Factors Associated with Consumer Behavior in Selecting Packaged Foods with Front-of-Package Nutrition Labeling (FOPNL)

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Submitted: 23 January 2025. Accepted: 18 November 2025. Published: 6 December 2025
Volume 34, 2026. pp. 802–812. http://doi.org/10.25133/JPSSv342026.040

Abstract

Obesity remains a significant public health challenge in Indonesia, partly driven by changes in dietary patterns and increased consumption of energy-dense, nutrient-poor foods. Front-of-package nutrition labeling (FOPNL) has been introduced globally as a strategy to support healthier food choices by improving access to simplified nutrition information. In Indonesia, the voluntary "Healthier Choice" logo represents the initial implementation of FOPNL, although its use and public awareness remain limited. This study aimed to identify factors associated with consumer behavior in choosing packaged foods with FOP labels. An analytical observational study with a cross-sectional design was conducted in September 2024 among 282 adult followers of the Ilmugiziku social media platform, selected through stratified random sampling. Data were collected using a self-administered online questionnaire and analyzed using chi-square tests and multivariate logistic regression. More than half of respondents (52.5%) demonstrated good food selection behavior. Bivariate analysis showed significant associations between food choice behavior and gender, education level, nutrition knowledge, and attitudes toward FOP labels ($p < .05$). In the final multivariate model, only education level remained significantly associated with behavior, with higher-educated respondents more likely to report good food selection behavior (AOR = 1.96, 95% CI [1.26, 3.16]). These findings indicate that education plays a central role in shaping consumer engagement with simplified nutrition labels. Strengthening nutrition literacy and expanding the clarity and reach of FOP labeling may support healthier food choices and contribute to national efforts to reduce diet-related non-communicable diseases while advancing universal health coverage and health system resilience.

Keywords

Consumer behavior; food choices; front-of-package labeling; Indonesia; non-communicable diseases; nutrition literacy; universal health coverage

Introduction

Obesity remains a significant public health concern globally and in Indonesia, partly associated with changes in dietary patterns and the increasing availability of energy-dense, nutrient-poor foods (Sulistiadi, Wasir, Astriana, et al., 2024; World Obesity Federation, 2023). Such dietary patterns contribute to metabolic disturbances and elevate the risk of non-communicable diseases (NCDs), which remain a substantial burden for the health system. Evidence indicates that excessive intake of sugar and saturated fat affects glucose regulation, adiposity, and cardiometabolic outcomes, highlighting the importance of strategies that support healthier food choices among the population (Ahmed et al., 2024; Alamnia et al., 2023; Babalola et al., 2025).

Food labeling is one of the strategies introduced to improve public access to nutritional information and to encourage more informed food choices. Nutrition information can be presented in a detailed Nutrition Information Table (NIT) or in simplified forms such as Front-of-Package Nutrition Labeling (FOPNL) (Afroza et al., 2024; Hammond et al., 2023). FOPNL provides key nutrient information on the front of product packaging and is intended to be easier to notice and interpret, particularly for consumers who may have limited time or lower nutrition literacy. These labels may display numerical values or incorporate symbols, colors, or summary ratings to help consumers assess a product's nutritional attributes more quickly (König et al., 2025; Muzzioli et al., 2025; Shrestha et al., 2023).

Evidence from various countries suggests that consumers may rely more on simplified front-of-package labels than back-of-package nutrition tables when making purchasing decisions (Oswald et al., 2022; Penzavecchia et al., 2022). Studies also indicate that FOPNL may help consumers distinguish between products with different nutritional profiles, and that clearer, more interpretive formats can improve understanding and influence product selection to some extent (Braesco & Drewnowski, 2023; Crosbie et al., 2023). In some settings, the introduction of FOPNL has been accompanied by gradual product reformulation, indicating that nutritional labeling may also influence industry practices (Ganderats-Fuentes & Morgan, 2023). Research from Brazil further suggests that, under certain conditions, FOPNL may contribute to small reductions in overweight and obesity prevalence and may be associated with modest reductions in obesity-related health expenditures over several years, with an estimated reduction of approximately US$5.5 million in direct public healthcare costs related to obesity-associated chronic diseases over five years (Faria et al., 2023).

In Indonesia, a voluntary "Healthier Choice" logo has been introduced for selected food products as an initial form of FOPNL (Food and Drug Authority of the Republic of Indonesia [BPOM], 2024). While this initiative provides a reference for consumers seeking healthier options, its application remains limited due to its voluntary nature. International findings show that evaluative and easy-to-interpret formats—such as color-coded indicators or star ratings—are often preferred and may support quicker decision-making, although the extent to which these findings apply in Indonesia may depend on local cultural, economic, and environmental contexts (Bassetti et al., 2023; Pries et al., 2024). While some studies report that consumers perceive simplified labels as helpful in identifying healthier products, the majority of existing research in Indonesia focuses on consumer preferences for labeling formats rather than behavioral determinants of label use (Aldera et al., 2024; Champeny et al., 2023; König et al., 2025).

Understanding the factors that influence consumer behavior regarding FOPNL is particularly relevant in Indonesia's current health policy landscape (Gonzalez et al., 2025). National efforts to strengthen universal health coverage (UHC) and build a more resilient health system increasingly emphasize preventive actions, including addressing modifiable dietary risks. As dietary-related NCDs contribute significantly to service utilization and financial pressures on the health system, improvements in health literacy—including the ability to interpret nutrition labels—may support broader goals of reducing avoidable disease burdens and promoting healthier population behaviors (Sulistiadi, Wasir, Thalib, et al., 2024; Wasir, Irawati, Makady, Postma, Goettsch, Buskens, et al., 2019; Wasir, Irawati, Makady, Postma, Goettsch, Feenstra, et al., 2019).

Despite this importance, research examining the determinants of consumer behavior in using FOPNL in Indonesia remains limited. Very few studies have assessed how sociodemographic factors, nutrition knowledge, and attitudes influence the selection of packaged foods with FOPNL. This creates a critical evidence gap for ongoing public health interventions and nutrition education efforts. Therefore, this study aimed to identify factors associated with consumer behavior in choosing packaged foods with front-of-package labels.

Materials and methods

Study design

This study employed an analytical observational approach with a cross-sectional design. All independent and dependent variables were measured at a single point in time.

Setting

Data collection was conducted in September 2024 through the Ilmugiziku social media platform (See https://ilmugiziku.com/).

Participant

Participants were Instagram followers of Ilmugiziku aged 18 years or older who consented to take part in the study. The minimum required sample size was calculated using the Lemeshow formula, yielding an estimated minimum of 152 respondents. A total of 282 respondents were ultimately included using stratified random sampling (Lemeshow, 1990).

Instrument

The independent variables in this study included gender, age, education level, occupation, nutritional status, nutrition knowledge, and attitudes toward FOP labels. Nutrition knowledge was measured using 10 true/false questions on nutrition labels and FOP information; correct answers were scored 1, and incorrect answers were scored 0. The total score was classified into three categories: good (≥ 80), moderate (60–79), and poor (< 60), adapted from standard knowledge assessment criteria commonly used in cognitive evaluation frameworks (Anderson & Krathwohl, 2001). Attitudes toward FOP labels were

measured using eight Likert-scale statements, four positive and four negative. Response options ranged from strongly agree to strongly disagree and were scored from 4 to 0 based on standard attitude measurement procedures (DeVellis, 2017; Likert, 1932). The total attitude score was assessed for normality using the Shapiro–Wilk test. Because the distribution was non-normal, the median value of 18.0 was used as the cut-off point. Scores below 18.0 were categorized as negative attitudes, and scores 18.0 or higher as positive attitudes.

The dependent variable, behavior in choosing packaged food, was assessed using 28 questions regarding reading product labels, nutritional information, and the use of FOP labels. Response categories included never, rarely, often, and always, each scored 0–3. Because the distribution of total scores was normal, the mean of 50.6 was used as the cut-off, with scores below 50.6 categorized as poor behavior and scores 50.6 or higher as good behavior. Nutritional status was assessed using Body Mass Index (BMI), calculated from self-reported weight and height (kg/m^2).

Classification followed the World Health Organization (WHO) Asian cut-off points: underweight (< 18.5), normal (18.5–22.9), overweight (23.0–24.9), and obese (≥ 25.0) (World Health Organization Expert Consultation, 2004). Additional sociodemographic variables included gender, age, educational background, occupation, and nutritional status. All instruments underwent validity and reliability testing among 25 respondents, following established psychometric standards, and all items met the required criteria (Nunnally, 1978; Tavakol & Dennick, 2011).

Data collection

Data were collected using a self-administered online questionnaire completed independently by respondents.

Data analysis

Data were analyzed using SPSS version 29. Bivariate analysis was conducted using chi-square tests to examine the association between each independent variable and food choice behavior. Variables that met the inclusion criteria were then entered into a multivariate logistic regression model to identify the factors most strongly associated with choosing packaged foods with FOP labels. Logistic regression was also used to estimate adjusted odds ratios while controlling for potential confounding variables.

Ethical approval

This study received ethical approval from the Research Ethics Committee of Universitas Pembangunan Nasional "Veteran" Jakarta on 4 September 2024 (No. 371/IX/2024/KEP).

Results

Respondent characteristics

A total of 282 respondents participated in this study. Most respondents were female (58.5%) and younger than 30 years (59.9%). More than half had completed a college education (56.4%) and were employed (59.6%). The majority had normal nutritional status (67.7%), while 13.1% were categorized as obese, 10.3% overweight, 6.7% underweight, and 2.1% severely underweight. The distribution of respondent characteristics is presented in Table 1.

Table 1: Frequency Distribution of Respondent Characteristics

Variable	Frequency (n)	Percentage (%)
Gender		
Female	165	58.5
Male	117	41.5
Age		
< 30 years	169	59.9
≥ 30 years	113	40.1
Education Level		
High School or below	123	43.6
College/ university	159	56.4
Occupation		
Unemployed/ student	114	40.4
Employed	168	59.6
Nutritional Status		
Obese	37	13.1
Overweight	29	10.3
Normal	191	67.7
Underweight	19	6.7
Severely underweight	6	2.1

Knowledge, attitudes, and behavior related to FOP labels

A total of 148 respondents (52.5%) demonstrated good behavior in their choice of packaged foods, while 134 respondents (47.5%) showed poor behavior. Nutrition knowledge was categorized as good (41.5%), moderate (28.7%), and poor (29.8%). Attitudes toward FOP labels were nearly evenly distributed between positive (50.7%) and negative (49.3%). Details are presented in Table 2.

Table 2: Distribution of knowledge, attitude, and food selection behavior

Variable	Frequency	Percentage (%)
Food Selection Behavior		
Poor	134	47.5
Good	148	52.5
Knowledge		
Poor	84	29.8
Moderate	81	28.7
Good	117	41.5
Attitude		
Negative	139	49.3
Positive	143	50.7

Bivariate analysis

Bivariate analysis showed significant associations between food choice behavior and gender, education level, knowledge level, and attitude toward FOP labels ($p < .05$). No significant association was found for age, occupation, or nutritional status. Detailed results are presented in Table 3.

Table 3: Bivariate analysis of factors associated with food choice behavior

Variable	Category Comparison	*p* value
Gender	Male vs Female	.029*
Age	< 30 vs ≥ 30 years	.184
Education level	High school or below vs College/university	.006*
Occupation	Employed vs Unemployed/student	.272
Nutritional status	Normal vs Others	.411
Knowledge level	Good/Moderate vs Poor	.005*
Attitude toward FOP labels	Positive vs Negative	.023*

*Note: *p < .05 indicates statistically significant association.*

Multivariate Analysis

A multivariate logistic regression analysis was conducted to identify the most influential factors. Only education level remained statistically significant in the final model. Respondents with a college or university education had higher odds of demonstrating good food selection behavior than those with a high school education or less (AOR = 1.96, 95% CI [1.26, 3.16], $p = .006$). The final multivariate model is shown in Table 4.

Table 4: Final multivariate logistic regression model

Variable	Adjusted Odds Ratio (AOR)	95% CI	*p* value
Education level	1.96	1.26–3.16	.006*

*Note: *p < .05 indicates statistically significant association.*

Discussion

This study examined factors associated with consumer behavior in choosing packaged foods with front-of-package (FOP) nutrition labels among adults in Indonesia. More than half of the respondents demonstrated good food selection behavior, indicating that many consumers are beginning to incorporate nutrition information into their food choices. However, the findings also show that awareness and consistent use of FOP labels remain limited, reflecting gaps in public familiarity with simplified labeling systems (Dorisse et al., 2025; Ikonen et al., 2020; Li et al., 2025).

Consistent with theoretical frameworks such as the Theory of Planned Behavior, food-related decisions are shaped by a combination of knowledge, attitudes, and contextual factors (Ajzen, 1991). The bivariate analysis showed that knowledge and attitudes were significantly associated with food choice behavior, suggesting that individuals who better understand nutrition labels and hold more positive views toward FOP systems are more likely to use them

when selecting products. This is aligned with global evidence showing that knowledge supports comprehension and label use, while positive attitudes strengthen behavioral intentions toward healthier choices (Roberto et al., 2021; Talati et al., 2019).

Despite these associations, education level emerged as the only variable that remained significant in the multivariate model. This indicates that education may operate as an overarching factor influencing nutrition literacy, cognitive ability to interpret health information, and motivation to apply nutrition guidance when making food choices. Similar findings have been reported in other settings, where higher educational attainment correlates strongly with diet quality and label use (Ikonen et al., 2020; Talati et al., 2019). The strong predictive power of education in this study suggests that structural determinants of health literacy play a central role in shaping consumer engagement with FOP labels in Indonesia.

Gender was significantly associated with behavior in the bivariate analysis, with women demonstrating more favorable label-related behavior. This is consistent with research indicating that women, across many contexts, tend to be more health-conscious and more engaged in nutrition-related decisions compared to men (Acton et al., 2022; Bhawra et al., 2023). However, this association did not persist in the multivariate analysis, suggesting that its effect may be mediated by underlying sociodemographic or psychosocial factors such as education, motivation, or exposure to health information.

Other variables—including age, occupation, and nutritional status—were not significantly associated with food choice behavior. This differs from findings in several international studies where older adults report greater attention to food labels or where individuals with higher BMI show heightened interest in nutritional information due to health concerns (Acton et al., 2023; Elshaer et al., 2025; Jabbour Al Maalouf et al., 2025). In the Indonesian context, rapid changes in digital food environments, widespread availability of processed foods, and varying access to health communication may dilute the effects of age or nutritional status on food-related decisions (Elmira & Suryahadi, 2025; Wasir et al., 2025).

The findings offer several implications for public health policy. Indonesia's current FOP initiative—the voluntary "Healthier Choice" logo—has limited visibility and reach, which may explain why many respondents report rarely noticing or using FOP labels. International evidence suggests that interpretive, standardized, and mandatory FOP systems may improve comprehension and influence choices more effectively than voluntary schemes (Ganderats-Fuentes & Morgan, 2023; Singh et al., 2021). Enhancing the clarity, consistency, and policy status of FOP labeling could increase its impact at the population level.

These findings are also relevant for Indonesia's broader efforts to strengthen universal health coverage (UHC) and health system resilience. Diet-related NCDs account for substantial health service utilization and financial pressures within the national insurance system. Improving population capacity to interpret and use nutrition labels represents an upstream prevention strategy that supports healthier diets and may reduce avoidable NCD burdens (Apriningsih et al., 2025; Sulistiadi, Wasir, Thalib, et al., 2024).

This study has several limitations. The online data collection method may introduce selection bias toward younger and more digitally connected populations. The cross-sectional design prevents causal inference, and the use of self-reported measures may not fully capture actual purchasing behavior. Nonetheless, the study provides crucial initial evidence regarding determinants of FOP-related behavior in Indonesia. It highlights the central role of education as a structural factor shaping nutrition literacy and consumer decision-making. Future

research should explore how different FOP formats influence purchasing decisions in real-world settings, examine disparities in label use across diverse socioeconomic groups, and assess the effectiveness of communication strategies to strengthen nutrition literacy.

Conclusion

This study found that education level was the strongest determinant of consumer behavior in choosing packaged foods with front-of-package labels. Nutrition knowledge and attitudes were also associated with healthier food choice behavior in unadjusted analyses, although their effects appeared to be mediated by education. These findings underscore the importance of improving nutrition literacy and strengthening public understanding of simplified nutrition labelling systems. Efforts to expand and standardize FOP labelling—coupled with targeted education initiatives—may enhance the role of nutrition labels in supporting healthier food choices. Such measures are aligned with Indonesia's priorities to reduce diet-related non-communicable diseases and to strengthen universal health coverage and health system resilience through preventive and health-promoting strategies.

Acknowledgments

The authors would like to express sincere appreciation to all respondents and the Ilmugiziku platform community for their participation in this study.

Funding

This research was funded by the Directorate of Research, Technology, and Community Service (DRTPM), Ministry of Education, Culture, Research, and Technology, under Grant Number 0459/E5/PG.02.00/2024.

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