ORIGINAL PAPER

The association between knowledge and attitude towards nutrition fact panels (NFP) with sugar intake of the Indonesian adolescents

Ulfi Rahma Yunita[1], Helda Khusun[1,2,3], Fiastuti Witjaksono[1]

1. *Nutrition Study Program, Faculty Medicine, Universitas Indonesia-Dr. Cipto Mangunkusumo Hospital, Jakarta 10430, Indonesia*
2. *Faculty of Health Sciences, Universitas Muhammadiyah Prof. Dr. HAMKA*
3. *Southeast Asian Minister of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON)-Pusat Kajian Gizi Regional Universitas Indonesia (PKGR UI), Jakarta 13120, Indonesia*

Abstract

The increasing sugar intake has become a global issue due to its impact on health. The survey conducted in Jakarta revealed that the median sugar intake for adolescents and adults is 18.8 g/capital/day and 24.5 g/capital/day, respectively. The government has taken several ways to reduce sugar intake, one of which is by using labels on packaged food. Therefore, this research aims to investigate the knowledge and attitude towards nutrition fact panels with sugar intake in Indonesian adolescent. This research was a cross-sectional study using an online questionnaire for adolescents in Indonesia with age range between 15-18 years old. Data on sociodemographic, mass media exposure, knowledge, and attitude were collected through online questionnaires, while sugar intake was assessed through online SQ-FFQ interviews. The study's findings showed that the majority of respondents were women (90%), with parents having below 12 years of schooling on average. Additionally, the median monthly pocket money and pocket money for food and drinks below IDR 300,000 and IDR 200,000, and mass media exposure occurred more than 3 times per month. More than half of the respondents displayed good knowledge (51.7%) and a positive attitude towards NFP (60.8%), with the majority having high sugar intake (53.5%). There is a relationship between knowledge of NFP, mass media exposure, and mother education with sugar intake in adolescents. It recommended to enhance knowledge of NFP among adolescents and parents through social media platforms, posters and TV ads to enable them select and consume appropriate foods.

Keywords: adolescents, attitude, nutrition knowledge, nutrition fact panels, sugar

Introduction

The issue of increased sugar consumption is a global concern, as it has been associated with various health problems.[1] In addition, the consumption of packaged foods and beverages, including sugar-sweetened beverages has been on the rise.[2] According to Food and Agriculture Organization (FAO) forecast for world sugar production in 2021/22 (October/September) is pegged at 174.6 million tonnes, up 5.1 million tonnes (3 percent) from the reduced level of 2020/21.[3] The highest per capita sugar consumption is in Europe, where the average person consumes around 33 kg of sugar per year.[4] Indonesia is ranked as the third-largest consumer of sugar in Asia, following India and China.[5]

Corresponding author:
Ulfi Rahma Yunita
Nutrition Study Program, Faculty Medicine, Universitas Indonesia-Dr. Cipto Mangunkusumo Hospital, Jakarta 10430, Indonesia
Email: ulfirahma0695@gmail.com

Data from Total Diet Survey in 2013 indicates that 4.8%, 18.3%, and 26.5% of the Indonesian population's consumption of sugar, salt, and fat has exceeded the recommended daily limits set by the Minister of Health, which are 50 grams of sugar, 2000 mg of sodium, and 67 grams of fat per person a day.[6] Several smaller studies showed that the consumption of sugar has increased ever since. A survey in Jakarta showed that the median sugar intake of adolescents and adults is 18.8 g/capital/day and 24.5 g/capital/day and the major contributor was sugar-sweetened beverages.[7]

As we are aware, poor eating habits, which involve high sugar consumption, have been identified as contributing factors to a decline in average life expectancy and are closely linked to various health conditions. The excessive consumption of free sugars leads to an overall increase in energy intake and may result in reduced consumption of nutritionally dense foods, thereby being associated with numerous detrimental health outcomes.[8] Evidence indicates a strong correlation between the substantial increase in obesity rates and the consumption of sugary beverages, which in turn has led to a rise in chronic diseases. Numerous studies have established a link between excessive consumption of sugary drinks and both obesity and an increased risk of various chronic diseases. Among different population groups, children and adolescents are particularly susceptible to the harmful effects of sugary beverages. In comparison to other age groups, children, and adolescents consume a higher proportion of their total caloric intake in the form of sugars.[9]

One of the strategies employed to reduce sugar consumption was through the provision of nutrition information on the label of packaged or processed food.[10] Other strategies implemented in several countries such as New Zealand, the United States, Mexico, France, and others to reduce sugar intake, particularly the limitation of sugar-sweetened beverage (SSB) consumption, include measures such as price adjustments, heightened public awareness, restrictions on SSB availability, and promotion of healthier beverage options.[9] Food labelling aims to provide accurate and clear information to the public about packaged food

products prior to purchase and/or consumption. In a systematic review and meta-analysis of 60 studies, comprising 111 intervention arms and over 2 million observations conducted across 11 countries, the findings indicate that food labelling has been effective in reducing consumer consumption of total energy and total fat, while simultaneously increasing vegetable consumption.[11] In the past two decades, various types of food labelling have been developed with the initial efforts focusing mostly on packaged food, for example, nutrition fact panels, menu calorie labels, traffic light labels, logos such as :"keyhole", "choice", and "health-check", and nutrition-or health-related claims.[11] In Indonesia, the inclusion of a nutritional fact panel on packaged or processed food labels was mandatory since 2021.

However, a study revealed that the utilization of nutrition labels did not demonstrate a significant association with healthier dietary patterns among adolescents. Although adolescents commonly utilized nutrition labels, their primary focus seemed to be on expiration dates rather than the nutritional information provided. Findings from the National Health and Nutrition Examination Survey (NHANES) data indicated that the adoption of nutrition labels among adolescents is relatively low.[12]

There are various factors that may influence individuals' propensity to utilize and peruse food labels, including age, income, education, gender, employment status, health status, knowledge of nutrition and food labels, parents' income and the importance of flavour and nutrients. Knowledge plays a crucial role in shaping individuals' thoughts and behaviors, including their reading habits and attention to nutritional information on food labels.[13] Another study found that individuals with higher levels of nutrition knowledge were 17.7 times more likely to read the nutritional information on food packaging.[14] Furthermore, research by Acheamong and Haldeman[15] suggests that consumers with better nutrition knowledge tend to have a good attitude toward healthy eating. Previous findings also have shown that NFP use is associated with reduced sugar and total cholesterol

intake, as well as increased fiber, vitamin C, and iron intake.[15,16]

A study revealed that the utilization of nutrition labels did not demonstrate a significant association with healthier dietary patterns among adolescents. Although adolescents commonly utilized nutrition labels, their primary focus seemed to be on expiration dates rather than the nutritional information provided.[17] Findings from the National Health and Nutrition Examination Survey (NHANES) data indicated that the adoption of nutrition labels among adolescents is relatively low.[18] Another study conducted among university students in Jakarta indicated that there was no correlation between the use of Nutrition Fact Panels (NFP) and overall diet quality.[17] It can be concluded that no studies have examined the association between the knowledge and practice of Nutrition Fact Panels (NFP) and sugar consumption among adolescents.

The researchers aim to investigate the knowledge and attitudes of adolescents on the Nutrition Fact Panels (NFP) and its association with sugar consumption. This study could provide valuable insights for developing preventive strategies to promote healthier dietary choices among adolescents.

Methods

Design, location, and time

The research was performed on Indonesian adolescents aged between 15 and 18 years who had completed junior high school. It was designed as a cross-sectional study and was carried out online between July and September of 2022. Before commencing data collection, the Ethical Committee of the Faculty of Medicine at Universitas Indonesia approved the study (KET.461/UN2.F1/ETIK/PPM.00.02/2022).

Sampling

The population of the study was adolescents aged 15-18 years old in Indonesia who have access to an online survey. To be included in the study, participants needed to be Indonesian citizens aged between 15 and 18 years old, have completed junior high school, and have internet access and the ability to use it. Those who had serious medical conditions like chronic infectious diseases, chronic diarrhea, or were undergoing medication or diet therapies, as well as those with special needs who were unable to communicate normally during the interview or use the internet, were excluded from the study.

Sample Size was calculated to estimate an association between knowledge and sugar intake based on the previous study with 95% confidence interval. Based on a previous study indicating a correlation value $r = 0.43$ between knowledge and sugar intake, as well as attitude and sugar intake.[19,20] However, given the absence of a link between NFP usage and diet quality in other research, we opted for a more conservative approach to the association and estimated the sample size using $r = 0.3$.[17] Based on these calculations, the minimal sample size needed was 85. As this study was conducted online, we factored in a response rate of 30% from the prior study, resulting in a total of 110 individuals for the analysis.

Study participants were recruited voluntarily by disseminating research-related information through various social media platforms such as the internet, WhatsApp, and Instagram. This study employs quota sampling to select participants. Interested individuals are given the opportunity to pre-register until the desired sample size is attained. Upon completion of the registration process, the respondents will be contacted for an interview to complete the SQ-FFQ questionnaire.

Data collection

The study's eligible participants were contacted by the researcher or enumerator and provided with an informed consent form along with a survey link that covered socioeconomic characteristics, mass media exposure, knowledge, and attitude toward NFP. Upon completion of the survey link, the enumerator contacted each respondent to conduct an SQ-FFQ interview.

Prior to the study's commencement, the questionnaire underwent a pre-testing process to evaluate the understanding, estimate the time required for its completion, ensure a seamless interview process, and address any logistical or potential issues.

The knowledge questionnaire used has been previously used and assessed.[17] Assessment of internal reliability of knowledge was among 30, a Cronbach's alpha coefficient of 0.73. The current study's nutrition knowledge covered four topics: dietary recommendation (four questions), sources of nutrients (five questions), diet-disease relationships (four questions), and understanding of the Nutrition Facts Panel (ten questions).[17]

The questionnaire used to assess attitudes towards Nutrition Fact Panels (NFP) was also been previously used.[21] The pretest results of the attitude questions yielded a Cronbach's alpha coefficient of 0.605. Participants responded to nine questions designed to assess their perceptions of the NFP label, using a Likert scale ranging from strongly disagree (1) to strongly agree (4).

Sugar intake in this study was assessed using SQ-FFQ, which is specifically designed for assessing sugar intake in adolescents.[22] This form had been previously developed and validated in a prior study. The SQFFQ form demonstrated high reability with strong agreement between the two administrations, which were conducted one month apart. The results of relative validity, utilizing 6-day food diaries as the reference method, showed a remarkable capability to precisely rank individuals into the same and adjacent categories, with less than 10% gross misclassification in all sugar intake assessments. The questionnaire included a total of 49 food ingredients, which were categorized into six groups: carbohydrates sources, sugary packaged food, sweet snacks, packaged drinks, fruit and additional sugar food. Sixteen options were provided in the category for frequency of intake, ranging from never to more than three times a day.[22]

In this study, various food composition databases were utilized to calculate the total sugar intake derived from the consumption of food and beverages by the participants. The database employed encompassed the Indonesian food composition database, the Malaysian food composition database, the Filipino food composition database and the USDA food data center. The sugar content of packaged meals or beverages was determined by checking the nutritional information provided on the packaging. Based on the provided nutritional information, the total sugar intake was calculated considering both the frequency and amount of consumption reported by respondents over the last month. For each food and beverage category, the total sugar content was computed, and the individual results were aggregated to determine the daily total sugar intake of each respondent.

Data analysis

The data analysis was carried out using SPSS for Windows version 20.0. Descriptive numerical data were presented using descriptive statistics such as mean, standard deviation or median, while categorical data were presented as percentages. The association between knowledge and attitude towards NFP as well as mass media exposure score and the level of sugar intake was analyzed using Spearman's test, while the relationship between sugar intake and socio-demographic characteristics was analyzed using the Mann-Whitney test. Furthermore, variables that showed a p-value < 0.2 in the bivariate analysis were included in the multiple linear regression test to evaluate their relationship with sugar intake after controlling for potential confounders.

Results

Socioeconomic and demographic characteristics

The total number of respondents who have completed this research phase was 120 respondents. **Table 1** presented the general characteristics of respondents. The respondents' median age in regard to sociodemographic factors was 17 years old. The majority of participants were females (90%) while the rest were males (10%). The majority of parents' education was

less than 12 schooling years, 60% for the father's education and 60.8% for the mother's education. The average monthly value of pocket money and pocket money for food and drink was IDR 300,000 and IDR 200,000, respectively. The group of respondents who fall below the median cut-off includes more than half of them (52.5% for pocket money and 65% for pocket money for food and drink). Furthermore, the data indicates that the respondents are exposed to media at various frequencies, ranging from 1 to more than 3 times per month.

Table 1. Socioeconomic demographic characteristics of respondents (n=120)

Variable	Median (min-max)	(%)
Age	**17 (15 – 18)**	
Gender		
Men		**10%**
Women		**90%**
Father Education		
Less or equal than 12 schooling years		60%
More than 12 schooling years		40%
Mother Education		
Less or equal than 12 schooling years		60.8%
More than 12 schooling years		39.2%
Pocket money for a month		
Less or equal median IDR 300.000		52.5%
More than the median IDR 300.000		47.5%
Pocket money for food and drink for a month		
Less or equal median IDR 200.000		65%
More than the median IDR 200.000		35%
Mass media exposure	**14 (10 – 23)**	

The median score of media exposure indicates that the larger value, the higher frequency of respondents being exposed to mass media, more than 3 times per month. This score obtained from the sum of several statements reflecting how often an individual is exposed to information within a month.
IDR : Indonesian Rupiah

In **Table 2**, it was found that over half of respondents possessed good knowledge (51.7%) and good attitudes (60.8%) towards nutrition facts panels. Moreover, the respondents had a higher sugar intake, which was more than half of the total

(52.5%). **Figure 1** indicates that the beverage group was the most consumed food group containing sugar among teenagers. Moreover, following the beverage group, other frequently consumed food group include the additional sugar food group and sweet snacks group.

Association between sociodemographic, knowledge and attitude with sugar intake

The main objective of this study was to assess the association between knowledge, attitude of NFP and sugar intake in adolescent. **Table 3** presented the association of sociodemographic variables, including gender, age, parent's education, pocket money for a month, pocket money for food and drinks for a month, mass media exposure with sugar intake. The results indicate that two variables, namely mother

Table 2. Distribution of knowledge, attitude, and sugar intake of respondents (n=12)

Variable	Median (min-max)	(%)
Knowledge of NFP	**14 (0 – 21)**	
Not good knowledge < 14		48.3%
Good knowledge ≥ 14		51.7%
Attitude of NFP	**25 (20 – 31)**	
Not good attitude < 25		39.2%
Good attitude ≥ 25		60.8%
Sugar Intake	**50.92 (33.10 – 76.33)**	
High sugar intake ≥50 gr/days		52.5%
Adequate sugar intake < 50 gr/days		47.5%

education and mass media exposure, had a significant relationship with sugar intake in adolescents (p<0.05).

In order to explore the association between knowledge and attitude towards NFP and sugar consumption, the Spearman test was employed, **Table 4** illustrates that there is a significant relationship between knowledge with sugar intake in adolescents (p<0.05). However, there is no

relationship between attitude with sugar intake in
adolescents (p<0.05).
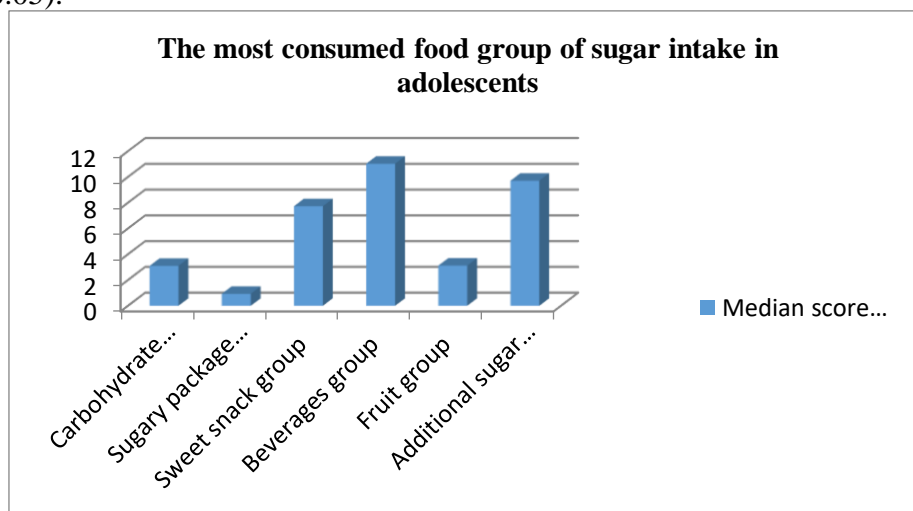
Figure 1. Detail analysis of food group of sugar intake in adolescents (gram)

Table 3. Association between sociodemographic with sugar intake

Variable	Sugar intake	R	p-value
	Median (min – max)		
Gender			
Men	56.40 (27.93 - 210.85)		0.319[1]
Women	50.53 (11.55 - 210.10)		
Age		-0.122	0.184[2]
Father Education			
Less or equal than 12 schooling years	49.54 (11.55 – 210.85)		0.371[1]
More than 12 schooling years	52.61 (13.66 – 290.10)		
Mother Education			
Less or equal than 12 schooling years	41.95 (11.55 – 197.49)		**0.007[1]***
More than 12 schooling years	63.26 (15.85 – 290/10)		
Pocket money for a month			
Less or equal median IDR 300.000	43.75 (11.55 - 145.49)		0.402[1]
More than median IDR 300.000	55.23 (13.66 - 290.10)		
Pocket money for food and drink for a month			
Less or equal median IDR 200.000	43.06 (11.5 - 210.85)		**0.172[1]**
More than median IDR 200.000	59.61 (19.23 - 290.10)		
Mass media exposure	59.61 (19.23 – 290.10)	0.177	**0.053[2]***

Note : 1 Mann Whitney U test analysis
2 Spearman test analysis
*Significant level p<0.05

Table 4. Association between knowledge and attitude with sugar intake

Variable	Sugar intake	R	p – value
	Median (min – max)		
Knowledge of NFP			
Not good knowledge	60.22 (15.87 – 197.49)	-(0.176)	0.023[1][*]
Good knowledge	39.45 (11.55 – 290.10)		
Attitude of NFP			
Not good attitude	49.34 (16.24 – 164.56)	0.049	0.709[1]
Good attitude	51.04 (11.55 – 290.10)		

Table 5. Multivariate Analysis of several variables associated to sugar intake in adolescents

Variable	Unadjusted			Adjusted		
	B	Standard error	p-value	B	Standard error	p-value
Age	-2.011	3.752	0.593	0.546	3.734	0.884
Mother education	21.686	8.008	0.008	22.548	8.223	0.007*
Pocket money for food and drink for a month	7.936	8.414	0.348	11.669	8.275	0.161
Mass media exposure	2.319	1.376	0.095	1.683	1.362	0.219
Knowledge of NFP	-8.513	8.023	0.291	-1.696	1.169	0.150

As an additional study, multiple regression analysis in **Table 5** was performed to assess the correlation between knowledge and attitude of NFP and sugar intake while adjusting for potential confounding factors such as age, mother's education, pocket money for food and drink, media exposure, and knowledge of NFP. The findings revealed that after controlling for potential confounders, the mother's education significantly contributed to sugar intake in adolescents compared to other potential confounding factors ($\beta = 22.54$, $p < 0.05$).

Discussion

In the present study, the median age of the respondents was 17 years, indicating that the majority of the sample comprised middle adolescents who possess a higher level of maturity and autonomy to make their own decisions.[23] Additionally, the majority of the participants' parents had attained no more than 12 years of education, equivalent to a maximum of high school education. According to the 2022 SUSENAS, out of 100 Indonesian residents aged 15 years and above, 22 have completed junior high school education, 29 people have graduated from high school, and 10 have completed tertiary education.[24] This indicates that the average Indonesian has a high school level of education. In 2020 SUSENAS data also showed that the average woman in Indonesia is up to senior high school.[25] Adolescents with mothers having lower levels of education reported higher availability of unhealthy food at home than mothers with higher education levels and were more likely to restrict their children's consumption of harmful food such as sweets, soft drinks, and chips.[26]

The amount of pocket money provided can have an impact on the type and selection of food consumed by adolescents, particularly packaged food. As a result, pocket money can indirectly influence the exposure of youths to food labels on packaged foods that are consumed.[27] Another

study revealed that adolescents who received more pocket money consumed packaged food and drinks 12.5% more frequently (more than 3 times a day) in comparison to respondents with lower pocket money (11%).[23] Then the results of the study also show that in the last month adolescents have been exposed to mass media once or twice in the last month. The results of a survey conducted by the Indonesian Internet Service Providers Association (2017) found that internet usage in Indonesia has been increasing year by year. The duration of social media usage per day was found to be 1 – 3 hours (43.89%), 4 – 9 hours (29.63%), and more than 7 hours (26.48%). Based on the detailed research, the respondents were found to be exposed to mass media marketing of extra food and drink products at the supermarket check-out counters. Food purchased at the checkout is typically unplanned, additional purchases that are likely to be driven by impulse. As such, the decision to purchase additional foods may occur subconsciously, making it difficult to suppress, even if the individual does not intend or wish to make such purchases.[28]

Knowledge and attitude of nutritional fact panels in adolescents

The study findings indicate that the respondents have good knowledge (51.7%) and good attitudes (60.8%) toward Nutrition Fact Panels (NFP). Research conducted by Aritonang[33] regarding sugar, salt and sugar intake showed that respondents had good knowledge (50.2%) and had positive attitudes (58.5%) about sugar, salt and sugar intake in adolescents. Additionally, the results of a previous study demonstrated that individuals with good knowledge tend to read nutrition labels more
frequently and exhibit a positive attitude towards reading and comprehending nutrition labels.[29] This highlights the positive relationship between good knowledge and the behavior of reading food labels, which can contribute to the development of healthier dietary habits.

Nonetheless, there are consumers who possess good knowledge yet remain sceptical about the nutritional value information provided on food labels.[23] The study further emphasizes that respondents who exhibit good attitudes towards food labels are more inclined to read NFP, enabling them to make informed choices while purchasing food items. This is also supported by the research of Ha and Dung[30] which demonstrates that consumers with a positive attitude and stronger support for information on food labels perceive the health benefits of such labels and acknowledge the significance of nutritional information in choosing food products, ultimately motivating them to utilize nutritional value information while making purchases.

Sugar intake in adolescent Indonesia

Sugar consumption per day in adolescents in this research is still included in the high category (>50 gr/day) (52.5%). The detailed analysis conducted in this research indicates that the food groups most frequently consumed by adolescents that can increase their sugar intake are the beverages group, followed by the additional sugar group and the sugary packaged food group. The results of this study are in line with the findings from the Total Diet Study's 2014 survey, which reported that 56.4% of adolescents aged 15 – 19 years consumed sugar-sweetened beverages (SSB).[31] The findings of the 2018 Basic Health Research (RISKESDAS) indicate that 56.4% of adolescents aged 15 – 19 years in Indonesia consume sweetened beverages more than once a day. On a global level, for example in Malaysia, adolescents consume an average of 1.039 ml/day of sweetened beverages, equivalent to four 250 ml-sized cans.[32] Similar to Indonesia, Korean children and adolescents had higher sugar intake among females (54.3 gr) compared to males (46.6 gr), and another study discovered that the average sugar intake of female Brazilian adults was higher than that of male Brazilian adults.[33,22] According to some of the study's findings, sugar intake in children and adolescents is still in the high category of the recommended limit.[22]

Association between several factors that affect sugar intake in adolescents

The main objective of this study was to assess the association between knowledge, attitude of NFP and sugar intake in adolescents. In This study indicates that a number of factors, including age, mother and father education, pocket money for month and pocket money for food and drink for month, mass media exposure, knowledge and attitude toward NFP, are related to adolescent sugar consumption. According to the findings of the bivariate test analysis, mother education and mass media exposure are a significant relationship with sugar intake in adolescents. In addition, it is also known that knowledge and sugar intake in adolescents also have a significant relationship, but there is no association between adolescent attitude and sugar intake. However, result from the multivariate analysis showed that mother education has a significant association with sugar intake in adolescent compared to other variables there are age, pocket money for food and drink, mass media and knowledge of NFP.

According to research, respondents with a good level of knowledge are more obedient in reading food labels (57.6%) than respondents with a low level of knowledge (41.4%). The enhancement of skills or knowledge regarding nutritional information can aid in reducing consumer misunderstanding about a food or drink product. A knowledgeable shopper is aware of the food consumed because it is tied to health, therefore desire to read and use food labels increases.[23] Furthermore, adolescents can easily access information from the media because it makes information more accessible especially information regarding nutritional aspects of foods. In the present study found that there is a positive relationship between mass media or media food marketing with increased sugar intake in food. Studies have evaluated print (vending machines, school logos, magazines, or public transportation) or audiovisual (TV) media (observational cross-sectional studies) food marketing exposure and high sugar beverage intake discovered a substantial positive relationship.[34]

Parents are found to play a significant effect in influencing the eating habits of their children by determining which foods are available and how foods are prepared in the home. One element of the home environment is parental education, and it has been discovered that poorer diets are connected with lower levels of parental education.[35] Research in America shows that parents with low levels of education can significantly increase the consumption of intermediate levels of SSBs aged 2 – 19 years and heavy consumption in adolescents aged 12 – 19 years.[36] Children's and adolescent eating habits have been found to be substantially correlated with parental education level, particularly mother education level.[37] Another research from Guo et al.,[38] stated that the father and mother's low education levels were associated with children's higher SSB consumption (Mantel-Haenszel p<0.01).

This research has limitations as it was conducted with a target audience of adolescents aged between 15 and 18 years. Obtaining respondents within this age range online was not easy task. Moreover, there were some respondents who filled out the online questionnaire but could not be reached for the SQ-FFQ interview. In Addition, conducting online interviews and administering online questionnaires requires a stable data connection. However, some respondents may be difficult to reach for interviews or may encounter issues when completing online forms, necessitating the need for follow up or repeated attempts.

Conclusion

This study indicates that adolescents possess a good understanding of NFP and exhibit a good attitude towards NFP. However, more than half of the respondents still have a high sugar intake. Additionally, this study reveals an association between knowledge, mass media exposure, and mothers' education with sugar intake among adolescents. On the other hand, attitude does not show a significant relationship with sugar intake among adolescents.

Future nutrition interventions could focus to increase awareness and educate people about NFP, with a particular emphasis on enhancing knowledge about NFP among adolescents and

parents of adolescents. One approach that can be implemented is to emphasize the importance of reading and comparing the nutritional values across multiple NFPs, rather than solely relying on information from a single product label. Additionally, leveraging social media platforms commonly used by teenagers and parents can be effective, such as broadcasting public service advertisements on television, creating short videos for social media platforms or designing posters illustrating how to interpret NFPs. Furthermore, the government can play a role in innovating NFPs by incorporating color-coded indicators that signify whether a product contains a certain level of nutrients categorized as low, medium, or high. This initiative would facilitate understanding and enable parents and adolescents to make informed food choices.

Conflict of interest

The authors declare that no conflict of interest with another person or institution.

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References

1. Ananda AJN. Development And Acceptance Of Added Sugar Intake Calculator (KUALA24) Application Among School Aged Children In East. Thesis. Jakarta. Univesitas Indonesia; 2016.
2. Wisuantari, Ni Putu Pristi. Program Literasi Kesehatan Untuk Mengurangi Konsumsi Minuman Berpemanis Pada Siswa SMPN "X" Di Jakarta. Skripsi. Universitas Indonesia;2019
3. United States Departement of Agriculture Foreign Agriculture Service. Sugar: World markets and trade[Internet]. 2023[cited May 2023]. Available from: https://apps.fas.usda.gov/psdonline/circulars/sugar.pdf
4. Landgeist. Sugar consumption in Europe [Internet]. 2023 [cited May 2023]. Available from: https://landgeist.com/2023/04/01/sugar-consumption-in-europe
5. IS, Organization, Sugar Online (Online). Available: www.sugaronline.com, 2003. (Accessed 07 July 2021).
6. Atmarita, Jahari AB, Sudikno, Soekatri M. Intake of Sugar, Salt, and Fat In Indonesia: The Analysis of Individual Food Consumption Survey 2014. Gizi Indonesia. 2016;39(1): 1-14.
7. Andarwulan N, Madanijah S, Briawan D, Anwar K, Bararah A, Saraswati, et al. Food consumption pattern and the intake of sugar, salt, and fat in the south Jakarta City—Indonesia. Nutrients. 2021;13(4):1289.
8. Prada M, Saraiva M, Garrido MV, Sério A, Teixeira A, Lopes D, et al. Perceived associations between excessive sugar intake and health conditions. Nutrients. 2022;14(3):640.
9. Sitohang MY. Reducing the consumption of sugar-sweetened beverages among children and adolescents. Populasi. 2022;30(1):74.
10. Maemunah S, Sjaaf AC. Hubungan Antara Pengetahuan Gizi , Kemampuan Membaca Label Informasi Nilai Gizi , Penggunaan Label Informasi Nilai Gizi dan Frekuensi Konsumsi Mi Instan Pada Konsumen Jakarta dan Sekitarnya. Indonesia J Heal Dev. 2020;2(2):129–36
11. Shangguan S, Afshin A, Shulkin M, Ma W, Marsden D, Smith J, et al. A meta-analysis of food labeling effects on consumer diet behaviors and industry practices. American Journal of Preventive Medicine. 2019;56(2):300–14.
12. Haidar A, Carey FR, Ranjit N, Archer N, Hoelscher D. Self-reported use of nutrition labels to make food choices is associated with Healthier Dietary Behaviours in adolescents. Public Health Nutrition. 2017;20(13):2329–39.
13. Novitamanda AD, Prayitno N, Nurdianty I. Information Exposure Relating With Reading Behavior on Packaged Food Product Among College Students In Fikes Uhamka. ARGIPA (Arsip Gizi dan Pangan). 2020;5(2):92–9
14. Rahayu, Siti. Pengetahuan Gizi Sebagai Faktor Dominan Kebiasaan Membaca Label Informasi Gizi Pada Mahasiswa Fakultas Ilmu-Ilmu Kesehatan Universitas Esa Unggul Skripsi. Jakarta: Universitas Esa Unggul; 2021.
15. Acheampong I, Haldeman L. Are Nutrition Knowledge, Attitudes, and Beliefs Associated with Obesity among Low-Income Hispanic and African American Women Caretakers?. Journal of Obesity. 2013;2013:1-8
16. Anastasiou K, Miller M, Dickinson K. The Relationship Between Food Label Use and Dietary

Intake In Adults: A Systematic Review. Appetite; 2019;138 (August 2018): 280 – 9.

17. Christy S. Association between nutrition fact panel use and dietary quality among young adults in Universitas Indonesia. Thesis. Jakarta: Universitas Indonesia; 2020

18. Wojcicki, J.M. and Heyman, M.B. Adolescent nutritional awareness and use of food labels: Results from the National Nutrition Health and Examination Survey. BMC Pediatrics. 2012; 12(1).

19. Buyuktuncer Z, Ayaz A, Dedebayraktar D, Inan-Eroglu E, Ellahi B, Besler H. Promoting a Healthy Diet in Young Adults: The Role of Nutrition Labelling. Nutrients. 2018;10(10):1335

20. Tania M. Perilaku pengetahuan remaja dengan perilaku konsumsi minuman ringan di SMKN 2 Baleendah Bandung. J Ilmu Keperawatan,. 2016;IV(1)

21. Mediani, Nenny Vini. Pengetahuan, persepsi, sikap dan perilaku membaca label informasi gizi pada mahasiswa. Skripsi. Bogor: Fakultas Manusia Institut Pertanian Bogor; 2014.

22. Rachmah Q, Kriengsinyos W, Rojroongwasinkul N, Pongcharoen T. Development and validity of semi-quantitative food frequency questionnaire as a new research tool for sugar intake assessment among Indonesian adolescents. Heliyon. 2021;7(6):e07288

23. Eka, Luthfia Annisa. Kandungan gizi sebagai faktor dominan yang berhubungan dengan kepatuhan membaca label pangan siswa SMA Negeri 39 Jakarta tahun 2018. Skripsi. Universitas Indonesia; 2018.

24. Badan Pusat Statistik. Buku 1 Pedoman Kepala BPS Provinsi, Statistisi Ahli Madya/Koordinator Fungsi Statistik BPS Provinsi, dan Kepala BPS Kabupaten/Kota Survei Sosial Ekonomi Nasional Susenas Maret 2022. Jakarta: BPS; 2022.

25. Angraini, Sylvianti, Nurhayati, Indah Lukitasaro, Wahyu Bodromurti, dan Dian Surida. Profile perempuan Indonesia 2021. Jakarta. Kementerian Pemberdayaan Perempuan dan Perlindungan Anak; 2021.

26. Van Ansem, W.J.C. et al. Maternal educational level and children's healthy eating behaviour: Role of the Home Food Environment (cross-sectional results from the INPACT study). International Journal of Behavioral Nutrition and Physical Activity, 2014,11(1).

27. Lestari, Dewi. Faktor dominan kepatuhan membaca label pangan pada siswa/I SMA Negeri Khusus Olahragawan Ragunan Jakarta tahun 2013. Skripsi. Universitas Indonesia; 2013.

28. Lally, P. and Gardner, B. Promoting habit formation. Health Psychology Review, 2013. Available at: https://doi.org/10.1080/17437199.2011.603640.

29. Oktaviana, Widia. Hubungan antara karakteristik individu dan pengetahuan label gizi dengan membaca label gizi produk pangan kemasan pada konsumsi di 9 supermarket wilayah kota Tangerang Selatan tahun 2016. Skripsi. Jakarta: Universitas Islam Negeri Syarif Hidayatullah; 2017.

30. Ha, N and Dung N. To Study Consumers' Use of Information on Food Labels in Vietnam. International Review of Management and Marketing.2017; 7(1), hal. 175 – 182.

31. Atmarita None;Imanningsih N;Jahari AB;Permaesih ID;Chan P;Amarra MS. Consumption and sources of added sugar in Indonesia: A Review. Asia Pacific journal of clinical nutrition. U.S. National Library of Medicine.2018.. Available at: https://pubmed.ncbi.nlm.nih.gov/29222880/ (Accessed: December 1, 2022)

32. Sari SL, Utari DM, Sudiarti T. Konsumsi Minuman Berpemanis Kemasan Pada remaja. Ilmu Gizi Indonesia. 2021;5(1):91.

33. Christoph, M.J. et al. Nutrition facts panels: Who uses them, what do they use, and how does use relate to dietary intake?. Journal of the Academy of Nutrition and Dietetics. 2018 ; 118(2), pp. 217–228.

34. Qutteina, Y., De Backer, C. and Smits, T. Media Food Marketing and eating outcomes among pre-adolescents and adolescents: A systematic review and meta-analysis. Obesity Review. 2019; 20(12), pp. 1708–1719.

35. Totland, T.H. et al. The relationship between Parental Education and adolescents' soft drink intake from the age of 11–13 years, and possible mediating effects of availability and accessibility. British Journal of Nutrition. 2013; 110(5), pp. 926–933.

36. Han, E. and Powell, L.M. Consumption patterns of sugar-sweetened beverages in the United States. Journal of the Academy of Nutrition and Dietetics. 2013, 113(1), pp. 43–53.

37. Mahmood, L. et al. The influence of parental dietary behaviors and practices on children's eating habits. Nutrients. 2021; 13(4), p. 1138.

38. Guo, H., Phung, D. and Chu, C. Sociodemographic, lifestyle, behavioral, and parental factors associated with sugar-sweetened beverage consumption in children in China. PLOS ONE. 2021; 16(12).