Students' Perception of Milk and Milk-Based Beverage Categories on Product Packaging and Its Impact on Dairy Consumption Behaviour and Purchase Decisions

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Abstract. This study aimed to examine university students' understanding of milk and milk-containing beverage categories and its influence on dairy consumption patterns and purchasing decisions. A total of 100 university students in Surakarta were selected as respondents using a purposive sampling method. Data were collected through an online questionnaire and analysed using descriptive statistics and the chi-square test. The results showed that the most frequent milk consumption was 1–2 times per week (81%), with most consumption occurring in the morning (49%). The main factors influencing purchasing decisions were halal labelling (50%) and taste (25%). Most respondents demonstrated a moderate level of understanding of food category classification (62%). Chi-square analysis revealed no significant correlation between students' understanding of milk and milk-containing beverage categories and their consumption patterns ($p = 0.216$), nor with food category–related purchasing factors ($p = 0.749$). These findings suggest that although students possess a relatively adequate understanding of food category classification, other factors, such as halal labelling and taste, play a more dominant role in purchasing decisions and do not necessarily translate into healthier milk consumption patterns.

1 Introduction

Adequate and balanced nutritional intake is crucial for supporting optimal human growth and development. Nutritional deficiencies, including vitamin A, zinc, and iron, can lead to various health problems, including stunting [1]. Stunting is characterized by impaired growth resulting from chronic undernutrition during early life and is associated with delayed cognitive development, which may ultimately compromise the quality of human resources in the future. Therefore, stunting prevention is a strategic priority for achieving the vision of "Indonesia Emas 2045" (Golden Indonesia 2045) by ensuring sufficient and balanced nutrition across all segments of society.

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Milk is a nutritional source that can help prevent stunting. It provides high-quality animal protein, particularly essential amino acids, which are vital for the development and repair of body tissues such as muscles and bones. However, milk consumption in Indonesia remains relatively low compared to neighbouring ASEAN countries. Despite this low level of consumption, dairy products available in the Indonesian market are highly diverse, including UHT milk, pasteurized milk, powdered milk, fortified milk, flavoured liquid milk, sweetened condensed milk, and other milk-based products.

To protect consumers, the Indonesian government regulates food product classification through Indonesian Food and Drug Authority (BPOM) Regulation No. 13 of 2023, which mandates conformity between food categories and their nutritional composition. This regulation aims to facilitate informed consumer choices based on individual nutritional needs. Nevertheless, consumers' understanding of food category information on product packaging remains inadequate.

A variety of factors influence consumers' purchasing decisions, including price, halal certification, and other product attributes. Knowledge of food categories, which is closely related to food labelling and nutritional value, also plays a significant role in shaping purchasing behaviour. However, many consumers do not fully understand the information presented on dairy product packaging and often make inappropriate comparisons between products from different food categories. Improving consumer awareness and understanding of food category classification is therefore essential to promote healthier consumption patterns and to support long-term national development goals. Moreover, purchasing decisions influenced by consumers' level of understanding have a significant impact on market sustainability and product availability, with broader social and economic implications [2].

University students were selected as study respondents due to their relatively good nutritional knowledge and access to information. In addition, students generally have autonomy in allocating their personal food expenditures and represent a microcosm of society that will play a significant role in driving Indonesia toward the Golden Indonesia 2045 vision. However, students often face financial constraints due to limited income and a lack of work experience, which may limit their ability to make informed purchasing decisions and increase their susceptibility to environmental influences, including in their food purchasing behaviour.

Based on the considerations above, this study aims to investigate university students' understanding of milk and milk-containing beverage categories and its influence on dairy consumption patterns and purchasing factors. Specifically, this research examines the level of understanding of food categories, including milk and milk-containing beverages, among university students in Surakarta.

2 Methods

This study employed a quantitative cross-sectional consumer survey using a structured online questionnaire as the data collection instrument. The research subjects were university students in Surakarta, specifically 100 consumers who volunteered to participate in the survey.

The questionnaire consisted of predefined questions specifically designed and validated for this study and was administered online using Google Forms. It was structured into four sections: (1) respondent characteristics (7 questions), (2) consumption patterns of milk and milk-containing beverages (4 questions), (3) purchasing factors influencing milk beverage selection, and (4) consumer understanding of food category classification between milk beverages and milk-containing beverages (18 questions). For the last section, one (1) to three (3) points were assigned for each correct answer and zero (0) for incorrect answers, so that

the maximum score of this section is 22. The questionnaire included a combination of open-ended, semi-closed, and closed-ended questions.

The questionnaire was validated and tested for reliability. The validity test revealed a significant positive association between each question item and the total score, with an r-value greater than 0.36 and $p < 0.05$. Furthermore, the Cronbach's alpha for the questionnaire was 0.74 (> 0.60), indicating that all variables were reliable [3].

Data analysis was conducted using Microsoft Excel for Mac, Version 16.101.3 (25100321), for descriptive statistics, and IBM SPSS Statistics, Version 26, for inferential statistics. Chi-square tests were applied to examine associations between consumer understanding, purchasing factors, allowance level, and the frequency of milk beverage consumption, with a significance level set at $p < 0.05$.

3 Results and discussions

3.1 Respondents' profile

The respondents of this study were university students residing in the Surakarta area. There were 96,826 university students in Surakarta overall in 2023. To guarantee sufficient representation of the population, a minimum sample size of 100 respondents was determined using the Slovin formula. The inclusion criterion for respondents was the absence of milk allergy.

Based on the respondent profile presented in Table 1, 80% of participants were female and 20% were male. The majority of respondents were between 19 and 22 years old, with the largest proportion being 21-year-olds (34%), followed by 22-year-olds (25%), 20-year-olds (22%), and 19-year-olds (19%). Regarding institutional affiliation, most respondents were students at Universitas Sebelas Maret (UNS), representing 62% of the total sample. The remaining respondents were distributed across several higher education institutions in Surakarta, including Institut Seni Indonesia (ISI) Surakarta (4%), Universitas Slamet Riyadi (3%), Politeknik Kesehatan Kemenkes Surakarta (11%), IIM Surakarta (13%), Universitas 'Aisyiyah Surakarta (2%), Universitas Kusuma Husada (2%), Universitas Setia Budi (1%), Universitas Nahdlatul Ulama (1%), and Universitas Terbuka Pokja Surakarta (1%). This distribution indicates that the respondents represented a diverse range of academic backgrounds within the higher education population of Surakarta.

Table 1. Profile of Respondents

Criteria	Description	Percentage
Sex	Male	20%
	Female	80%
Age (years)	19	19%
	20	22%
	21	34%
	22	25%
Home University	UNS (Universitas Sebelas Maret)	62%
	ISI Surakarta	4%
	Universitas Slamet Riyadi	3%
	Politeknik Kesehatan Kemenkes Surakarta	11%

Criteria	Description	Percentage
	IIM Surakarta	13%
	Universitas 'Aisyiyah Surakarta	2%
	Universitas Kusuma Husada	2%
	Universitas Setia Budi	1%
	Universitas Nahdlatul Ulama	1%
	Universitas Terbuka Pokja Surakarta	1%

3.2 Frequency of milk consumption

The frequency of milk consumption among respondents, arranged from the lowest to the highest, was as follows: more than seven times per week (1%), five to seven times per week (3%), three to four times per week (15%), and one to two times per week (81%) (Figure 1). These findings are consistent with a previous study, which reported that the majority of young people (Generation Z) consume milk only once a week [4].

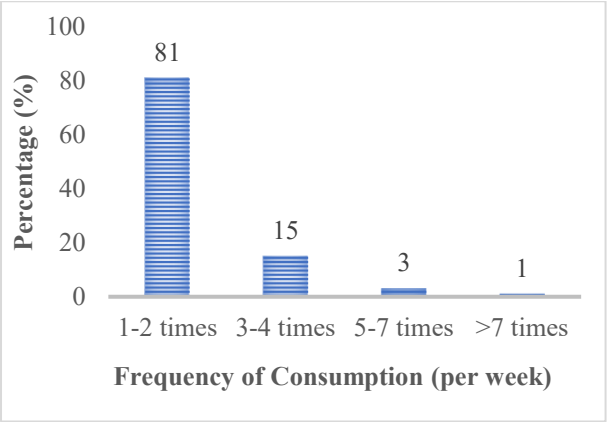

Fig. 1. Frequency of Consumption of Liquid Milk Products per Week

This consumption pattern may be attributed to young consumers' preference for contemporary beverages, such as coffee-based drinks and alternative protein beverages, including whey protein and protein shakes. Generally, milk consumption in Indonesia remains relatively low. The average weekly consumption of liquid milk is approximately 30 mL per capita, equivalent to 1.5 kg per capita per year, while the weekly consumption of powdered milk is approximately 14 g per capita. In contrast, the government-recommended milk intake, as stated in Government Regulation No. 41 of 2004, is 1 cup (200 mL) per day, or approximately 1,200–1,400 mL per week.

In 2023, the availability of cow's milk, both locally produced and imported, in Indonesia reached 3.7 kg per capita per year. This indicates that sufficient milk availability does not necessarily translate into higher milk consumption. These findings suggest that low milk consumption in Indonesia is not primarily influenced by supply or stock availability, but rather by consumer preferences and willingness to incorporate milk into regular dietary habits.

3.3 Relationship between allowance and frequency of milk beverage consumption

The analysis showed no significant relationship between students' monthly allowance and the frequency of milk beverage consumption ($p = 0.187$). This finding suggests that factors other than financial resources play a more prominent role in shaping milk consumption patterns among university students. Socio-cultural influences, particularly peer influence and lifestyle, appear to be important determinants of consumption behaviour.

Food choices among adolescents and university students, including milk beverage consumption, are strongly influenced by peer groups. Peers represent the social group with which students interact most frequently, resulting in a high intensity of influence on daily consumption habits. This peer influence is often associated with current youth trends, such as preferences for coffee-based beverages consumed in cafés or protein drinks like whey protein and protein shakes, which are perceived as more fashionable or aligned with an active lifestyle [5].

Lifestyle factors also significantly affect consumption behaviour. Inappropriate lifestyle patterns may lead to consumptive behaviour among young adults, in which desires are prioritised over actual nutritional needs. For example, students may allocate a substantial portion of their allowance to fashion or social activities to conform to prevailing trends, even though they already own sufficient clothing. Such behaviour can lead to neglect of essential nutritional needs, resulting in the consumption of food and beverages solely to satisfy hunger, without considering their nutritional quality. Additionally, students' allowances are often prioritized for other essential expenses, such as transportation, savings, and communication needs (e.g., mobile phone credit or internet data), which may further reduce the allocation of funds available for nutritionally adequate food and beverage choices, including milk [6].

3.4 Time of milk consumption

As presented in Figure 2, the highest proportion of milk consumption occurred in the morning, accounting for 49% of respondents (49 individuals), followed by consumption at night (44%, 44 individuals), in the afternoon (40%, 40 individuals), and in the evening (30%, 30 individuals). These results indicate that university students consume milk at various times of the day, not only in the morning and at night. The relatively small differences among consumption times suggest that milk is perceived as a beverage that supports daily activities during periods of high activity.

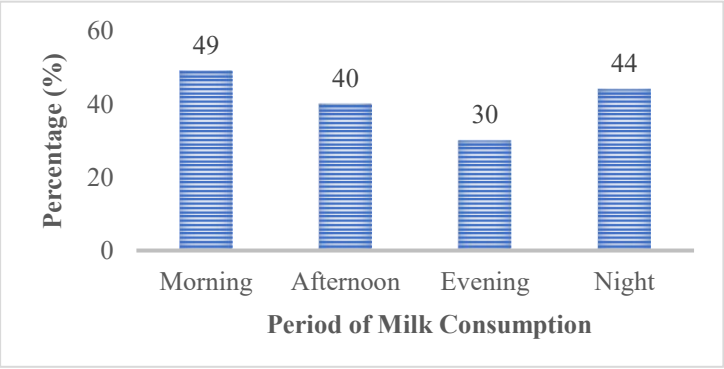

Fig. 2. Time of Liquid Milk Consumption

Milk contains carbohydrates in the form of lactose, which serve as an energy source to support physical activity and help regulate body metabolism. The highest milk consumption

was observed in the morning and at night. Morning milk consumption is beneficial due to its vitamin, mineral, and fat content, which provide longer-lasting satiety and may help reduce hunger. Fat in milk is digested more slowly than carbohydrates and proteins, contributing to prolonged energy availability.

Meanwhile, consuming milk at night may improve sleep quality by increasing tryptophan levels, which enhance melatonin production. Melatonin is a hormone that possesses antioxidant properties and plays a crucial role in regulating sleep and rest cycles. Previous studies have shown that consuming milk before bedtime can improve sleep quality, particularly among elderly individuals experiencing insomnia, as increased melatonin levels promote relaxation and sleepiness [7].

3.5 Milk beverage brands

Figure 3 illustrates respondents' preferences for milk beverage brands. The most frequently selected brand was Ultra Milk® (60%), followed by Cimory™ (41%), Indomilk® (27%), Frisian Flag® (22%), Milo® (18%), and Dancow® (13%). Other brands were selected by a smaller proportion of respondents, including Real Good™ (6%), Greenfields™ (2%), Hilo™ (2%), Zee™ (2%), Ovaltine® (1%), and Diamond™ (1%).

The dominance of Ultra Milk® and Cimory™ indicates a strong preference among university students for widely distributed and well-established brands. These brands are commonly available in various retail outlets, including minimarkets and campus surroundings, which may contribute to their higher consumption frequency. Additionally, factors such as affordable pricing, familiar taste, extensive product variety, and strong brand recognition are likely to influence students' brand choices.

Additionally, brands such as Indomilk®, Frisian Flag®, Milo®, and Dancow® also demonstrated moderate selection rates, indicating consumers' familiarity with long-standing dairy and milk-based beverage products in Indonesia. Some of these brands are often associated with fortified products or flavoured milk beverages, which may appeal to younger consumers looking for both nutritional value and taste.

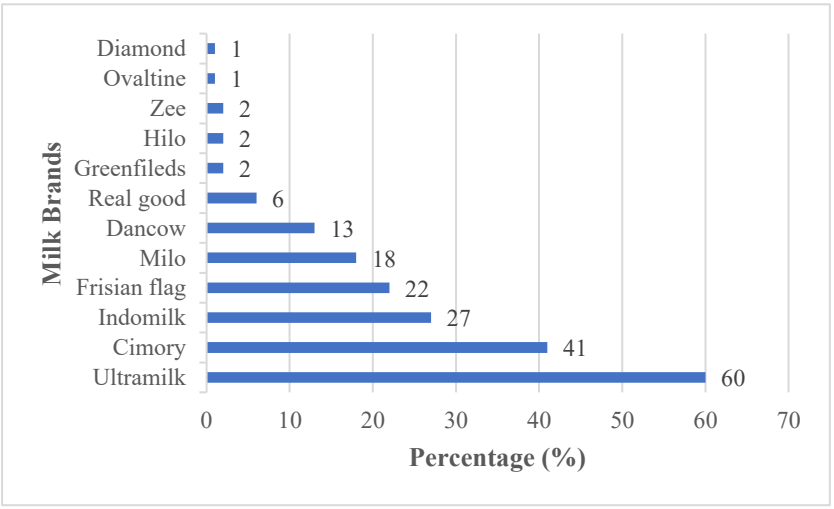

Fig. 3. Respondents' Milk Brand Choices

In contrast, brands with lower selection percentages, such as Greenfields™, Hilo™, Ovaltine®, and Diamond™, may be perceived as more specialised, premium-priced, or targeted towards specific consumer segments. These factors may limit their accessibility and appeal among university students, who typically face budget constraints and prioritise practicality in their purchasing decisions. Overall, the findings suggest that brand familiarity, availability, and affordability play a significant role in shaping students' preferences for milk beverage products, alongside nutritional considerations.

3.6 Reasons for milk consumption

The survey results presented in Figure 4 indicate that the majority of respondents (57–58%) consumed milk because they perceived it as a healthy beverage and enjoyed its taste. Other reasons for milk consumption included convenience (29%), its use as a substitute for a main meal (16%), and additional factors such as promotional offers or discounts, the availability of new product variants, or receiving milk purchased by others (6%).

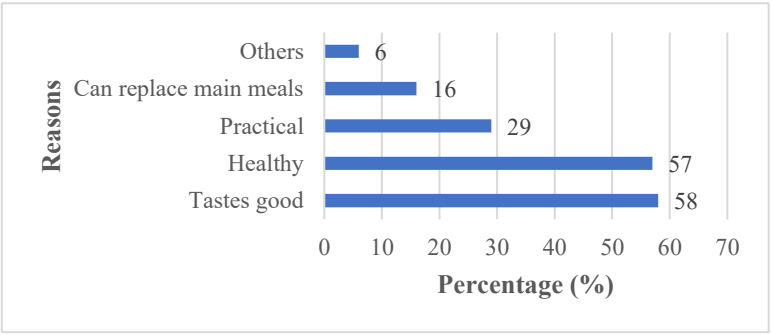

Fig. 4. Reasons for liquid milk consumption

Furthermore, 71% of respondents preferred flavoured milk over unflavoured milk. Although the addition of flavouring generally increases the sugar content of milk, flavoured milk may still serve as a practical strategy to enhance overall nutrient intake compared with not consuming milk at all. Health-related considerations also played a significant role in consumption behaviour, as 57% of respondents reported consuming milk to supplement nutrients that may not be obtained from other dietary sources [8]. Milk contains various essential nutrients beneficial to health, including calcium, which is crucial for bone and dental development [9]. These findings indicate that a considerable proportion of respondents have been adequately informed about the nutritional benefits of milk, although taste and practicality remain key drivers of consumption.

3.7 Factors influencing dairy product purchasing decisions

The survey results presented in Table 2 indicate that purchasing factors were ranked from the highest to the lowest level of importance as follows: (1) halal labelling, (2) taste, (3) price, (4) brand, (5) promotion, (6) place of purchase, (7) food category, (8) packaging, and (9) producer. Halal labelling emerged as the most important factor influencing purchasing decisions, particularly among consumers with strong religious values [10].

Table 2. Level of Importance of Factors in Purchasing Milk Products (Beverages)

No.	Purchasing Factors	Percentage of responses for each level of importance (%)									Total
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	
1	Food category	15	11	13	8	12	**16**	11	7	7	100
2	Price	7	19	**20**	**20**	11	4	12	3	4	100
3	Brand	4	16	16	**19**	14	11	8	8	4	100
4	Taste	13	**25**	20	19	5	9	1	4	4	100
5	Promotion	2	1	4	6	**24**	15	21	10	17	100
6	Sale location/place	0	2	5	13	10	18	14	**22**	16	100
7	Halal Lable	**50**	12	5	3	7	2	8	5	8	100
8	Packaging	4	10	11	8	12	**16**	11	**16**	12	100
9	Producer	5	4	6	4	5	9	14	25	**28**	100

Notes:
Score for relative importance (1-9):
1-2: very important
3-4: quite important
5-6: less important
7-9: very little important

In Indonesia, halal certification is not only a personal consideration but also a regulatory requirement. According to Law No. 33 of 2014 on Halal Product Assurance, Article 4, products that enter, circulate, or are traded within Indonesian territory must be certified as halal. This regulation serves as a consumer protection measure for Indonesia's predominantly Muslim population. From the producers' perspective, halal certification may also enhance product competitiveness and consumer trust, thereby encouraging repeat purchases.

The relatively even distribution of scores across the nine purchasing factors suggests that consumer perceptions of purchasing priorities are diverse. This finding indicates that no single factor exclusively determines purchasing decisions; instead, consumers tend to weigh multiple considerations simultaneously. Each individual may assign different levels of importance to specific factors when selecting a dairy product.

Consumer purchasing behaviour is influenced by a combination of factors, including: (1) cultural factors, such as religion, ethnicity, and geographical background; (2) social factors, including family influence, social environment, and social status; (3) personal factors, such as age, lifestyle, economic conditions, and occupation; and (4) psychological factors, including motivation, attitudes, personality traits, and self-concept. These factors interact to collectively shape consumer decision-making processes when selecting dairy products.

3.8 Respondents' understanding of milk and milk-containing beverage category information

The results showed that 16% of respondents (16 individuals) demonstrated a low level of understanding of milk and milk-containing beverage categories, 62% (62 individuals) had a moderate level of understanding, and 22% (22 individuals) exhibited a high level of understanding (Figure 5). Based on the survey scoring system, understanding was categorized as low when the score was < 13, moderate when $13 \leq$ score < 19, and high when the score was ≥ 19.

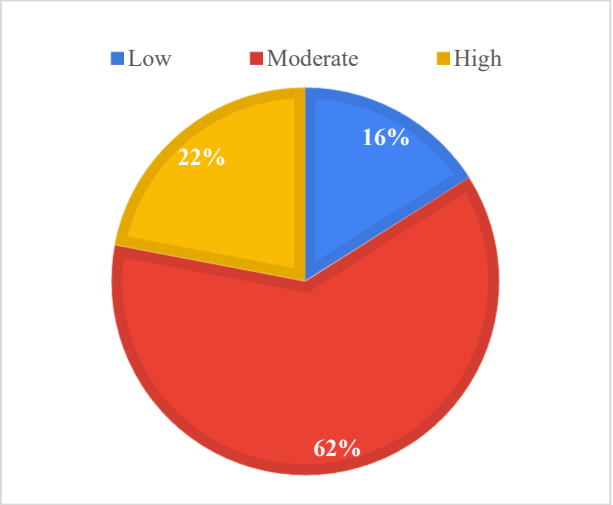

Fig. 5. Respondents' understanding of the food categories of milk and milk-containing beverages

The moderate level of understanding accounted for the highest proportion of respondents (62%). This finding is consistent with previous research, which reports that the majority of young adults (77%) demonstrated a moderate level of knowledge regarding nutrition information and food labelling [11]. Information on food category classification is typically displayed on the front-of-package label, and careful examination of label information enables consumers to identify the food category of a product. These results suggest that most respondents were reasonably well-informed about food category information. Consumer understanding tends to increase in tandem with curiosity and engagement in the products being purchased. Consumers who are highly involved with information sources are more likely to seek additional information, which positively influences their knowledge and food label reading behaviour [12].

Furthermore, understanding food category classification also implies an understanding of nutritional composition, as food categories are partly determined by their nutrient content, including fat, protein, and other components. An individual's nutritional knowledge influences attitudes and behaviours regarding food choices, which subsequently affect their overall nutritional status. Higher levels of nutritional knowledge are generally associated with more favourable nutritional outcomes, whereas inadequate nutritional knowledge may result from limited access to balanced nutrition information and low individual awareness of nutritional issues.

3.9 Relationship between understanding of milk and milk-containing beverage categories and frequency of milk consumption

The chi-square statistical analysis revealed no significant relationship between respondents' understanding of milk and milk-containing beverage categories and milk consumption frequency ($p = 0.216$). Several studies have demonstrated a variable correlation between nutritional knowledge and food consumption patterns. A weak correlation was also found between knowledge and practice in a study on healthy eating habits among Arab young adults [13]. Meanwhile, a review by O'Leary et al. [14], highlighted that a positive relationship between knowledge and dietary intake was likely found when a study represented female respondents more than their male counterparts. These findings indicate that a high level of knowledge does not necessarily lead to increased consumption or the establishment of

healthy dietary patterns. Therefore, in order to effectively affect consumption behaviour, nutritional knowledge must be combined with real-world application.

Understanding represents one domain within Bloom's taxonomy of cognitive learning, which consists of six hierarchical levels: (1) knowledge, defined as the ability to recall previously learned information; (2) comprehension, referring to the ability to correctly explain known information; (3) application, the ability to use knowledge in real-life contexts; (4) analysis, the ability to break down information into smaller components; (5) synthesis, the ability to integrate various pieces of information to form new concepts; and (6) evaluation, the ability to assess information based on predetermined criteria. These levels demonstrate that multiple cognitive processes must be carried out before knowledge can be effectively applied in practice. Consequently, individuals who have reached a good level of understanding may not necessarily apply what they know in real-life situations or in their daily dietary behaviour.

In addition to knowledge-related factors, consumption patterns are also shaped by socio-cultural influences, particularly habitual milk consumption practices. Introducing and reinforcing milk consumption habits from an early age may contribute to the development of healthier milk consumption patterns later in life. Therefore, the role of family and the surrounding environment is crucial in shaping early dietary habits, including the regular consumption of nutritious foods and beverages.

3.10 Relationship between understanding of food category information and the importance of food category as a purchasing factor

The correlation analysis revealed no significant relationship between respondents' understanding of milk and milk-containing beverage category information and the importance of food category as a purchasing factor for dairy products ($p = 0.749$). This finding indicates that although respondents possessed a moderate level of understanding regarding food category classification, this knowledge did not translate into prioritising food category information when purchasing dairy products. Instead, purchasing decisions were primarily influenced by halal labelling, taste, and price.

These results are consistent with previous studies, which report that 86% of university students with good baseline knowledge consider halal labelling and price to be significant determinants of beverage purchasing decisions [10]. Students' decisions to purchase Ultra Milk® products have also been strongly influenced by taste [4]. As discussed earlier, an adequate understanding of food category information does not necessarily result in its practical application in everyday purchasing behaviour.

Several factors, including cultural and personal determinants, influence consumer behaviour in selecting product attributes. In the Indonesian context, religion represents a key cultural factor, as the predominantly Muslim population places high importance on halal certification. Halal compliance is governed by both religious principles and national regulations and is widely perceived as a reflection of religious observance. Personal factors, particularly age, also play a significant role in shaping consumer preferences. Previous research indicates that children and adolescents tend to prefer flavoured milk over plain milk; when flavoured options are unavailable, they are more likely to forgo purchasing milk altogether [8]. Younger consumers generally perceive flavoured milk as more appealing and enjoyable, which helps explain why taste outweighs food category information in dairy product purchasing decisions.

From a policy perspective, these results indicate that the mere presence of food category information on packaging is insufficient to influence consumer purchasing behaviour. Although food category labelling is intended to guide consumers toward informed and nutritionally appropriate choices, its effectiveness depends on consumers' ability to interpret

and perceive its relevance. Therefore, product labelling policies should emphasize clearer, more prominent, and consumer-friendly presentation of food category information. This might be integrated with simplified nutritional cues or front-of-pack labelling systems that are easier to understand.

From an educational standpoint, nutrition education initiatives should move beyond improving consumer knowledge to fostering practical decision-making skills. Educational programs should explicitly link food category information to its nutritional implications and to everyday dietary choices, particularly among young consumers. Integrating food labelling literacy into school- and university-based nutrition education, as well as public health campaigns, may enhance consumers' ability to use food category information more effectively during purchasing decisions. Such combined regulatory and educational approaches may strengthen the role of food category labelling in promoting healthier dairy consumption behaviours.

4 Conclusion

University students in Surakarta predominantly consumed milk 1–2 times a week, mainly in the morning and at night. The primary reasons for milk consumption were its pleasant taste and perceived health benefits. Among the various brands available on the market, Ultra Milk® emerged asmost preferred. The most important factors influencing dairy beverage purchasing decisions were halal labelling and preferred flavour variants. Most respondents demonstrated a moderate level of understanding of milk and milk-containing beverage category information on product packaging (62%), followed by a high level (22%) and a low level (16%). Chi-square analysis indicated no significant association between understanding of food category information and either milk consumption frequency or the importance of food category as a purchasing factor. In addition, no significant relationship was found between students' allowance and the frequency of milk beverage consumption, suggesting that financial constraints are not the primary factor limiting milk consumption among students. Overall, these findings suggest that while students possess a sufficient understanding of food category classification, this knowledge does not directly influence their consumption behaviour or purchasing decisions. Instead, sensory attributes, halal assurance, and lifestyle-related factors play a more dominant role in shaping milk consumption patterns among university students.

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