Journal of
Food and Pharmaceutical Sciences

Review Article

Nutrition Labelling's Impact on Consumption Patterns and Nutrition Awareness in Community: A Literature Review

Tri Wahyuni, Rostika Flora*, and Anita Rahmiwati

Faculty of Public Health, Sriwijaya University, Palembang, South Sumatera, Indonesia
*Corresponding author: Rostika Flora | Email: rostikaflora@unsri.ac.id

Received: 27 May 2025; Revised: 12 November 2025, Accepted: 23 November 2025; Published: 20 December 2025

Abstract: Background: Nutrition labelling on food packaging has become an essential tool for assisting consumers in making healthier food choices. Various label styles are used in different nations, but their usefulness varies according to the design and ease of understanding by customers, the aim of this study is to determine the impact of nutrition labels on consumption pattern and nutrition awareness; Methods: This study used a descriptive literature review with 2 data sources, namely PubMed and Google Scholar. The keywords used are "Nutrition Labelling" OR "Food Labels" AND "Healthy Food Choices" AND "Nutrition Awareness" with predetermined inclusion and exclusion criteria, then article analysis was carried out to achieve the objectives; Results: A total of 5 articles met the criteria and objectives of the study, the study's findings indicate show that front-of-pack nutrition labelling (FoPL) is essential for directing better food choices and increasing consumer nutrition awareness; and Conclusions: Nutrition labelling has been found to play a significant effect in raising nutritional knowledge and affecting people's consumption habits. Labels like Multiple Traffic Lights (MTL), Traffic Light Food Labels (TLF), and Nutri-Score regularly encourage healthy food choices by offering information that is simple to understand and visually appealing.

Keywords: Nutrition labelling; healthy food choice; nutrition awareness; health policy

1. INTRODUCTION

Non-communicable diseases (NCDs) are the main cause of death worldwide, in Southeast Asia, and nationally. The majority of deaths worldwide (77%) occur in low- and middle-income nations. In Indonesia, the major cause of death from infectious diseases to NCDs has switched over the last three decades, from 40% in 1990 to 72% in 2019. The 2023 Indonesian Health Survey indicated that the prevalence of hypertension and diabetes mellitus in Indonesia is still relatively high. The Indonesian Health Survey results showed that 30.8% of the population had hypertension, while 11.7% had diabetes mellitus. When compared to the results of the 2018 Basic Health Research, the hypertension rate decreased slightly from the previous 34.1%. However, the prevalence of diabetes mellitus actually increased from 10.9%, this indicating that NCDs are still a serious threat to health in Indonesia [1], [2], [3].

Several variables can contribute to the change in the prevalence of Noncommunicable Diseases (NCDs) from the elderly to productive age. One of the main factors is changes to sedentary lifestyle and increasingly unhealthy eating patterns, which begin at a young age [4]. Low consumption of vegetables and fruits, the habit of consuming foods high in sugar, salt, and fat excessively, smoking, alcohol consumption, and lack of physical activity. In addition, changes in lifestyle, such as increased consumption of fast food and inadequate physical activity, also contribute to the increasing prevalence of NCDs [5].

Lack of awareness in reading nutrition labels contributes to an increased risk of Non-Communicable Diseases (NCDs), because many individuals do not understand the importance of nutritional information in determining food choices and manage the portion size. Low interest and difficulty in understanding nutrition labels lead to uncontrolled consumption of foods high in sugar, fat, cholesterol that exist in animal-source product and oil, which ultimately increases the risk of obesity, heart disease, and metabolic disorders [6]. Merely 6.7% of Indonesian consumers scrutinize

nutritional information on packaging. According to Anggraini et al. (2018), Students with normal nutritional status exhibit a superior understanding of reading nutritional labels (51.5%) compared to their obese counterparts (21.2%), with a statistically significant difference (p=0.004) [7], [8]. Nutrition labels that are designed with an unattractive appearance and shown in the hidden area of the package tend to be ignored by consumers, so that the information listed is not optimally considered. In addition, the use of technical terms and complex data presentation can make it difficult to understand, reducing people's interest in reading them [9].

Considering these factors, research on the effectiveness of nutrition labelling is very relevant to be conducted. A deeper understanding of the relationship between nutrition labelling, consumption patterns, and nutritional awareness will provide important insights for policy makers and the food industry in designing more effective strategies to improve overall public health. This literature review aims to explore scientific evidence related to the impact of nutrition labelling and provide recommendations for optimizing its implementation in the future.

2. MATERIALS AND METHODS

This study used a descriptive literature review with 2 data sources, namely PubMed and Google Scholar. Articles in Indonesian and English in 2020-2025 period. The keywords used are "Nutrition Labelling" OR "Food Labels" AND "Healthy Food Choices" AND “Nutrition Awareness”. The inclusion criteria of selected articles are research articles published between 2020 and 2025, articles in Indonesian or English, discussing the effectiveness of nutrition labelling on public consumption patterns and nutrition awareness, and available in full text. The exclusion criteria include research not relevant to the topic of the effectiveness of nutrition labels on nutrition awareness or consumption pattern (e.g. focusing solely on food policy or economic aspects), not available in full text, and published outside the 2020-2025.

Articles were analyzed using the PRISMA (Preferred Reporting Items for Systematic Review & Meta-Analysis) method. This method consists of four stages: Identification, Screening, Eligibility and Included.

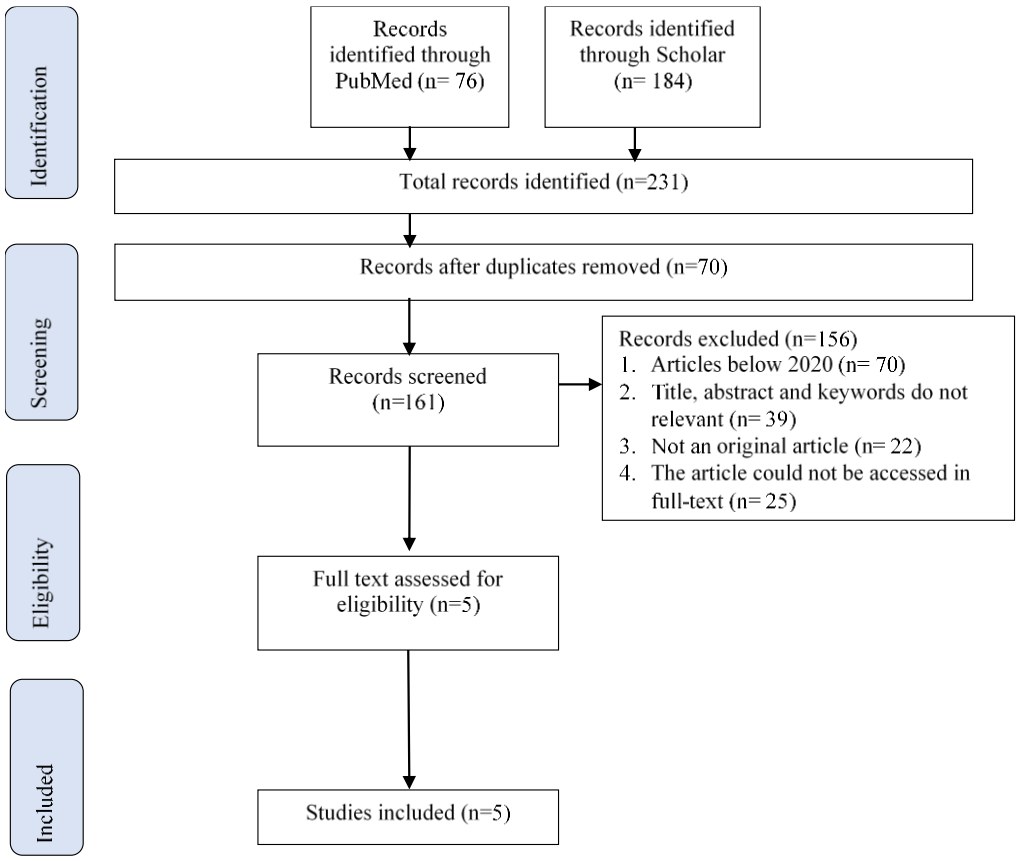

Figure 1. Study selection process based on Prisma-ScR

3. RESULTS AND DISCUSSION

Based on database, 231 articles were obtained using keywords, 76 from PubMed, and 184 from Scholar. After going through duplication screening, 161 articles were obtained to screened first so that 156 articles were excluded because 1) title, abstract, and keyword do not relevant; 2) not an original article; 3) the article could not be accessed in full-text; and 4) Articles below 2020 (see Figure 1).

Table 1. Literature summary on selected articles study

No	Title	Author	Year	Country	Method	Results
1	Impact of Front-of-Pack Nutrutuin Labels on Consumer Purchasing Intentions : A Randomized Experiment in Low and Middle Income Mexican Adults	Jauregui et al.	2020	Mexico	RCT with 2194 respondents in an online shopping simulation with three label conditions.	The results of the study showed that the Multiple Traffic Lights (MTL) and Warning Labels (WL) nutrition label significantly improved the nutritional quality of consumer choices compared to the Guideline Daily Amounts (GDA). This shows that more interactive and easy-to-understand labels can encourage consumers to make healthier food choices. MTL and WL not only increase nutritional awareness but also reduce the time needed when shopping, which shows efficiency in the Decision-making process.
2	Consumer Reactions to Positive and Negative Front-of-Package Food Labels	Grummon et al.	2023	United States of America	RCT with 3051 respondents divided into four label conditions.	The results of the study found that the use of positive and negative labels has a significant impact on consumer understanding in choosing food. Labels that combine both approaches are more effective than using only one type of label. This shows the importance of label design that can attract attention and trigger emotional reactions to choose healthier foods.
3	Effectiveness of Displaying Traffic Light Food Labels on the Front of Food Packages in Japanese University Students	Wakui et al.	2023	Japan	RCT with 264 college students choosing foods with and without labels	This study shows that the use of TLF food labels increases nutritional awareness among college students. TLF labels encourage healthy food choices and provide clear and direct information to consumers. These findings suggest that even though college students have varying understandings of nutrition, the use of easy-to-understand labels can help

						them make better decisions about the food they consume.
4	A Randomized Controlled Study to Test Front-of-Pack (FOP) Nutrition Labels in the Kingdom of Saudi Arabia	Shin et al.	2023	Saudi Arabia	RCT with 656 respondents in an online shopping simulation	This study shows that nutri-score labels significantly improve diet quality among respondents in Saudi Arabia. Although warning labels did not show a significant effect, these results indicate the potential for labels that provide comprehensive information on the nutritional quality of products. The importance of this study lies in the potential for public health policies to adopt more effective labelling systems in local contexts to address diet-related health issues.
5	Investigation of the 1-week effect of Traffic Light Nutrition Labelling on Diet Selection among Japanese University Students	Wakui et al.	2024	Japan	RCT with 70 students choosing foods with and without labels	This study using TLF labels for one week showed an increase in healthy dietary choices among college students. TLF labels not only facilitated better food choices but also increased awareness of nutritional components not listed on the label. These findings suggest that the use of clear and instructive labels can contribute to efforts to prevent lifestyle-related diseases among young people.

The effectiveness of nutrition labels has been extensively studied to determine their impact on consumer behaviour and nutrition awareness. These labels aim to guide consumers toward healthier choices by providing clear, interpretable information about the nutritional content of food products. Nutrition labelling on food packaging is one of the strategies in Public Health policy that aims to increase consumer awareness of nutritional information and encourage them to choose healthier foods [10], [11]. The success of nutrition labelling in achieving this goal depends on several factors, including label design, consumer understanding, and the social and cultural contexts surrounding it. Several studies in various countries have evaluated the effectiveness of various types of nutrition labels in influencing consumption patterns and public understanding of nutrition (see Table 2).

The results of the studies consistently show that front-of-pack nutrition labelling (FoPL) is essential for directing better food choices and increasing consumer nutrition awareness. Regardless of label design, population, or environment, all studies show that simple, straightforward, and visually appealing labels have a greater impact on consumer behavior than complex or information-dense ones.

Table 2. Effectiveness of Nutrition Labels on Nutrition Awareness and Consumption Patterns based on Outcomes

No	Author, Year	Type of label/ Intervention	Aspects measured	Outcome	P-Value
1	Jauregui et al. 2020	Multiple Traffic Light (MTL), Warning Label (WL), and Guideline Daily Amount (GDA)	Nutritional quality	MTL and WL greatly improved the nutritional quality of chosen items above GDA. Consumers also made more quickly and more efficient decisions.	p< 0.05
2	Grummon et al. 2023	Positive and negative labels on the front of the pack	Consumer understanding and perception of product health	The combined positive-negative label improved product "healthiness" judgments by 3.19 points over the control. This label combination was the most effective in increasing customer knowledge.	p< 0.01
3	Wakui et al. 2023	Traffic Light Food Label (TLF)	Nutrition awareness and food selection behavior	TLF enhanced nutrition awareness and promoted healthy eating habits. Students were better able to identify high-sugar, high-fat items.	p<0.01
4	Shin et al. 2023	Nutri-Score and Warning Label (WL)	Diet quality score	The Nutri-Score label improved diet quality scores by 2.5 points over the control; WL had no significant effect.	p<0.01 for nutri-score, not significant for WL
5	Wakui et al. 2024	Traffic Light Label (TLF)	Changes in consumption patterns and nutritional awareness	TLF exposure for one week resulted in healthier dietary choices and enhanced awareness of previously missed nutritional content.	p< 0.05

Jáuregui et al. (2020) discovered that both Multiple Traffic Light (MTL) and Warning Labels (WL) significantly enhanced the nutritional quality of food selections when compared to Guideline Daily Amounts (GDA) labels among Mexican adults. These labels not only improved the healthfulness of food selection, but they also shortened decision-making time, implying that streamlined label forms promote decision efficiency. Similarly, Grummon et al. (2023) discovered that combination of positive and negative front-of-package messages had the greatest impact on consumer perception and awareness of product health. The mixed labelling format produced a stronger emotional and cognitive reaction, implying that dual-message labelling could be more compelling than single-message systems.

3.1. Traffic Light Labels

Traffic Light Labels are a color-coded marking method applied to the front packaging of food and beverage products to help consumers make decisions. The colours red, orange and green are

used to indicate the levels of a particular nutrient in the product, for example sugar, fat, salt, or calories, each having a high, medium and low level. With a clear visual display, this system makes it easier for consumers to understand the nutritional information of a product more quickly and efficiently [12], [13].

There are various types of Traffic Light Labels which are classified based on four main dimensions [14]:

3.1.1. Use of colour (multi-colour or one colour)

Multi-colour TLF uses various hues for each nutrient, allowing consumers to quickly determine if nutrient levels are high or low [15]. For example, the UK "Multiple Traffic Light" system shows red for high sugar, orange for moderate fat, and green for minimal salt on items like Kellogg's Corn Flakes [16]. In Indonesia, similar ideas are utilized through the Guideline Daily Amount (GDA) system for breakfast items such as Energen Cereal Drink or Nestlé Koko Krunch, where the sugar indicator bar clearly shows contribution to daily intake [17]. In contrast, single-colour TLF indicates nutritional level using a monochrome symbol or text [18]. Chile's black stop-sign label reads "ALTO EN AZÚCARES" ("High in Sugar") for beverages such as Coca-Cola. In Indonesia, BPOM Regulation No. 26/2021 requires goods like Teh Pucuk Harum and Frestea to have "High Sugar Content" wording on the front label [19], [20].

3.1.2. Type of information provided (uniform or more detailed)

Uniform labels provide only generic qualitative information, such as “High/Medium/Low Sugar" [21]. In Indonesia, low-sugar goods such as Ultra Milk Low Fat High Calcium or You C1000 Vitamin Drink use textual promises such as "Rendah Gula" (low sugar), which act as a green traffic light indicator. Detailed labels include numerical information such grams per 100g or serving, as well as color codes [15]. For example, Coca-Cola Indonesia and Sprite utilize comparable labelling in Indonesia, providing sugar amounts (e.g., 35g per 330ml) as well as GDA percentages, indicating that sugar accounts for around 10% of daily needs [17].

3.1.3. Application to all products or only to certain products (healthy or unhealthy products)

All-products TLF labels all food categories, healthy and unhealthy [21]. Nestlé Indonesia uses GDA labels across practically its entire portfolio, including Milo, Koko Krunch, and Dancow FortiGro, to inform customers about sugar, fat, and sodium levels [17], [20]. Selective TLF is exclusively used for items that surpass nutrient thresholds, such as those high in sugar or sodium [18]. In Indonesia, front-of-pack warnings are required for Sugar-Sweetened Beverages (SSBs) with sugar content ≥6g per 100ml. For example, Fanta Strawberry must plainly disclose its sugar level [17], [20].

3.1.4. The presence of additional supporting information

In Singapore, the Nutri-Grade system uses letter grades (A-D) and color codes to show sugar levels in drinks like Milo or Heaven and Earth Tea, along with a message about health hazards [22]. Similarly, in Indonesia, beverage commercials like NutriBoost feature statements from BPOM, such as "limit sugar intake to 50g per day” [19].

Research indicates that TLF labels improve consumers' ability to identify healthier products and reduce the purchase of unhealthy options [9,10]. For example, a systematic review and network meta-analysis found that TLF labels increased the likelihood of selecting healthier products by 50% [23], [24]. According to Wijesinghe's research, the traffic light system can help Sri Lankan consumers make healthier food choices [25].

3.2. Warning Labels

Warning Labels are a type of Front of Pack Label (FoPL) that aims to quickly and easily inform consumers if a product contains excessive levels of sugar, fat or sodium. This label helps consumers

recognize and avoid unhealthy foods [15], [26]. Unlike other types of FoPL, warning labels are usually mandatory, they cover all products on the market, facilitate comparison between products, and encourage manufacturers to change their product formulations to be healthier. In addition, warning labels can help someone understand the nutritional quality of a product and make healthier choices [27].

Studies have demonstrated that WLs are particularly effective in reducing the perceived healthfulness of unhealthy products and discouraging their purchase. For instance, in a Brazilian sample, WLs improved participants' ability to identify healthier products and reduced their intention to purchase unhealthy options [28]. Similarly, in a Kenyan study, WLs were found to enhance consumers' understanding of excess nutrients and reduce intentions to buy unhealthy foods. Additionally, WLs have been shown to perform better than other label types in certain context, such as in low-and middle-income countries [29].

3.3. Guideline Daily Amounts

Guideline Daily Amount is a nutritional information label that provides daily guidance on the amount of nutrients that should be consumed. This label is designed to help consumers make healthier decisions by providing more detailed information about the nutritional content of products [30]. GDA provides recommended daily intake levels for key nutrients such as energy, sugar, fat, and sodium, allowing consumers to make more informed dietary choices. GDA is especially useful for ready-to-eat foods, as it highlights nutritional value comprehensively [31]. The GDA system solely gives numerical information regarding the content of nutrients present in a portion and their associated percentage of the recommended daily intake, with no interpretative guidance [32].

3.4. Nutri Score Label

Nutri score label is one type of Front of Pack Label (FoPL) for food and beverages, which classifies the nutritional quality of products from A to E. This assessment is based on the nutritional content that is considered beneficial or less beneficial. The letter A indicates better nutritional quality, while the letter E indicates lower quality [33]. Nutri score is designed to make it easier for consumers to choose healthier foods by presenting nutritional information concisely. Nutri score also aims to encourage innovation in healthier products. It is highly effective in improving consumers' ability to rank products by nutritional quality, outperforming other label formats like Multiple Traffic Lights and Reference Intakes [34]. The algorithm in this system considers fiber, sugar, fat, and salt content to determine a product's score [35].

3.5. Effectiveness of Nutrition Labelling on Consumption Patterns and Nutritional Awareness

Nutrition labelling plays an important role in helping people make better decisions when choosing food. A number of studies have shown that labels designed with a clearer and easier-to-understand appearance can improve the quality of the food chosen. Research by Jáuregui et al. in Mexico and Magriplis et al. showed that 48,4% of respondents chose and preferred Multiple Traffic Lights (MTL), the use of Multiple Traffic Lights (MTL) and Warning Labels (WL) were more effective in improving the nutritional quality of the food chosen compared to Guideline Daily Amounts (GDA). These results indicate that simple and informative labels can help consumers choose healthier products [36], [37].

Traffic Lights are effective in influencing consumer decisions and encouraging healthier food purchases. People tend to avoid products with red labels, which indicate unhealthy content, and prefer products with green labels. TL has also been shown to increase consumer understanding of the information provided [12], [38]. In addition, a study conducted by Wakui et al. revealed that students who were exposed to Traffic Light Food Labels (TLF) for one week tended to choose healthier foods compared to those who did not use the label. This shows that easy-to-understand

labelling has the potential to be an effective strategy in changing consumption habits, especially in the short term [39].

Warning Labels (WL) have been shown to influence consumption patterns and nutritional awareness by helping people understand the nutritional value of a product and encouraging them to choose healthier foods. After seeing the WL, some consumers can recognize less healthy products and switch to healthier options [40]. In Mexico, Nonato, et al. (2022) found that during the deployment of WL, the examined population had a better impression and knowledge of less nutritious packaged foods when using WL than GDA label [41].

In Saudi Arabia, Shin et al. (2023) found that the Nutri-Score label considerably increased diet quality scores compared to the control group, whereas the Warning Label had no significant effect. This implies that comprehensive scoring systems that incorporate numerous nutrient parameters may be more suitable for people less accustomed with warning-based labels [42]. In addition, a randomised trial study conducted by Egnell et al. (2022) and Courbet et al. (2024) found that the Nutri-Score indicated a much better nutritional quality of purchasing intentions, recommending healthier food choices among people suffering from cardiometabolic chronic conditions [43], [44].

Nutrition labelling also plays an important role in increasing public awareness of the nutritional content of the food they consume. A study conducted by Grummon et al in the United States showed that a combination of labels with positive and negative messages had a greater impact on increasing consumer understanding than using only one type of label. These results indicate that an eye-catching label design that is able to trigger an emotional response is more effective in increasing nutritional awareness. These results indicate that an eye-catching label design that is able to trigger an emotional response is more effective in increasing nutritional awareness [45], [46]

Research by Wakui et al (2023) in Japan also supports this finding by showing that the use of TLF labels can help students understand nutritional information more quickly, making it easier for them to make decisions regarding food choices [46]. In addition, research conducted by Wakui et al. (2024) and Croker et al (2020) also shows that TLF labels not only help in choosing healthier foods, but also increase understanding of nutritional components that may have previously been less noticed by consumers. This confirms that educational labels can be an effective tool in efforts to prevent diseases related to unhealthy eating patterns [39], [47].

While each label type has its advantages, the choice of label should consider the specific context and target population. Wakui et al. (2024) highlighted that Nutri-Score's comprehensive grading may benefit populations with higher nutrition literacy, such as university students, whereas warning labels might be more practical for public consumers who make faster, heuristic-based decisions. Therefore, it is plausible that age and education differences influence which type of labelling is more effective at promoting healthy food choices. The effectiveness of these labels also depends on their integration with broader public health strategies and consumer education efforts [48].

Across all studies, an overall trend emerges: front-of-pack labelling works best when it is simple, color-coded, and culturally appropriate to the intended audience. Labels that reduce cognitive burden and clearly communicate nutritional information help to bridge the knowledge-to-action gap, transforming awareness into healthy purchasing behavior. Roudsari et al (2021) qualitative study in Iran discovered that most participants ignored nutrition fact table and trafic light label due to a lack of knowledge and education, as well as defects in the appearance and specifics of the labels [49]. Differences in label efficacy underscore the importance of contextual and demographic characteristics such age, education level, and prior nutrition awareness. Nutrition labelling has great potential to increase nutritional awareness and encourage changes in people's consumption patterns towards healthier ones. However, further research is needed to explore the long-term impacts of different nutrition labelling systems and identify challenges in their implementation in different countries. With the right approach, nutrition labelling can be an effective tool in preventing diet-

related diseases, protecting consumers from unhealthy nutrition, and improving overall public health [50], [51].

4. CONCLUSION

Nutrition labelling has been found to play a significant effect in raising nutritional knowledge and affecting people's consumption habits. Labels like Multiple Traffic Lights (MTL), Traffic Light Food Labels (TLF), and Nutri-Score regularly encourage healthy food choices by offering information that is simple to understand and visually appealing. Furthermore, a combination of labels with positive and negative signals improves people's understanding of nutritional facts, hence promoting healthier eating habits.

The implementation of good nutrition labelling not only assists customers in selecting healthier foods, but it also raises awareness of the significance of a well-balanced nutritional intake. Policymakers and the food industry should encourage label designs that are simple, color-coded, and evidence-based, as they have been shown to promote greater consumer understanding and healthier eating habits. Further study is needed to assess long-term behavioral effects, cross-cultural applicability, and the integration of labelling tactics into larger nutrition education programs.

Funding: This research received no external funding.
Acknowledgement: The authors would like to thank the Faculty of Public Health, Sriwijaya University, for the academic support and facilities provided during the preparation of this article. The authors also appreciate all researchers whose works were referenced in this study
Conflicts of interest: The authors declare no conflict of interest

References

[1] Health Development Policy Agency, "Noncommunicable Diseases: Prevalence, Impact, and Control Efforts for Hypertension and Diabetes in Indonesia," Ministry of Health of the Republic of Indonesia: Jakarta. Accessed: Aug. 23, 2025. [Online]. Available: https://www.badankebijakan.kemkes.go.id/laporan-tematik-ski/

[2] Ministry of Health of the Republic of Indonesia, "Indonesian Health Survey," Ministry of Health of the Republic of Indonesia. Accessed: Aug. 23, 2025. [Online]. Available: https://kemkes.go.id/id/survei-kesehatan-indonesia-ski-2023

[3] E. A. Finkelstein, F. J. L. Ang, B. Doble, W. H. M. Wong, and R. M. van Dam, "A Randomized Controlled Trial Evaluating the Relative Effectiveness of the Multiple Traffic Light and Nutri-Score Front of Package Nutrition Labels," *Nutrients*, vol. 11, no. 9, p. 2236, Sep. 2019, doi: 10.3390/nu11092236.

[4] H. Arifin *et al.*, "Analysis of Modifiable, Non-Modifiable, and Physiological Risk Factors of Non-Communicable Diseases in Indonesia: Evidence from the 2018 Indonesian Basic Health Research," *J Multidiscip Healthc*, vol. Volume 15, pp. 2203–2221, Sep. 2022, doi: 10.2147/JMDH.S382191.

[5] S. N. Mintarsih, R. Ambarwati, A. Y. Rahmawati, and M. Mardiana, "Deteksi Dini Faktor Resiko Ptm Pada Remaja Berbasis Posbindu," *Jurnal Riset Gizi*, vol. 10, no. 2, pp. 86–93, Nov. 2022, doi: 10.31983/jrg.v10i2.9477.

[6] I. Dwijayanti and K. Juliani, "Literature Review: Relationship between Knowledge Related to Food Labels with Attitudes and Compliance in Reading Labels in Productive Age Groups in Indonesia," *Indonesian Scientific Nutrition Media*, vol. 2, no. 9, pp. 96–108, 2024.

[7] A. Aprianti, K. Mubarokah, M. C. Yuantari, and N. S. Rahma, "Nutrition Fact Literacy in Productive Age Communities in Semarang City, Indonesia," *Amerta Nutrition*, vol. 7, no. 3, pp. 406–412, Sep. 2023, doi: 10.20473/amnt.v7i3.2023.406-412.

[8] S. Anggraini, D. Handayani, and I. Kusumastuty, "Tingkat Pengetahuan Cara Membaca Label Informasi Gizi Mahasiswa Status Gizi Normal Lebih Baik dibandingkan Mahasiswa Obesitas," *Indonesian Journal of Human Nutrition*, vol. 5, no. 2, pp. 74–84, Dec. 2018, doi: 10.21776/ub.ijhn.2018.005.02.2.

[9] I. A. Sukmawati and A. N. Sartika, "Hubungan Paparan Media Informasi Dengan Kebiasaan Membaca Label Gizi Produk di SMA Widya Nusantara," *Jurnal Ilmu Gizi Indonesia (JIGZI)*, vol. 3, no. 2, Sep. 2022, doi: 10.57084/jigzi.v3i2.1011.

[10] S. Pettigrew *et al.*, "A review of front-of-pack nutrition labelling in Southeast Asia: Industry interference, lessons learned, and future directions," *The Lancet Regional Health - Southeast Asia*, vol. 3, p. 100017, Aug. 2022, doi: 10.1016/j.lansea.2022.05.006.

[11] B. Kelly, S. H. Ng, A. Carrad, and S. Pettigrew, "The Potential Effectiveness of Front-of-Pack Nutrition Labelling for Improving Population Diets," *Annu Rev Nutr*, vol. 44, no. 1, pp. 405–440, Aug. 2024, doi: 10.1146/annurev-nutr-011224-030917.

[12] J. P. Hughes, M. Weick, and M. Vasiljevic, "Can environmental traffic light warning labels reduce meat meal selection? A randomised experimental study with UK meat consumers," *Appetite*, vol. 200, p. 107500, Sep. 2024, doi: 10.1016/j.appet.2024.107500.

[13] F. Sadeghi, S. Pashaeypoor, A. Nikpajouh, and R. Negarandeh, "The impact of healthy nutrition education based on traffic light labels on food selection, preference, and consumption in patients with acute coronary syndrome: a randomized clinical trial," *BMC Public Health*, vol. 24, no. 1, p. 1332, May 2024, doi: 10.1186/s12889-024-18805-2.

[14] L. Arrazat *et al.*, "Traffic-light front-of-pack environmental labelling across food categories triggers more environmentally friendly food choices: a randomised controlled trial in virtual reality supermarket," *International Journal of Behavioral Nutrition and Physical Activity*, vol. 20, no. 1, p. 7, Jan. 2023, doi: 10.1186/s12966-023-01410-8.

[15] M. Cecchini and L. Warin, "Impact of food labelling systems on food choices and eating behaviours: a systematic review and meta-analysis of randomized studies," *Obesity Reviews*, vol. 17, no. 3, pp. 201–210, Mar. 2016, doi: 10.1111/obr.12364.

[16] UK Food Standards Agency, "Building on the success of front-of-pack nutrition labelling in the UK: a public consultation Building on the Success of Front of Pack Nutrition Labelling in the UK: A Public Consultation 2," London, 2020. Accessed: Oct. 23, 2025. [Online]. Available: https://www.food.gov.uk/business-guidance/nutrition-labelling

[17] Badan Pengawas Obat dan Makanan, "Peraturan Badan Pengawas Obat dan Makanan Nomor 26 Tahun 2021 Tentang Informasi Nilai Gizi Pada Label Pangan Olahan," 2021

[18] S. Shangguan *et al.*, "A Meta-Analysis of Food Labelling Effects on Consumer Diet Behaviors and Industry Practices," *Am J Prev Med*, vol. 56, no. 2, pp. 300–314, Feb. 2019, doi: 10.1016/j.amepre.2018.09.024.

[19] WHO, "Nutrition Labelling: Policy Brief," Geneva, 2022.

[20] M. ; Nidhal, I. Budiman, M. Nidhal, and M. Mainka, "Revisiting front-of-pack nutrition labelling policies in Indonesia Standard-Nutzungsbedingungen: POLICY BRIEF Revisiting Front-of-Pack Nutrition Labelling Policies in Indonesia Key Messages," 2024. [Online]. Available: https://hdl.handle.net/10419/315359

[21] C. Hodgkins *et al.*, "Understanding how consumers categorise nutritional labels: A consumer derived typology for front-of-pack nutrition labelling," *Appetite*, vol. 59, no. 3, pp. 806–817, Dec. 2012, doi: 10.1016/j.appet.2012.08.014.

[22] Ministry of Health Singapore, " Measures for Nutri-Grade," Health Promotion Board. Accessed: Oct. 23, 2025. [Online]. Available: https://www.hpb.gov.sg/healthy-living/food-beverage/nutri-grade

[23] J. Song *et al.*, "Impact of color-coded and warning nutrition labelling schemes: A systematic review and network meta-analysis," *PLoS Med*, vol. 18, no. 10, p. e1003765, Oct. 2021, doi: 10.1371/journal.pmed.1003765.

[24] K. M. Shanti, "Effectiveness of Traffic Light Nutrition Labels on Consumer Understanding, Perception, and Attitude in Indonesia: A Systematic Literature Review ," *Jurnal Gizi Kerja dan Produktivitas*, vol. 6, no. 1, p. 31, May 2025, doi: 10.62870/jgkp.v6i1.31589.

[25] M. S. D. Wijesinghe *et al.*, "Understanding consumer response to front-of-package labelling: insights from a nationwide survey in Sri Lanka," *BMC Public Health*, vol. 25, no. 1, p. 3687, Oct. 2025, doi: 10.1186/s12889-025-24994-1.

[26] A. H. Grummon, L. A. Gibson, A. A. Musicus, A. J. Stephens-Shields, S. V. Hua, and C. A. Roberto, "Effects of 4 Interpretive Front-of-Package Labelling Systems on Hypothetical Beverage and Snack Selections," *JAMA Netw Open*, vol. 6, no. 9, p. e2333515, Sep. 2023, doi: 10.1001/jamanetworkopen.2023.33515.

[27] L. Bablani, C. Ni Mhurchu, B. Neal, C. L. Skeels, K. E. Staub, and T. Blakely, "The impact of voluntary front-of-pack nutrition labelling on packaged food reformulation: A difference-in-differences analysis of the Australasian Health Star Rating scheme," *PLoS Med*, vol. 17, no. 11, p. e1003427, Nov. 2020, doi: 10.1371/journal.pmed.1003427.

[28] N. Khandpur *et al.*, "Are Front-of-Package Warning Labels More Effective at Communicating Nutrition Information than Traffic-Light Labels? A Randomized Controlled Experiment in a Brazilian Sample," *Nutrients*, vol. 10, no. 6, p. 688, May 2018, doi: 10.3390/nu10060688.

[29] S. F. Mohamed, C. H. Karugu, S. Iddi, V. Ojiambo, C. Kirui, and G. Asiki, "Effectiveness of Three Front-of-Pack Food Labels in Guiding Consumer Identification of Nutrients of Concern and Purchase Intentions in Kenya: A Randomized Controlled Trial," Sep. 2024, doi: 10.20944/preprints202409.1723.v1.

[30] L. Kontopoulou *et al.*, "Guideline Daily Amounts Versus Nutri-Score Labelling: Perceptions of Greek Consumers About Front-of-Pack Label," *Cureus*, Dec. 2022, doi: 10.7759/cureus.32198.

[31] N. Ratisoontorn and N. Chatwattanasiri, "Integrated Image Processing Framework to Determine Nutrient Quantities from Guideline Daily Amount (GDA) Label," in *2021 IEEE SmartWorld, Ubiquitous Intelligence & Computing, Advanced & Trusted Computing, Scalable Computing & Communications, Internet of People and Smart City Innovation (SmartWorld/SCALCOM/UIC/ATC/IOP/SCI)*, IEEE, Oct. 2021, pp. 558–564. doi: 10.1109/SWC50871.2021.00083.

[32] R. Deliza, M. de Alcantara, R. Pereira, and G. Ares, "How do different warning signs compare with the guideline daily amount and traffic-light system?," *Food Qual Prefer*, vol. 80, p. 103821, Mar. 2020, doi: 10.1016/j.foodqual.2019.103821.

[33] S. Hercberg, M. Touvier, and J. Salas-Salvado, "The Nutri-Score nutrition label," *International Journal for Vitamin and Nutrition Research*, vol. 92, no. 3–4, pp. 147–157, Jul. 2022, doi: 10.1024/0300-9831/a000722.

[34] M. Egnell *et al.*, "Objective understanding of Nutri-Score Front-Of-Package nutrition label according to individual characteristics of subjects: Comparisons with other format labels," *PLoS One*, vol. 13, no. 8, p. e0202095, Aug. 2018, doi: 10.1371/journal.pone.0202095.

[35] M. M. Paulsen *et al.*, "Responses to the updated Nutri-Score algorithms in Norway: A qualitative study among food system actors in the NewTools-project," *Food Nutr Res*, vol. 68, Oct. 2024, doi: 10.29219/fnr.v68.10254.

[36] E. Magriplis *et al.*, "The Relation between Consumer Perception and Objective Understanding of Front-of-Package Nutrition Labels (FOPNLs); Results from an Online Representative Survey," *Nutrients*, vol. 16, no. 11, p. 1751, Jun. 2024, doi: 10.3390/nu16111751.

[37] A. Jáuregui *et al.*, "Impact of front-of-pack nutrition labels on consumer purchasing intentions: a randomized experiment in low- and middle-income Mexican adults," *BMC Public Health*, vol. 20, no. 1, p. 463, Dec. 2020, doi: 10.1186/s12889-020-08549-0.

[38] A. Shrestha, K. Cullerton, K. M. White, J. Mays, and M. Sendall, "Impact of front-of-pack nutrition labelling in consumer understanding and use across socio-economic status: A systematic review," *Appetite*, vol. 187, p. 106587, Aug. 2023, doi: 10.1016/j.appet.2023.106587.

[39] N. Wakui *et al.*, "Effectiveness of Displaying Traffic Light Food Labels on the Front of Food Packages in Japanese University Students: A Randomized Controlled Trial," *Int J Environ Res Public Health*, vol. 20, no. 3, p. 1806, Jan. 2023, doi: 10.3390/ijerph20031806.

[40] S. Pettigrew, M. Jongenelis, D. Maganja, S. Hercberg, and C. Julia, "The Ability of Nutrition Warning Labels to Improve Understanding and Choice Outcomes Among Consumers Demonstrating Preferences for Unhealthy Foods," *J Acad Nutr Diet*, vol. 124, no. 1, pp. 58-64.e1, Jan. 2024, doi: 10.1016/j.jand.2023.08.135.

[41] I. Campos-Nonato *et al.*, "Perception and Understanding of Guideline Daily Amount and Warning Labelling among Mexican Adults during the Law Modification Period," *Nutrients*, vol. 14, no. 16, p. 3403, Aug. 2022, doi: 10.3390/nu14163403.

[42] S. Shin *et al.*, "A Randomized Controlled Study to Test Front-of-Pack (FOP) Nutrition Labels in the Kingdom of Saudi Arabia," *Nutrients*, vol. 15, no. 13, p. 2904, Jun. 2023, doi: 10.3390/nu15132904.

[43] M. Egnell *et al.*, "Impact of the Nutri-Score front-of-pack nutrition label on purchasing intentions of individuals with chronic diseases: results of a randomised trial," *BMJ Open*, vol. 12, no. 8, p. e058139, Aug. 2022, doi: 10.1136/bmjopen-2021-058139.

[44] D. Courbet *et al.*, "A randomized controlled trial to test the effects of displaying the Nutri-Score in food advertising on consumer perceptions and intentions to purchase and consume," *International Journal of Behavioral Nutrition and Physical Activity*, vol. 21, no. 1, p. 38, Apr. 2024, doi: 10.1186/s12966-024-01588-5.

[45] A. H. Grummon, A. A. Musicus, A. J. Moran, M. G. Salvia, and E. B. Rimm, "Consumer Reactions to Positive and Negative Front-of-Package Food Labels," *Am J Prev Med*, vol. 64, no. 1, pp. 86–95, Jan. 2023, doi: 10.1016/j.amepre.2022.08.014.

[46] M. Singer, "Non-Communicable Diseases," in *The Wiley Blackwell Encyclopedia of Health, Illness, Behavior, and Society*, Wiley, 2014, pp. 1686–1690. doi: 10.1002/9781118410868.wbehibs407.

[47] H. Croker, J. Packer, S. J. Russell, C. Stansfield, and R. M. Viner, "Front of pack nutritional labelling schemes: a systematic review and meta-analysis of recent evidence relating to objectively measured

consumption and purchasing," *Journal of Human Nutrition and Dietetics*, vol. 33, no. 4, pp. 518–537, Aug. 2020, doi: 10.1111/jhn.12758.

[48] N. Wakui *et al.*, "Investigation of the 1-week effect of traffic light nutrition labelling on diet selection among Japanese university students: a randomized controlled trial," *BMC Public Health*, vol. 24, no. 1, p. 381, Feb. 2024, doi: 10.1186/s12889-024-17815-4.

[49] A. H. Roudsari, S. F. Abdollah Pouri Hosseini, A. M. Bonab, M. Zahedi-rad, F. M. Nasrabadi, and A. Zargaraan, "Consumers' perception of nutritional facts table and nutritional traffic light in food products' labelling: A qualitative study," *Int J Health Plann Manage*, vol. 36, no. 3, pp. 628–642, May 2021, doi: 10.1002/hpm.3105.

[50] N. Zlatevska, B. Barton, C. Dubelaar, and J. Hohberger, "Navigating Through Nutrition Labelling Effects: A Second-Order Meta-Analysis," *Journal of Public Policy & Marketing*, vol. 43, no. 1, pp. 76–94, Jan. 2024, doi: 10.1177/07439156231158115.

[51] U. Afroza, A. K. Abrar, A. Nowar, S. M. M. Sobhan, N. Ide, and S. R. Choudhury, "Global overview of government-endorsed nutrition labelling policies of packaged foods: a document review," *Front Public Health*, vol. 12, Nov. 2024, doi: 10.3389/fpubh.2024.1426639.