัญหา แต่การมีอยู่ของฉลากโภชนาการสามารถเพิ่มความน่าเชื่อถือของผลิตภัณฑ์ต่อผู้บริโภคได้

**สรุปและข้อเสนอแนะการวิจัย**

งานวิจัยนี้ได้เสนอแนะแนวทางปรับปรุงฉลากทั้งแบบตารางและจีดีเอ เพื่อการออกแบบฉลากที่ดีขึ้น ระบุแนวทางการส่งเสริมความรู้ด้านโภชนาการ เพื่อส่งเสริมผู้บริโภคสามารถเข้าใจข้อมูลฉลากโภชนาการได้ดียิ่งขึ้น

**คำสำคัญ :** ประเทศไทย/ฉลากโภชนาการ/ความเข้าใจ/ผู้บริโภค/ความยากลำบาก

## Abstract

**Background**

Systematic review of nutrition labels in Thailand has not yet been attempted and there is a little information on Thai consumer understanding of existing labels. To fill this gap, we investigated Thai consumers and real food packages, identifying the difficulties and barriers consumers have with both Nutrition Information Panels (NIP) and Guideline Daily Amounts (GDA) labels.

**Materials and Methods**

The study employed samples of real food packages and in-depth interviews of 34 participants aged 20-45 years including urban (Bangkok) university educated consumers, and rural (Ranong) non-university educated consumers representing a wide range of socio-demographic groups. Interviews were audio and video recorded to collect verbal and non-verbal information. A qualitative data analysis program was used to help in the analysis of transcripts by searching for repeated words and codes to build themes and meanings.

**Results**

We identified four difficulties consumers have with nutrition labels (low awareness, suspected truthfulness of information, low literacy and numeracy, and insufficient nutrition knowledge), and five barriers (confusing labels, small font size, use of technical terms, repeated words, unobtrusive location). These problems impeded consumer use of nutrition labels. However existing nutrition labels can increase trust in a food product.

**Conclusions**

To improve consumer understanding of labels we suggest practical ways to amend NIP or GDA and recommend nutrition education strategies to enhance consumer knowledge. Results of this study should contribute to the design of nutrition labels that are easier for consumers to use.

**Keywords :** Thailand/Nutrition label/Understanding/Consumer/Difficulty

## Introduction

Nutrition labels are part of an array of strategies to support healthy food choices as diet-related diseases emerge in developed and developing nations (Campos, Doxey, & Hammond, 2011). In Thailand, two types of nutrition labels appear on Thai snack packages: Nutrition Information Panels (NIP) and Guideline Daily Amounts (GDA). NIPs display a detailed list of nutrients, vitamins, and minerals on the back of packages whereas GDA is a simplified nutrition label including only four core nutrients (energy, sugar, fat, and sodium) on the front of package (Royal Thai Government Gazette, 1998, 2011). They have been developed in response to the non-communicable diseases (NCD) epidemic to provide information to consumers to assist them choose healthier foods.

Diet-related diseases are particularly important in South East Asia at present because of the rapid transition from traditional to

westernized diets which include more processed and packaged foods, associated with body size and chronic diseases (Kelly et al., 2010; Lipoeto, Geok Lin, & Angeles-Agdeppa, 2013). The Thai national examination survey in 2009 shows that average Body Mass Index (BMI) significantly increased in both men and women (aged 20 and over) when compared to 1991 (Aekplakorn et al., 2014). About twenty percent (19.1%) of children aged 2 to 14 consumed snack foods everyday while the proportion of adults age 15 to 59 years frequently eating snack foods (more than 4 times a week) increased from 3.4 to 7.9% (Ministry of Public Health, 2011).

Nutrition labels are considered to be a tool that shoppers can use to help choose healthy foods but they often experience difficulties in interpreting and understanding the labels. Studies find that consumers say they understand food labels although evaluation tests show that their comprehension is not as good as they think (Sharf et al., 2012). Others found that participants are not confident in their ability to read and understand nutrition labels (Zweig & Pilliar, 2012). In general, consumers have insufficient nutritional literacy and numeracy skills to interpret labels and consider them to be bothersome and difficult to understand (Cowburn & Stockley, 2005; Kim & Kim, 2009; Rothman et al., 2006). In 2012, a global Nielson survey revealed more than half the world's consumers had difficulty understanding nutrition labels with levels of confusion being highest in Asia Pacic countries (Nielsen consumer research, 2012).

There is a shortage of data on consumers' responses to nutrition labels in Thailand. The first local study on the topic in 2009 reported that 54.4% of respondents understood NIP (Parinyasiri, 2010). After GDA was launched, another study reported 45.8% of trained participants had a high level of understanding of the labels (Hokiarti, Siriwong, & Chulakarangka, 2012). A Thai national survey also showed 63.3% of participants understood GDA but that fewer (52.4%) were able to use the labels to choose food products (Yodtheun, Juntarasuthi, Rochanawanitchakarn, Ratanatikaumporn, & Panprayun, 2013). However, these studies did not investigate the problems and barriers consumers have with nutrition labels in any detail.

Many studies have recommended that nutrition labels be changed to improve consumers' comprehension. These studies have mainly focused on two important components of nutrition labels: design and content. Design-focused research has used eye-tracking techniques to monitor consumers' visual attention. As a result these studies recommend that visual clutter around nutrition labels should be reduced and the labels should be larger and located on the center of the package (Ares et al., 2013; Graham, Orquin, & Visschers, 2012). Most studies evaluated consumers' understanding of labels by testing them (De la Cruz-Gongora et al., 2012; Sharf et al., 2012) or asking consumers to score their level of understanding using a close-ended questionnaire (Aygen, 2012; Jacobs, de Beer, & Larney, 2011). These approaches reflect researcher pre-conceptions about problems with labels and miss the opportunity to gather data on consumer views of difficulties.

The qualitative study reported here was designed to fill this gap by identifying the difficulties and barriers consumers have in understanding the two types of nutrition labels used in Thailand: the Nutrition Information Panel (NIP) and the Guideline Daily Amounts (GDA). We analysed our results to provide recommendations for improving the use of nutrition labels by Thai consumers. These results have implications for the food industry, nutritionists, nutrition educators, related policy makers, and the general population.

## Methods

### Study design

Semi-structured interviews were conducted in May-July 2013 with 34 participants aged between 20 to 45 years who were almost evenly distributed over two areas, urban Bangkok and regional Ranong. These areas have contrasting socio-economic and education backgrounds (university and non-university educated) representing a wide array of potential barriers in interpreting food labels. We expected that highly educated people living in a capital city would have more opportunities to access information of nutrition labels via many types of multimedia than regional area.

Equal numbers of men and women were recruited for interview as both undertake food shopping and therefore may read labels. Bangkok participants were recruited from an ongoing Thai Cohort Study (TCS) established in 2005 to observe the health-risk transition underway in Thailand. At the time of recruitment TCS members were students enrolled at Sukhothai Thammatirat Open University (Seubsman, Yiengprugsawan, Sleigh, & the Thai Cohort Study team, 2012; Sleigh, Seubsman, Bain, & the Thai Cohort Study Team, 2008). The TCS provided an opportunity to locate and recruit educated Bangkok residents into the study. Fourteen TCS members were invited by phone to join the study. The random sample was balanced for sex and age group. The Bangkok interviews were held at an agreed venue and time to maximize participants' convenience. Ranong participants entering or exiting a Tesco Lotus store were invited to take part in the study. Individual customers were screened to exclude those who had a university education.

The overall aim was to recruit participants from a range of educational and socio-economic backgrounds and with different exposures to food advertising to cover the variety of experiences people might have in interpreting and understanding nutrition labels. Recruitment in both Bangkok and Ranong continued until data saturation was reached and little new information was gained by continued interviewing.

All participants were given an information sheet in the Thai language, asked to sign a consent form guaranteeing their privacy, and agree to both an audio and video recording. Each interview lasted around 30-45 minutes. This study protocol was approved by the Australian National University Human Research Ethics Committee (Protocol 2013/148).

### Interviews

Interviews were conducted in the Thai language by a native speaker and began with questions about participant eating behaviour and frequency of using labels when purchasing foods. We provided an example of an actual pack of snack food containing more than one serving size and asked participants to identify the nutrition label, and then explain it. Then, two small snack food packages were shown to participants to test their ability to use nutrition labels to help them choose a product. These packs were equivalent to one serving size making it easier for consumers to compare the nutrient contents without having to take recommended serving size into account.

In general, food manufacturers displayed nutrition labels using different fonts and sizes. We gave participants four snack packages and asked them to discuss their preferences between the packs, difficulties in using them and any suggestions to improve nutrition labels. We also encouraged them to talk about their practical use of nutrition labels and difficulties they had.

### Analysis

All interviews were transcribed into Thai language verbatim from the audio-recording and

information collected by video recording was used to conrm the verbal transcript and non-verbal cues. We also collected socio-demographic details (sex, career, household size, weight, and height). Throughout the study, we maintained an open-ended approach loosely adapted from grounded theory (Glaser & Strauss, 2009) to more deeply to investigate the barriers to interpretation. Atlas.ti software was used to manage the textual material and to easily search across data set for repeated meanings, words, and themes. Notable examples of quotations were transcribed into English and discussed with the research team before writing up final results.

## Results

### Study participants

Of all the provinces of Thailand, Ranong, where we selected a group of non-university education participants, is the most socially and economically different from Bangkok. It has the smallest population, few high schools, and only one large-size supermarket. To reach data saturation, more Ranong participants were recruited because they had more had difficulties in discussing nutrition labels than those from Bangkok. Overall, thirty-four participants were interviewed - 14 from Bangkok and 20 from Ranong. (Table 1)

**Table 1** Participant characteristics

| **Participants (n=34)** | |
|---|---|
| Average BMI (S.D.) | 24.0 (3.7) |
| Age in years (S.D.) | 22.8 (6.7) |
| Age group (%) | |
| 20-35 years | 50 |
| 36-45 years | 50 |
| Sex (%) | |
| Male | 50 |
| Education (%) | |
| Lower than university educated | 59 |
| University educated or higher | 41 |
| Career (%) | |
| Officer/ public servant | 24 |
| Employee /elementary worker (non-physical) | 26 |
| Professional | 9 |
| Police/soldier | 6 |
| Merchant | 15 |
| Agricultural | 3 |
| Not work/ housemaid | 18 |

**Consumer difficulties with nutrition labels**

*Low awareness of GDA labels*

A majority of participants reported that they have not seen or were not aware of the term "GDA" or even the equivalent Thai name "Hwan-Man-Khem" before participating in this study. However, when we asked participants to compare products by using any information on package, they prefer to use GDA than NIP because they are less complex and are easier to read because of a larger font size.

It [GDA] does not show on every snack, does it? I don't know. I found back-nutrition label [NIP] on every snack pack but I have only just heard of front-label [GDA]. (male, Bangkok, aged 36)

Back-label [NIP] shows good details but front-label [GDA] is easy-to-understand information. (female, Bangkok, aged 30)

However, people who read labels often use NIP first to read because it looks obviously and is used on every package.

[I often used] back-nutrition labels. [Why?] Are front-nutrition labels more widespread? I have not seen it. (female, Bangkok, aged 41)

*Suspected truthfulness of information*

Participants in general did not understand the process of generating and regulating nutrition labels but most of them believed that food products get government approval. Factors can reduce trust in labels including questions about the truthfulness of information. Participants also made comments like "Information on the submitted document may be different from real products" or "[they] may declare a value less than the real [value]" or "[they] display zero sugar but I taste it [as] sweet".

If I know some organizations approve the accuracy of information on nutrition label, I will give 100% trust. I think [such endorsement] may available but I am not sure. (female, Bangkok, aged 37)

Some participants were more likely to trust products that displayed nutrition labels than non-labeled products irrespective of the content of the labels. Nutrition labels were seen by consumers as a type of product disclosure information that influenced their buying decision. Both Bangkok and Ranong participants were interested about product disclosure.

The level of prominence given to nutrition labels can reflect something. ... It says how much the food producer cares for their customers. ... If they care, they will be pleased to disclose information to consumers and let us decide by ourselves, and it suggests they can be trusted. [Those] who avoid being noticed [are] suspicious. (female, Bangkok, aged 40)

I do not trust products without a nutrition label. ... Whether it [nutrient value] is truthful or not but at least they try to show a nutrition label to me. (female, Ranong, aged 37)

*Misinterpretation due to low literacy and numeracy*

Frequently problems occurred when participants interpreted "serving size" and "RDI". The statement "serving size: 1/3 package (30 g), servings per package: 2.5" that is displayed on existing large packs (more than 1 serving) of snack food was shown to participants (Figure 1). Many participants reported that they did not understand this statement and it was often misinterpreted by non-university educated participants because the written statements were examined first which influenced the interpretation of the quantitative information.

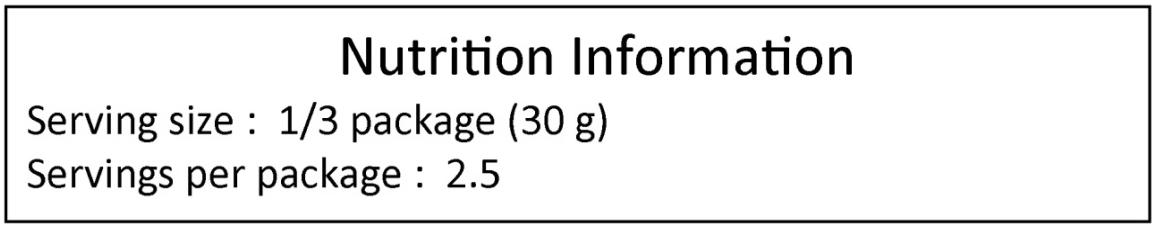


**Figure 1** Serving size and servings per package on Nutrition Information Panel (NIP)

For example, the statement "1/3 package (30 g)" was misinterpreted in two ways; 1) the entire package contain 30 g of snack. "One package contain 30 gram, then one-third is equal to 10 grams" or 2) one-third of others such as "filled 1/3 of package". A Bangkok woman wanted more clarity about the meaning of statement.

I should have only 1/3 of package. I never read this before. Umm. I want to know that 1/3 is for one day or other meaning. (female, Bangkok, aged 29)

Also for "serving per package: 2.5", some participants reported that it should type 'unit' after number 2.5. Some other participants may misunderstand that 2.5 means "2 and half days" or "2.5 times in one day".

I don't understand. What? [if it was 3 instead, you will get better understand?] ... Equal 3. What is 3? Isn't it? It does not show that 3 package or 3 calories. ... [It] stand-alone without any unit. (male, Bangkok, aged 26)

Participants often reported difficulties when they interpreted "%" on NIP. Many participants thought %RDI meant what are the nutrients in the food product or how high or low are nutrients from the food ingredients rather than how high or low are nutrient compared to recommended daily intake.

[Difficulties] mostly happened with '%' such as 4%, 5%, and others like this. If they are children, [I think] they will understand only it contains vitamin, protein, and fat but not for actual amount of nutrients. (female, Ranong, aged 28)

This entire package contain 12% of fat. (male, Ranong, aged 34)

Participants may think that it is the recommend amount they should eat 'not exceed' rather than nutrient-containing declaration of product.

[The %RDI value of fat] is 12% and it comes from 100, does it not? From 100, we should have not more than 12. (male, Bangkok, aged 41)

*Lack of diet-health relationship knowledge*

Lack of nutrition knowledge in some participants contributed to their misuse of labels. Even if participants can compare the value of nutrients, they may not be able to apply this information to their own health situation.

I will choose this snack. I select by energy value because this contains higher levels. ... It is better because it contains more potatoes. ... It gives us energy. (male, Ranong, aged 37)

How I can say? I think these [nutrition] labels tell only benefits. It does not show bad things. I want something said how much we consume and then [adverse] effect to our health. (female, Ranong, aged 24)

**Consumer barriers to understand nutrition labels**

*Confusion between types of food labels*

Many participants were confused by the different food labels displayed on packages. Though they were likely to describe themselves as nutrition label users, open-ended interviews revealed that they mixed up the ingredient lists on foods dis-

playing a quantitative ingredient declaration (QUID) with the similar NIP. Participants reported that the "nutrition label is [the] ingredient list label" and they looked for a list of ingredients on nutrition labels which aim to encourage heathy eating through a statement about nutrient or substances content (Codex Committee on Food Labelling, 2013) rather than specic ingredients. Examples from these two non-university educated participants misused nutrition labels:

I read [nutrition labels] for how much fat content? [How much] of ingredients like sugar? salt? flavour enhancer? (female, Ranong, aged 43)

I have read [nutrition labels] before. If it contains flavour enhancer, I will not let my child eat it. (male, Ranong, aged 34)

*Font size*

User and non-user participants reported similar difficulties reading NIP especially on small food packages. Small packages usually use too small a font size to display a range of information making it difficult for consumers to identify and read the nutrition labels.

I never read it. It is so fussy. Crowded with a lot of unknown [terms] with small font size. (female, Bangkok, aged 40)

Small NIP can made people feel bothered. Discouraged to read it. There are too many [words]. (female, Ranong, aged 23)

[GDA] is easier. It is better. For this [NIP], contain too much detail. We purchase food to eat-just 5 baht or 10 baht; nobody wastes time to read them. (female, Ranong, aged 37)

Although GDA font size is obviously bigger than the font size of NIP, most participants still complained that some packages displayed GDA labels with small fonts which are hard to read. "It should be a bigger font than this. ... This [second sample] is also too small. I sometimes need to peer at it." "I want a big font so that some older people will [be comfortable to] read it when they decide to give snacks to children" One male participant made a useful suggestion to make the label more noticeable.

I know but I rarely use it because the font is too small on every nutrition label. ... I think the presenter's picture on packages looks more outstanding. If we limit the size of the presenter's picture and make labels [GDA] bigger and more obvious, we can see it. I think they [food producers] don't want to tell us the nutrient amount. They just have [nutrition label] by law. (male, Bangkok, aged 32)

*Technical terms*

Most participants understand the terms 'carbohydrate', 'protein' and 'fat' but only a few participants are familiar with the term 'sodium'. Participants had difficulty answering when we asked them about sodium in food. Participants often said "I have heard the term but I don't know what it is" or "Too much is not good". A few participants knew that sodium is a major component in salt.

I don't know that [elderly should avoid high sodium food]. I know that everyone should eat less sodium but I don't know the in-depth reason. I just know that it is not good. Don't eat it too much. (female, Bangkok, aged 40)

*Word repetition on NIP*

Repeated words on nutrition labels, especially NIP, can confuse participants about the right location of required information. Some technical terms can be repeated up to 3 times within the NIP itself. For example, the word "fat" confusingly appears on the Thai nutrition information panel three times: in the nutrient declaration, in the reference to recommended daily intakes (RDI), and in the footnote of nutrient calories (Figure 2). For example, when we asked a 32 year-old women

from Ranong how much fat intake was recommended for healthy people in one day, based on the displayed RDI reference (Figure 2b), she became confused by the footnote below the nutrition label Figure 2c.

I can find [recommended value] but I am still confused. To find the RDI of fat, I see these show that fat=9, protein=4, and carbohydrate=4, then I [became] confused with this statement '50% reduced fat from original recipe'. ... I thought that RDI of fat possibly is 9.

Many participants did not know what the RDI meant even though it was displayed and explained on nutrition labels. After we asked participants about their understanding of values on the nutrient declaration (Figure 2a) which is the information designed to assist in choosing or comparing foods, it became clear that many participants misinterpreted them as we will show later.

**a) Nutrient declaration**

| | % RDI* |
|---|---|
| Total Fat 8 g | 12% |

**b) References of Recommended Daily Intake (RDI)**

The energy demand for individual may be different. The person whose energy demand of 2,000 kcal/day shall receive nutrients as follows :

| | | |
|---|---|---|
| Total Fat | Less than | 65 g |

**c) Footnote of nutrient calories**

Energy (kcal) per gram : Fat = 9 : Protein = 4 : Carbohydrate = 4

**Figure 2** Repeated words in Nutrition Information Panel

*Unobtrusive label location*

Many participants reported that they rarely see GDA labels due to their location at the corner of packages. GDA labels are hidden when packages are placed on the shelf or held in the hand. This problem was often reported in relation to flexible pillow bag packages. Participants complained about location of GDA as follows.

I never use it. Just saw on some brands. It is quite difficult to see when it [pillow bag package] stands up. If it [food package] is a box, and nothing overlays it or covers up, it can be possible to see [GDA]. (female, Bangkok, aged 29)

This GDA labels is close to the corner of [snack] bags. I think that it difficult to see because it is on the corner. In contrast, on another package,

with a bit higher position of GDA labels, you can obviously see. (female, Bangkok, aged 37)

## Discussion and implications

This in-depth qualitative study concerning the interpretation of nutrition labels is the first to be conducted since labels were introduced to Thailand. Previous studies showed that a little over half of the Thai consumers surveyed correctly understood the information on nutrition labels (Kumsri, Juntarasuthi, Rochanawanitchakarn, Yodtheun, & Ratanatikumpon, 2013; Parinyasiri, 2010). The previous studies did not seek an in-depth understanding of the difficulties and barriers that Thai consumers have with nutrition labels. In this study, we included a variety of participants by age, sex, education, and residence, demographically aiming to get a broad insight into the problems people have with understanding nutrition labels.

Many factors that affected nutrition knowledge and use of nutrition labels have been reported elsewhere. Age is associated with nutrition knowledge and understanding of labels in both positive and negative ways. For example, older people have more interest in a healthy diet but less nutrition knowledge and are less likely to read labels closely (Drichoutis & Rodolfo M. Nayga, 2006; Grunert, Wills, & Fernndez-Celemn, 2010; Levings, Maalouf, Tong, & Cogswell, 2015). Gender and socio-economic status are also associated with knowledge. For example, women and high socio-economic status scored better on nutrition knowledge questions (Bogue, Coleman, & Sorenson, 2005). Education and demographic factors also affected the ability to read labels and have nutrition knowledge. For example, a study of 537 undergraduate students revealed they had more exposure to nutrition education than graduate students who included a large group of internationals who may have had limited exposure to nutrition education (Misra, 2007).

In this study, we found that participants had numerous difficulties understanding and responding to labels because of the ways in which they were displayed and the types of information provided on them. Participants did not understand differences between nutrition labels and food labels and were often confused by their similar appearance. Participants had difficulty finding factually correct information on labels that was relevant to their needs. This is partially due to the large amount of information displayed in a small area. Research shows that consumers' attention to any single component of a label declines as the number of components on a label increases (Graham et al., 2012). Furthermore, the information overload on labels deters many consumers from reading them at all (Spink, Singh, & Singh, 2011). This confusing, visual clutter should be reduced (Visschers, Hess, & Siegrist, 2010). Key components, like nutrient information, could be highlighted by using a bold font (Silver & Braun, 1993) while health promotion education should emphasize that the role of nutrition labels is to supply recommended daily intake values.

The study identified several visual barriers. Participants complained about small font size on food packages. In general consumers do not read labels mainly because of small print (Jacobs et al., 2011). Many studies have recommended that minimum font sizes should be around 10 to 12 point size (Mercer et al., 2013). The small font sizes of NIP causes problems in particular for older consumers, and will be an increasing problem as the population ages. Although GDA is easy for consumers to understand, it is usually difficult to see because it is often displayed on bottom corner area of package where consumer difficult to see at first glance. Some type of packaging, such as the flexible pillow bag packages, tend to obscure information located at the bottom of the package. GDA labels should be moved to a higher location on the package where they will be easily visible

as research suggests consumers will spend more time looking at them (Graham & Jeffery, 2011).

Nutrition labels could be improved by reducing visual clutter of NIP, regulating the minimum font size for both NIP and GDA, and displaying them on a prominent location on packages. However, we are concerned that changes to nutrition label laws might adversely affect international trade. To reduce unnecessary trade barriers, any changes should be based on scientific evidence, and should follow the Codex international guidelines on nutrition labelling.

Supplementary nutrition education strategies can reduce barriers and also enhance consumer ability to read and understand labels. Many participants lacked basic knowledge about nutritional terms such as 'sodium'. They knew that food containing high levels of sodium is bad for their health but few participants were aware of the foods containing sodium. Another study also reported that few participants understood the relationship between sodium and health risks (McLean & Hoek, 2014). In general, non-university educated participants were more familiar with the term 'salt' than 'sodium chloride' and 'flavour enhancer' than 'monosodium glutamate'. Another example is the term 'energy' that consumers evaluated as either good or bad for their heath. Participants were confused by information about serving sizes and the use of percentages was difficult to interpret for many lower educated participants.

In a population where many people still have limited education, additional information and training is required for consumers to be able to understand the technical information on food labels. Nutrition labelling was introduced after most of participants graduated from school and these people will be part of an ageing population in the future. The supplementary promotion of nutrition labels should be aimed at this demographic group who are more likely to perceive the benefit of nutrition labels as they age. GDA is able to be better understood by uneducated users but an advertisement campaign is needed to improve consumers' knowledge and awareness (Rimpeekool et al., 2016).

Beyond barriers and difficulties in interpretation, most participants were positive about nutrition labels because they provided nutrient information, and contributed to the trustworthiness of food. However, it may be that processed and packaged food producers benefit from the general trust in products displaying food labels while at the same time obscuring and complicating information that consumers need to make healthy food choices.

## Limitations of this study

This study has a number of limitations requiring consideration. First, the quantitative results are not intended to be statistically generalized to the whole population. Instead we aimed to explore evidence and qualitatively deepen understanding of Thai consumer difficulties and barriers with nutrition labels. Secondly, studies containing small participant numbers are often deemed to have lower reliability compared to large quantitative studies. However, this study enabled researchers to investigate verbal and body language and reactions to real food packages in a way that large, questionnaire based studies could not. We consider that our findings will be transferable to similar groups in the Thai population.

## Conclusion

Many difficulties and barriers with nutrition labels were identified in this study and some could be overcome through the better design of labels and by supplementary promotion strategies. This in-depth qualitative study revealed that barriers in

understanding nutrition labels included: 1) a confusing variety of food labels, 2) small font sizes, 3) confusing repetition of terms, 4) technical terminology, and 5) unobtrusive locations of GDA labels. Many people also misunderstood or misinterpreted the information on labels because of: 1) low awareness, 2) distrust of the information, 3) low literacy and numeracy, and 4) insufficient nutrition knowledge. If nutrition labels are to have a positive impact on Thai consumer ability to make healthy food choices the problems with the display and information provided on the labels should be addressed. Health promotion campaigns could provide consumers with the knowledge needed to interpret and understand nutrition labels. Without these strategies in place, food labels are unlikely to be an efficient tool to deal with the increasing prevalence of chronic non-communicable diseases in the future.

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