Original Research

Packaged food consumption and understanding of front-of-pack labels in urban Thailand

S. Pongutta[*], P. Tantayapirak, C. Paopeng

International Health Policy Program, Ministry of Public Health, Tiwanon Rd, Nonthaburi 11000, Thailand

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ABSTRACT

Objectives: We assessed the use of current guideline daily amount (GDA) label and consumers' ability to read GDA, compared with GDA-plus labels (green colour—coded GDA [GGDA], GDA label with text [GDAT] and green colour—coded GDA label with text [GGDAT]) in Thailand.

Study design: This is a cross-sectional study.

Methods: We interviewed individuals at 23 major supermarkets across the country in March 2015. We used a mixed multivariate logistic regression model to identify factors associated with the ability to make healthier choices when reading front-of-pack (FoP) labels.

Results: Of 1364 participants, only 11% claimed to read the GDA label every time; those who did not read the main reason was that it was not understandable or attractive. In total, 65%, 62%, 61% and 39% were able to read GDAT, GGDAT, GGDA and GDA labels, respectively. When reading GGDA, GDAT and GGDAT labels, participants were 2.91 (95% confidence interval [CI]: 2.45, 3.45), 3.59 (95% CI: 3.01, 4.28) and 3.13 (95% CI: 2.63, 3.72) times more likely to choose healthier food choices compared with having read an ordinary GDA label. Participants who were exposed to food selection guidelines were more likely to make healthier food choices when reading FoP labels with different odds depending on sources of information. Participants who recognized the link between diet and non-communicable diseases were 1.21 (95% CI: 1.02, 1.44) times more likely to choose healthier food choices. No sociodemographic characteristics were significantly statistically associated with the ability to choose healthier food choices when adjusted for diet-related knowledge and FoP formats.

Conclusions: Use and understanding of GDA are still low, mainly because GDA is incomprehensible and unattractive. Interpretive FoP formats tend to be more understandable and need less complementary public campaigns compared with non-interpretive formats.

* *Corresponding author.* International Health Policy Program, Ministry of Public Health, Tiwanon Rd, Nonthaburi 11000, Thailand.
E-mail addresses: suladda@ihpp.thaigov.net (S. Pongutta), parwin1@gmail.com (P. Tantayapirak), chatchawarn@ihpp.thaigov.net (C. Paopeng).

Introduction

Nutrition labelling, a tool to provide nutrition information to consumers at the point of purchase, is one of the key measures recommended to promote a healthy diet.[1] However, there are potential barriers for consumers that might hinder the effectiveness of nutrition labelling, such as lack of nutrition knowledge,[2] lack of motivation to use nutrition labels and lack of time to read the labels.[3] To overcome the barriers, a front-of-pack (FoP) labelling scheme has been introduced to encourage and facilitate decision-making.

A wide range of FoP formats have been developed worldwide, which can be classified into two main schemes: interpretive and non-interpretive. An interpretive scheme indicates the healthiness value of a food; for example, the multiple traffic light[4] and the Health Star Rating system.[5] A non-interpretive scheme refers to FoP labels containing numerical information with no statement on healthiness, such as the GDA label.[6] Substantial evidence indicates that different FoP schemes provide different outcomes on consumers' ability to identify healthier choices,[7] while some evidence shows no significant difference between different FoP schemes.[8] Almost all studies on the effectiveness of FoP labels have been conducted in developed countries. Evidence from developing countries is limited.

With the nutrition transition underway in developing countries, the availability of packaged food is increasing, especially in urban areas.[9,10] To promote a healthy diet, it is important to understand the behaviours of consumers in terms of packaged food consumption, and use and understanding of nutrition labels. In Thailand, since 2011, GDA labelling is required by law for five types of snacks: fried or baked potato chips, fried or baked popcorn, rice crisps or extruded snacks, crackers or biscuits and filled wafers;[11] however, understandings of GDA labelling among Thai people in all age groups has not yet been evaluated. Therefore, we studied the frequency of the consumption of packaged foods and practices related to reading FoP labels and consumers' ability to interpret various FoP labels including GDA.

Methods

Study population and sampling method

We conducted a nationwide cross-sectional study among Thai consumers aged ≥10 years from 23 of 77 provinces in March 2015. We employed a two-stage stratified sampling method, where the primary and secondary sampling units were at province level and individual consumers level, respectively. First, we stratified the whole country into four political regions (north, south, north-east and central—excluding Bangkok) plus the capital city, Bangkok. We then randomly selected one-third of the provinces (or between four and seven provinces) from each of the four regions using simple random sampling. Next, we selected individuals in proportion to the size of three age groups: 10—19 years, 20—59 years and ≥60 years, using convenience sampling. The data collection took place in supermarket outlets in the city of each province.

Sample size

We calculated a sample size of 1500 based on an estimated proportion of 0.6 for the number of Thais capable of reading an FoP label to obtain estimates with 95% confidence levels, a design effect of 3 and a 65% expected response rate.

Data collection instruments

To examine the ability of consumers to use FoP labels in selected healthier food products, we tested the current GDA and three additional formats of FoP labels (see Fig. 1). The additional formats were selected using three criteria (including understandable, acceptable and feasible) by five experts who have been actively involved in an advocacy network of interpretive FoP labelling in Thailand for 10 years:

(i) the currently used GDA labelling contains a bar of information each on energy, sugar, total fat and sodium in the form of g/container and percentage of Thai recommended daily intake (%Thai RDI);

(ii) GDA label with text (GDAT) adds in text 'high' or 'low' where the content of each nutrient is higher or lower than the cut-off point determined by the Thai nutrient profile;

(iii) green colour—coded GDA (GGDA) includes coding in green of a certain bar that contains a healthy amount of nutrients;

(iv) green colour—coded GDA label with text (GGDAT) combines text and a colour code with the GDA.

We used the Thai nutrient profile[12] to assign colour or text to the labels and determine the overall healthiness of a certain food product. The Thai nutrient profile has been developed to classify packaged food according to the amounts of the following nutrients: total fat, saturated fat, cholesterol, sugar, sodium, energy, protein, dietary fibre, vitamin C, vitamin B1, vitamin B2, vitamin A, iron and calcium per serving size of the foods. The benchmarks of nutrient contents, indicating appropriate amounts of the nutrients based on Thai RDI, were specified. The healthiness evaluation of each nutrient in a food product was carried out by comparing the nutrient contents to the benchmarks. Next, the gaps were scored and graded to identify a summary nutritional value.

Each FoP label was displayed on a pair of pictures of a ready-to-eat meal. In the pair, each picture showed different levels of nutrients. Participants were asked to make the healthier choice between the two pictures by reading the label. In total, four pairs of the pictures (one format for each pair) of the food product were used to assess the ability to identify healthier choices in random order by every participant.

We used the Thai-structured questionnaire containing semi close-ended questions to collect self-reported data with four sections as follows: (1) sociodemographic characteristics, weight, height and health status; (2) packaged food consumption; (3) use (ever read or not, and how many times it was read in ten purchases) of GDA label, comprehension of information on GDA label and GGDA label; and (4) preference for FoP labels, recognition of the link between diet and non-
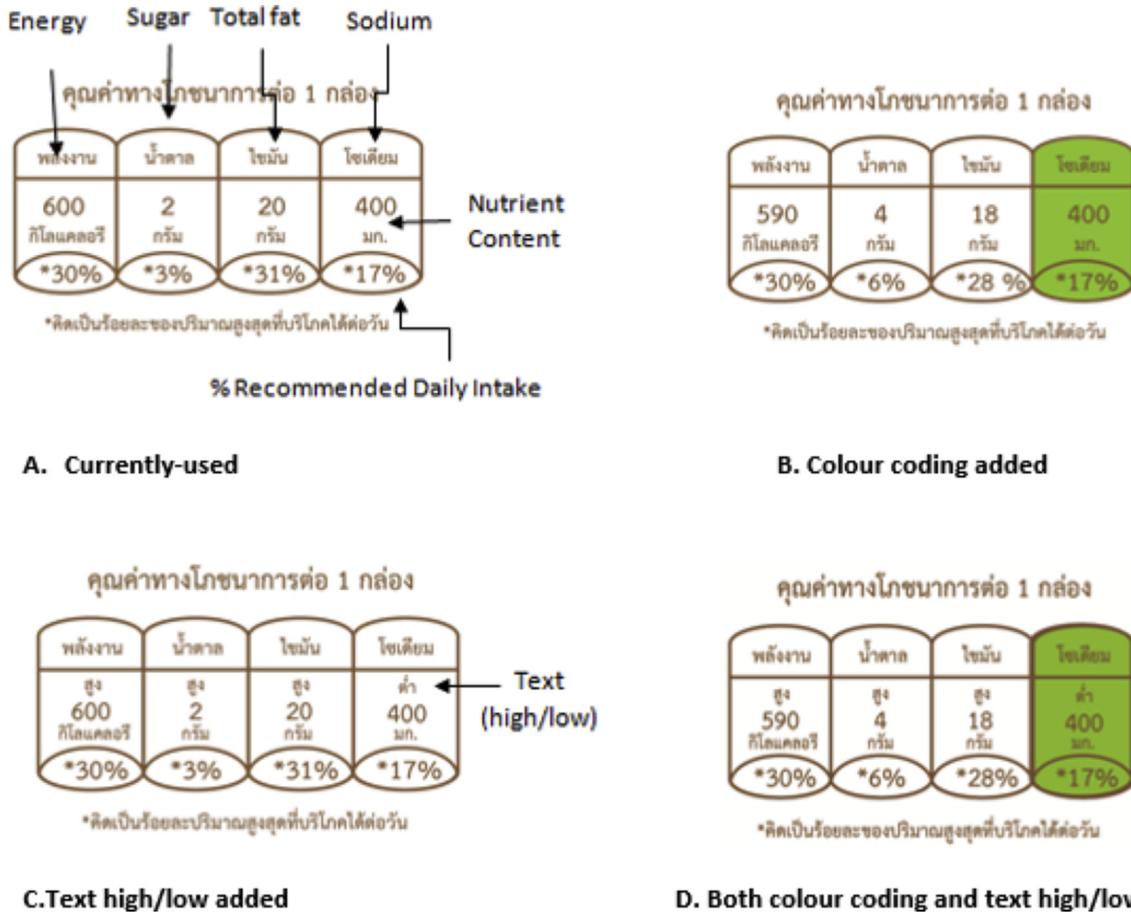
Fig. 1 — Formats of the current GDA label (A) and its modifications used in the study (B,C, and D). *Guideline daily amount (GDA) label is a compulsory scheme in 5 types of snacks in Thailand.

communicable diseases (NCDs) (knowing that over-consumption of sodium increases the risk of hypertension and overconsumption of sugar and energy increase the risk of diabetes), and exposure to food selection guidelines and sources of data.

Interview process and human subject protection

Trained researchers recruited consumers at major super-markets from 10 am to 5 pm on weekends. The interview took place in front of the supermarkets with three steps to the process. First, the researchers asked shoppers if they wanted to participate in the research project. Participants who agreed to take part were requested to sign a consent form. For participants aged <18 years, permission from their parents was sought. Second, the team asked con-senting participants to make a healthier choice from each pair of pictures of a food product labelled with similar FoP formats, totalling four pairs and four FoP formats. Third, the team used the structured questionnaire to collect other data as mentioned previously.

Data analysis

We analyzed data using STATA, version 11.0.[13] Frequency and percentage statistics were used to characterize the study population, packaged food consumption, use of current GDA labels and the ability to identify healthier choices. We used a mixed model for multivariate logistic regression to identify independent factors associated with GDA use (reading GDA almost all the time and every time when making purchases) and also the ability to make healthier choices. Examining the factors correlated with GDA use was included in the model with the following independent variables: sociodemographic characteristics; packaged food consumption; recognition of the link be-tween diet and NCDs; and exposure to and sources of food selection guidelines. Investigating the factors associated with the ability to make healthier choices, an FoP format was added to the model. Adjusted odds ratios and 95% confidence intervals (CIs) were calculated. Variables hav-ing a P-value less than 0.05 were considered statistically significant.

Table 1 — Characteristics of the participants (total = 1364).	
Characteristics	Number of participants (%)
Gender	
Female	930 (68.2)
Male	434 (31.8)
Age (years)	
10—19	227 (16.6)
20—59	933 (68.4)
≥60	204 (15.0)
Education	
Primary school and lower	267 (19.5)
High school	327 (24.0)
Diploma	163 (12.0)
Bachelor's degree or higher	607 (44.5)
Occupation	
Student	364 (26.7)
Public/private employee	515 (37.7)
Business owner	174 (12.8)
Labourer	176 (12.9)
Unemployed	67 (4.9)
Other	68 (5.0)
Health status	
Healthy	1072 (78.6)
Diet-related NCDs[a]	232 (17.0)
Other diseases	60 (4.4)
Exposure to food selection guideline	
Exposed	1298 (95.2)
Private sources	946 (69.4)
Public sources	183 (13.4)
School/training courses	169 (12.4)
Not exposed	66 (4.8)
Recognizes the link between diet and NCDs[b]	
Yes	879 (64.4)
No	485 (35.6)

NCDs, non-communicable diseases.

[a] Type two diabetes, hypertension, stroke, kidney disease, cardiovascular diseases, oesophageal cancer, colorectal cancer, breast cancer, endometrium cancer or kidney cancer.

[b] Knows that overconsumption of energy and sugar increase the risk of diabetes and overconsumption of sodium increases the risk of hypertension.

Results

Characteristics of the participants

Of 1500 participants approached to participate in the study, 1382 (92%) were willing to take part. Complete data were available for 1364 participants (91%) and were included in the analyses. The majority of the participants were female (68%) and of working age (68%). Almost half (45%) of all participants were highly educated (holding a bachelor's or higher degree) and 38% of them were public/private sector employees (see Table 1). The self-declared prevalence of diet-related NCDs was 17% and 23% of participants were overweight. Two-thirds of participants knew that they should choose food products with low sugar or energy content in order to decrease the risk of developing diabetes and products with lower sodium content in order to decrease the risk of developing hypertension. Almost all participants (95%) had been exposed to food selection guidelines, of which 69% were exposed to the guidelines from private sources, 12% received the information from school or training courses and 13% had received information from public sources.

Packaged food consumption and GDA use

As shown in Table 2, almost all participants (96%) consumed packaged food, of which one-quarter consumed it at least once a day. The proportion of participants who consumed sugar-sweetened beverages, snacks and high-salt meals every day was 19%, 11% and 3% respectively. While the majority (85%) had read GDA labels, only 11% of the participants read GDA labels every time they made a purchase. The most common reasons for not reading the GDA labels were difficulty in interpreting the information (26%), unattractive labelling (21%) and lack of time (13%).

Table 3 shows factors associated with reading GDA labels almost every time and every time when making purchases. After adjusting for possible factors, exposure to food selection guidelines and recognition of the link between diet and NCDs were associated with the use of GDA label. Participants who have been exposed to food selection guidelines from public sources were 3.97 times (95% CI: 1.46, 10.66) more likely to use GDA than those who have not. Participants who have been exposed to food selection guidelines from schools or training

Table 2 — Packaged food consumption and GDA label use by participants (total = 1364), Thailand, 2015.	
Characteristic	Number of participants (%)
Packaged food: frequency of consumption	
Never	51 (3.7)
Less than daily	975 (71.5)
Daily	338 (24.8)
Consumption of packaged food (eat daily)	
Snacks	143 (10.6)
Sugar-sweetened beverages	258 (19.1)
High-salt meals (e.g. instant noodles and rice porridge)	36 (2.7)
Reading GDA labels	
Ever read	1163 (85.3)
Only for new products	62 (4.6)
Rarely (<4 of past 10 times)	507 (37.2)
Often (4—7 of past 10 times)	291 (21.3)
Almost all the time (8—9 of past 10 times)	153 (11.2)
Every time when making a purchase	150 (11.0)
Never	201 (14.7)
Reason for not reading every time	
Cannot interpret/letters too small	356 (26.1)
Not attractive	292 (21.4)
Focus on flavour, price and brand	250 (18.3)
Does not have time	182 (13.4)
Other	284 (20.8)
Ability to identify healthier choice when reading FoP labels	
GDA label (informative scheme)	529 (38.8)
Other three formats (interpretative scheme)	
Green colour—coded GDA label (GGDA)	826 (60.6)
GDA label with text (GDAT)	882 (64.7)
Green colour—coded GDA label with text (GGDAT)	846 (62.0)

FoP, front-of-pack; GDA, guideline daily amount.

Table 3 – Factors associated with GDA use (almost all the time and every time when making purchases) using multivariate logistic regression (total = 1364).[a]		
Factors	Adjusted OR (95% CI)	P
Exposure to food selection guideline		
Not exposed	1	
Private sources	2.31 (0.90–5.93)	0.082
Public sources	3.97 (1.46–10.66)	0.006
School/training courses	5.57 (2.09–14.83)	0.001
Recognize the link between diet and NCDs		
No	1	
Yes	0.74 (0.57–0.98)	0.034

[a] Independent variables are as follows: gender, age, education, occupation, having NCDs, exposure to food selection guideline, consumption of packaged food and recognition of the link between diet and NCDs. The table presents only factors that were significantly associated at P < 0.05, using mixed model analysis for multivariate logistic regression.

CI, confidence interval; GDA, guideline daily amount; NCDs, non-communicable diseases; OR, odds ratio.

Table 4 – Factors associated with the ability to identify healthier choices using mixed model analysis for multivariate logistic regression (total = 1364).[a]		
Factors	Adjusted OR (95% CI)	P
FoP labels		
GDA	1	
Green colour–coded GDA label	2.91 (2.45–3.45)	<0.001
GDA label with text	3.59 (3.01–4.28)	<0.001
Green colour–coded GDA label with text	3.13 (2.63–3.72)	<0.001
Exposure to food selection guideline		
Not exposed	1	
Private sources	1.56 (1.06–2.28)	0.023
Public sources	1.68 (1.08–2.59)	0.020
School/training courses	1.77 (1.15–2.73)	0.010
Recognize the link between diet and NCDs		
No	1	
Yes	1.21 (1.02–1.44)	0.025

[a] Independent variables are as follows: gender, age, education, occupation, having NCDs, exposure to food selection guideline, GDA use, consumption of packaged food, recognition of the link between diet and NCDs and FoP format. The table presents only factors that were significantly associated at P < 0.05, using mixed model analysis for multivariate logistic regression.

CI, confidence interval; FoP, front-of-pack; GDA, guideline daily amount; NCDs, non-communicable diseases; OR, odds ratio.

courses were 5.57 times (95% CI: 2.09, 14.83) more likely to use GDA than those who have not. Private food selection guidelines were not associated with GDA use. Participants who recognized the link between diet and NCDs were 0.74 times (95% CI: 0.57, 0.98) more likely to use GDA than participants who did not. There were no associations between GDA use and sociodemographic characters, namely sex, age, education and occupation.

Ability to interpret front-of-pack (FoP) labels

Comprehending information on FoP labels
Two-thirds of participants were able to correctly specify the nutrient contents displayed on the GDA label. However, only 34% of participants were able to interpret the declared nutrient contents in relation to Thai RDI, and only 40% could interpret the phrase 'per container' together with 'should divide into … portions'. More than half (58%) recognized the meaning of green colour as 'healthy if consumed within the specified amount', while 22% did not understand the meaning at all and 14% thought that they could eat as much as they wanted.

The ability to interpret FoP labels and determinants
Among the four FoP formats used in the study, participants could identify healthier choices most frequently when reading a GDAT label (65%), followed by GGDAT (62%), GGDA (61%) and GDA (39%) labels (see Table 2).

Table 4 presents factors associated with consumers' ability to identify healthier choices when reading all of the FoP labels, after adjusting for intrasubject correlation and possible confounders. When reading GGDA, GDAT and GGDAT, participants were more likely to identify healthier choices than when reading GDA labels, with the adjusted odds ratios of 2.91 (95% CI: 2.45, 3.45), 3.59 (95% CI: 3.01, 4.28) and 3.13 (95% CI: 2.63, 3.72), respectively. Participants who have been exposed to public media were 1.77 times (95% CI: 1.15, 2.73) more likely

to make healthier choices than those who have not. Participants who have been exposed to school or training courses were 1.68 times (95% CI: 1.08, 2.59) more likely to make healthier choices than those who have not. There was no relationship between exposure to private media and the ability to make healthier choices. Participants who recognized the link between diet and NCDs were 1.19 times (95% CI: 1.01, 1.41) more likely to identify healthier choices compared with those who did not.

Discussion

This study found that packaged food, including unhealthy food, is frequently consumed. The findings indicated that packaged food may play an important role in terms of diet-related health conditions among Thai people. Although GDA labelling has been introduced through school-based campaigns and mass media since 2011[14] and the majority of the participants were highly educated, the general use and understanding of GDA labelling were still low. The findings also suggested that the main reasons for not making decisions based on the label information were because of difficult-to-understand and unattractive formats. Interestingly, recognizing the link between diet and NCDs was negatively associated with GDA use. The results indicate that even if consumers know the link between diet and NCDs, it is of no use if they do not comprehend the information provided on FoPs. Therefore, implementing easy-to-understand FoP labelling might promote FoP label use among consumers who have difficulties in using non-interpretive FoP labelling.

The results from the mixed effect multivariate logistic regression analysis also confirm that an interpretive FoP format is more understandable than a non-interpretive format. Although GDA (non-interpretive format) has been used for many years and GDA-plus labels (interpretive format) have not been introduced before, almost twice as many participants could identify healthier choices when reading GDA-plus labels compared to GDA label. The interpretive labels tend to be understandable instantly without introductory public campaigns. This evidence supports the statement that an understandable FoP format is a key fundamental of FoP labelling implementation. The findings are comparable with the results of studies from high-income countries, which indicated that the interpretive format is more understandable than the non-interpretive format.[7,15] This maybe because reading the interpretive labels require less cognitive process than non-interpretive labels.[16] Therefore, interpretive FoP format should be the first priority, and this concept could be applied not only to European countries but also to an Asian country like Thailand.

The results also suggest that, among the interpretive labels, GDAT provided the best outcome, followed by GGDAT and GGDA, respectively. The findings of this study are in line with the findings from Chile,[17] which revealed that positive reinforcement labels (FoP labels that indicate excessive amounts of critical nutrients) increased the ability of consumers to select healthier choices compared with GDA labels. Also, the results support the findings of other studies[18,19] that the colour green was psychologically perceived as 'healthy'. The findings did not indicate whether adding text or the colour green to GDA labels is comparable to the well-known traffic light system or not. However, the findings suggested that current GDA labels should be replaced with the locally suitable GDA-plus label. Further studies should investigate the effect of different FoP formats on consumers' food choices more deeply.

Moreover, the results also add to the findings that having diet-related knowledge, including food selection and the link between diet and NCDs, could increase the ability to make healthier food choice as mentioned in other countries.[20] Interestingly, sociodemographic characteristics had no statistically significant association with the ability to make healthier choices when adjusted for FoP format and diet-related knowledge, whereas other studies found the relationship does exist.[20] The difference may be due to different measurement methods and different contexts. The assumption should be tested by further studies.

There are some limitations to be discussed. First, the findings may not be generalizable to the Thai population due to possible bias caused by convenience sampling practice taken in one supermarket outlet from each province. However, the samples represented all age groups of people who are meant to be the target of FoP labelling interventions. Second, the results of this study were from a self-reported survey, which may introduce desirability bias[21] which also may lead to overestimation of nutrition label use, as reported elsewhere.[22] Third, this study did not reflect how much effort the participants made or the difficulty of selecting healthier choices. Fourth, the results cannot entirely explain the effectiveness of FoP labels as it did not investigate the influence of FoP labels on the decision-making process and eating behaviours.

Conclusion

Packaged food is frequently consumed by Thai consumers. In a middle-income country like Thailand, the use and understanding of current GDA labels are still low even among higher social class and educated people. Although the GDA-plus formats have not been introduced before and GDA has been promoted for many years, interpretive FoP formats are more understandable compared with GDA formats. Therefore, in a context where radical change is unacceptable, GDA-plus formats are a step forward and are highly recommended to replace the current GDA. Further research should be conducted to assess the influence of FoP labels on decision-making and eating behaviours.

Author statements

Ethical approval

This study was approved by the Bureau of Food, Ministry of Public Health of Thailand. All participants or their parents signed the consent forms.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

S.P. was responsible for study design, data analysis, writing and revision of the manuscript. P.T. and C.P. contributed to data collection, data analysis and manuscript revision. All authors have read and approved the final version of this manuscript.

Data statement

The data set is confidential.

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