The Socio-Economic Factors Influencing Sugar-Sweetened Beverages (SSB's) Consumption in Household of DKI Jakarta Province in 2020

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Abstract. Non-communicable diseases (NCDs) are responsible for causing 41 million deaths annually, constituting approximately 74% of all global fatalities. One of the key factors contributing to the elevated risk of NCD's is the excessive consumption of sugary beverages, which encompass a variety of liquid products containing added sugars. This research endeavor seeks to identify the socioeconomic factors that perform in shaping the consumption patterns of sugary beverages within households residing in Province of DKI Jakarta. This study using data from the 2020 Susenas survey, contain a total of 5,456 sampled households. Binary logistic regression is used for modelling whether households had consumed sugary beverages during the preceding week or not. Variables such as marital status, gender, age, educational attainment, employment status of the household head, as well as internet accessibility, economic status, internet usage motives, and household size, were found to influence the likelihood of consuming sugar-sweetened beverages (SSBs) in DKI Jakarta Province. Based on these findings, it is recommended to enhance the use of the internet for promoting healthy lifestyles.

1. Introduction

World Health Organization (WHO) [1] stated that non-communicable diseases (NCDs) cause the deaths of 41 million people each year, equivalent to 74% of all deaths overall. Each year, 17 million people die from NCDs before the age of 70 and 86% of these premature deaths take place in low- and middle-income countries. Cardiovascular disease is the major cause of NCD deaths (17.9 million), go along with cancer (9.3 million), chronic respiratory disease (4.1 million) and diabetes (2.0 million including deaths from kidney disease caused by diabetes). Unlike infectious diseases that caused by viral or bacterial infections, NCDs can occur due to unhealthy lifestyles, both in terms of food consumption patterns and lack of physical activity. Therefore, reducing mortality from non-communicable diseases is one of the sustainable development goals (SDGs) as stated in goal 3 target 3.1 [2], which is to reduce premature deaths from NCDs by one third by 2030.

Along with the times, various types of food began to develop. Current food trends tend to have strong flavors with a high content of preservatives, colorings, and sweeteners. Sugar-sweetened beverages (SSBs) have become a popular drink in the community. Sugar-sweetened beverages (SSBs) are liquids that are added with various forms of sugar such as brown sugar, corn sugar, corn syrup, dextrose, fructose, glucose, sucrose, and others. Sugar-sweetened beverages can include fruit drinks, sports drinks, energy drinks, electrolyte replacement drinks, and coffee and tea drinks that have added sugar [3].

Various studies have shown the adverse effects of excessive consumption of sugar-sweetened beverages on the emergence of diabetes mellitus, obesity, several types of cancer, and cardiovascular disease. Evidence found from previous studies on SSBs in relation to weight gain [4] and cardiometabolic diseases [5]. Research conducted also found a positive and significant association between SSBs intake and the risk of breast cancer and prostate cancer [6]. In addition, the consumption of SSBs was linked with to a higher risk of coronary events and possibly coronary death [7]. An increase in daily SSBs intake of 355 ml was associated with an increased risk of coronary events and possible coronary death. In addition, SSBs may also be associated with sleep patterns, and blood glucose levels correlated with diabetes. A three-way interaction effect was found between SSBs, sleep patterns, and glucose levels of blood [8].

The side effects caused by excessive consumption of sugar-sweetened beverages need to be addressed appropriately. One approach that can be researched is by further examining consumption theory. The life cycle consumption theory published by Modigliani suggests that consumption is not only influenced by current income, but is influenced by spending throughout life [9]. This change in consumption will adjust to the socioeconomic factors of each individual during his or her lifetime [10].

Prevention should not be limited to the individual level, but should be carried out at a higher level, namely the household. Previous research suggests that the head of the household plays a vital role in managing income and expenditure in the family [11]. The head of the household is the decision maker for the family, including the consumption of sugar-sweetened beverages. Differences in socioeconomic factors owned by each household will result in different consumption. For example, gender differences in South African households determine economic access and decision-making for these households [11]. Differences in socio-economic and demographic factors for household heads in Serbia also affect spending on goods and services in these households [12]. A similar study from Vietnam found that there were differences in expenditure between households with the employment status and gender of the household head [13].

In addition to examining the consumption and household side, the next step that can be taken is by knowing the consumption pattern of SSBs and the factors that influence it to determine the appropriate intervention method. Some studies have shown that consumption of SSBs is related to socioeconomic factor and demographic characteristic [14–18]. Malik & Hu [5] found many populations show high consumption levels of SSBs and in low and middle-income countries, raised consumption patterns are linked with urbanization and economic growth. Another study found that internet access variables were associated with a decrease in household SSB consumption expenditure and participation [18].

Many previous studies have analyzed the factors that influence the consumption of sugary foods both internationally [4,14,16,17,19–21], and nationally [18,22]. However, research on the consumption of sweetened beverages analyzes on a regional basis [18,23]. In fact, DKI Jakarta Province can be a province that has the potential for further research because DKI Jakarta Province is the capital of the country and is the province with the highest prevalence of non-communicable diseases in Indonesia. Therefore, this study aims to determine the social and economic factors that influence the consumption of sugar-sweetened beverages in DKI Jakarta Province. Therefore, this study aims to determine the social and economic factors that influence the consumption of sugar-sweetened beverages in DKI Jakarta Province.

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2. Research Methods

2.1. Study Area

This research focuses on all household heads in DKI Jakarta Province in 2020. DKI Jakarta Province (Figure 1) was chosen as the locus of this study because occupies the top position compared to other

provinces in the prevalence of diabetes mellitus with 3.4%. in 2018, a slight increase compared to 2,5% in 2013 [24]. This condition shows the need to analyze the consumption patterns of sugar-sweetened beverages in DKI Jakarta so the government can reduce mortality rate from non-communicable diseases, especially diabetes mellitus.

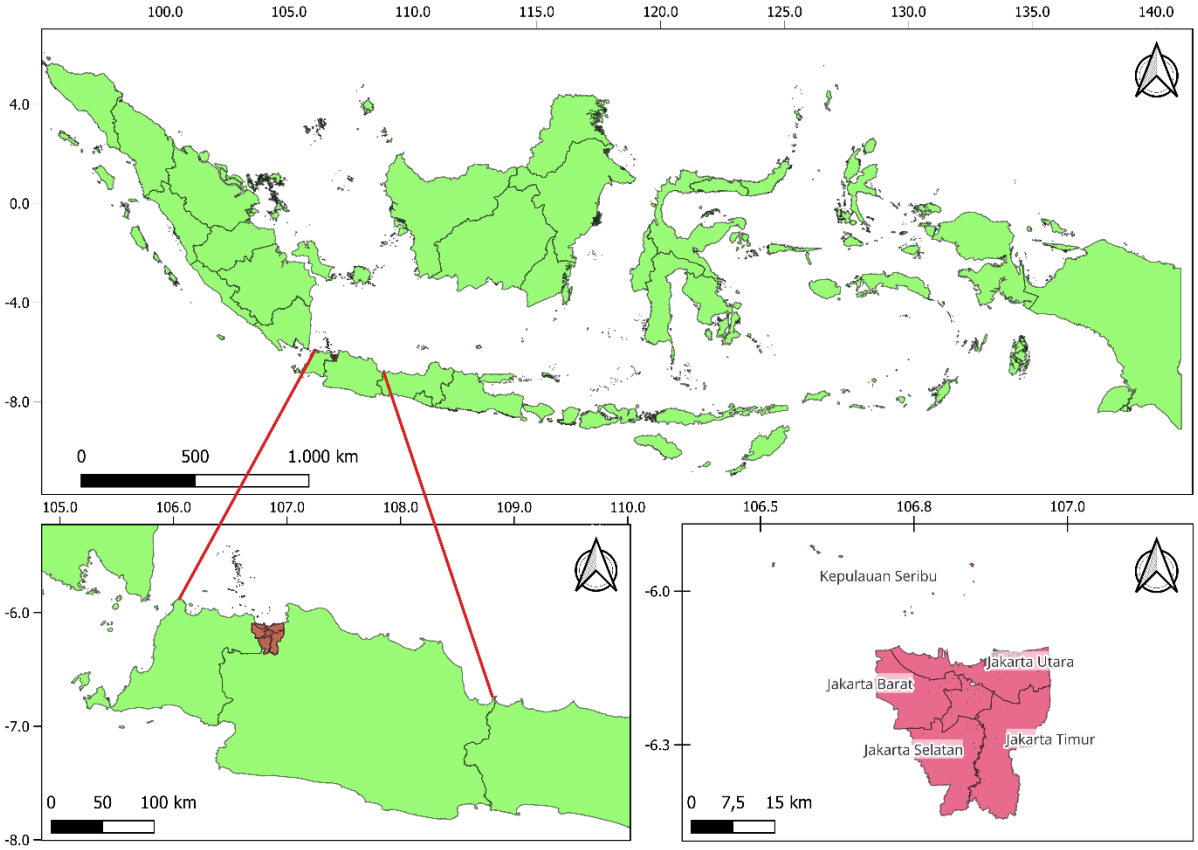


Figure 1. Study Area

2.2. Data

This study uses secondary data from the results of the National Socio-Economic Survey (Susenas) in March 2020 on the KOR questionnaire and the consumption and expenditure module (KP) of DKI Jakarta Province with 5,456 household respondents. The dependent variable used is the expenditure on sugar-sweetened beverages for households that are included in the group of processed food and beverages with codes 177-179, namely bottled tea water and soft drinks / containing CO2, packaged fruit juice, health drinks, energy drinks, and finished drinks (coffee, coffee milk, tea, chocolate milk, etc.) during the past week. A total of 2,420 households were found to have sugar-sweetened beverage consumption, while the other 3,036 did not have sugar-sweetened beverage consumption in the past week. The independent variables were age, gender, marital status, education of the household head, internet access, and purpose of internet access; and household economic condition. The data and operational definitions of variables in this study can be shown in Table 1.

Table 1. Data and Operational Variable Used in Study

No.	Variables	Notation	Operational Definition	Category	Reference
1.	Consumption of sugar-sweetened beverages	Y	Consumption of sugar-sweetened beverages includes bottled tea water and fizzy/CO2-containing drinks (item 177), bottled fruit juice, health drinks, energy drinks (item 178), and processed drinks (coffee, coffee milk, tea, chocolate milk, etc.) (item 179) during the past week. This information is contained in the March 2020 SUSENAS KP with COICOP Code 11111055/059, 01223-01225, 11111052-57. Households were categorized as having sugar-sweetened beverages if in the past week they had at least one expenditure in one of the sugar-sweetened beverages.	0: No* 1: Yes	[3,8,10–15,17,18]
2.	Marital Status of Household Head	X_1	Married is someone who has a partner (wife or husband) at the time of enumeration, whether living together or separately. This concept includes not only legal marriages, but also those who live together and are considered husband and wife by the surrounding community. Unmarried status includes not yet married, living divorce, and death divorce.	0: Not Married* 1: Married	[12,18]
3.	Gender of Household Head	X_2	Badan Pusat Statistik (BPS) stated that gender is a biological difference between men and women. Biological differences are reflected in genital differences and genetic differences. Sex is divided into male and female.	0: Female* 1: Men	[8,13,17]
4.	Age of household head	X_3	According to BPS, age is information about the date, month and year of the respondent's birth based on the Gregorian calendar. Age is rounded down, referring to the respondent's last birthday.	Numerical	[21]
5.	Education Level Of Household Head	X_4	Education level is estimated by the highest diploma/STTB held by the household head.	0: No School* 1: Elementary 2: SMP 3: SMA 4: PT	[17,20–22,25]
6.	Internet Access	X_5	Internet access is divided into 2 categories, the “yes” category if in the last 3 months, the head of household has used the internet.	0: No* 1: Yes	[18,22]
7.	Household Economic Status	X_6	Economic Status is approached from household expenditure divided into five quintiles. Expenditure quintiles are the division of expenditure groups into five equal parts after being sorted from the smallest to the largest expenditure. The higher the quintile group, the higher the expenditure.	0: Quintile 1* 1: Quintile 2 2: Quintile 3 3: Quintile 4 4: Quintile 5	[16,20,21]

No.	Variables	Notation	Operational Definition	Category	Reference
8.	Purpose of Internet Access	X_7	The purpose of internet access is obtained from the question of using the internet for anything. The category is divided into social media if the respondent answers the purpose of internet access for social media and the category is not social media if the answer is for purposes other than social media.	0: Not Social Media* 1: Social Media	[18,22]
9.	Working Status of Head of Household	X_8	Head of households with working status are those who have economic activities with the goal of gaining or helping to obtain income or profit, at least 1 hour (uninterrupted) in the past week. These activities include activity patterns of unpaid workers who assist in a business/economic activity. It also includes having a job but temporarily not working.	0: Not Working* 1: Working	[25]
10.	Number of Household Members	X_9	Number of household members.	Numerical	[25,26]

*) Reference Category

2.3. Logistic Regression

2.3.1. Logistic Regression Model

The analysis was conducted using a binary logistic regression model to determine the factors that influence whether or not a household consumed sugar-sweetened beverages in a week. Logistic regression modelled the probability of certain conditions or statements that are qualitative in nature as a function of several independent variables. Predictor variables can be quantitative (continuous), qualitative (discrete), or both/mixed. The binary logistic regression model of p independent variables can be written as follows [27].

$$\ln\left(\frac{\pi(x_i)}{1-\pi(x_i)}\right) = \beta_0 + \beta_1 x_{i1} + \cdots + \beta_k x_{ik}$$

Where $\pi(x_i)$ denotes the predicted probability at the time of the i-th observation, x_{ij} denotes the value of the j-th independent variable at the i-th observation, and β_j denotes the effect coefficient of the j-th independent variable.

In this study, the independent variable has 2 categories, namely $Y = 1$ is households that have sugar-sweetened beverage expenditures, $Y = 0$ is households that do not have sugar-sweetened beverage expenditures. Because the independent variable is dichotomous or binary, a binary logistic regression model used.

2.3.2. Overall Parameter Testing

The simultaneous test is used to test the response variable can be explained by the predictor variables in the model together [27].

Hypothesis:

$H_0: \beta_1 = \beta_2 = \cdots = \beta_k = 0$ (There is no effect of predictor variables on the response variable)

$H_1: \beta_j \neq 0, j \in \{1, 2, \cdots, k\}$ (There is at least one predictor variable that affects the response variable)

Test statistic:

$$G^2 = -2\log\left(\frac{L_0}{L_1}\right)$$

Description:

L_0: likelihood of the model without containing independent variables (only contains the intercept β_0)

L_1: likelihood of the model using k predictor variables

This statistic will be compared with the value of χ^2 with degrees of freedom according to the number of parameters in H_0. The decision to reject H_0 occurs if $G^2 > \chi^2_{\alpha,db}$ or p-value<α. The decision indicates that at least one predictor variable significantly affects the response variable in the model.

2.3.3. Partial Parameter Testing

Partial testing in logistic regression can be conducted by using the Wald test. The Wald test employs a standard formula to assess the probability that the estimated parameters, or sample statistics, were obtained from the hypothesized population under the null hypothesis. The Wald test statistic (χ^2) is, specifically, the squared version of the Z-statistic.

Hypothesis:

$H_0: \beta_j = 0$ (There is no significant effect of the predictor variable on the response variable)

$H_1: \beta_j \neq 0$ (There is significant effect of the predictor variable on the response variable)

Test Statistic:

$$W^2 = \left(\frac{\hat{\beta}_j}{Se(\hat{\beta}_j)}\right)^2$$

The W^2 test statistic follows a chi-square distribution with one degree of freedom since it tests one parameter. The critical value to reject the null hypothesis (H_0) is $\chi^2 > \chi^2_{df=1}$ or p-value<α, for large samples. Thus, the decision suggests that the predictor variable significantly influences the response variable in the model [27].

2.3.4. Hosmer Lemeshow Test

The Hosmer Lemeshow test is used to check the suitability of the variables to the dependent variable in the logistic regression model by dividing the predicted probability of the data into g parts [28].

Hypothesis:

H_0 : There is a fit of the range of independent variable values to model the dependent variable

H_1 : There is no fit of the range of independent variables to model the dependent variable

Test Statistic:

$$G^2_{HL} = \sum_{j=1}^{g} \frac{(O_j - E_j)^2}{E_j\left(1 - \frac{E_j}{n_j}\right)}$$

The test statistic G^2_{HL} will be chi square distributed with $g-2$ degrees of freedom. The null hypothesis will be rejected if $G^2_{HL} > \chi^2_{df=g-2}(\alpha)$ is obtained.

2.4. Analysis Flow

To answer the research objectives, the data used in this study were analyzed using Rstudio software [29] with analysis and visualization package [30,31]. The workflow of this research can be shown Figure 2.

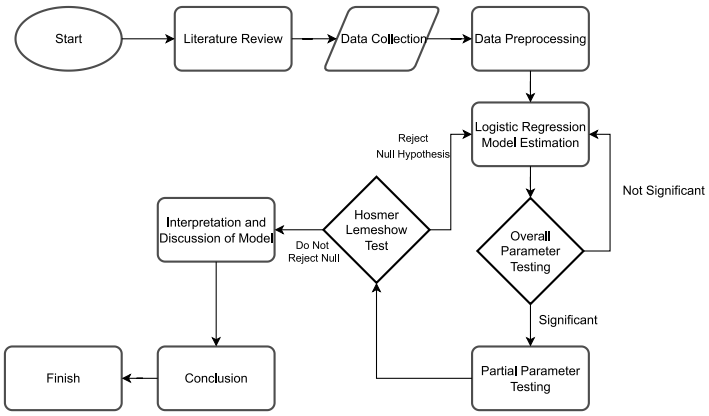


Figure 2. Research Analysis Workflow

This research begins with a review of literature related to the analysis that discusses the consumption of sugar-sweetened beverages both internationally and nationally. Next, data collection was conducted and continued with preprocessing of Susenas data to obtain the variables to be used in accordance with the variable definition Table 1. Logistic regression modeling was then carried out in order to answer the research problem. The logistic regression model that was formed was subjected to overall parameter testing. If the overall parameter test shows significant results, the test is continued by testing the parameters partially. The logistic regression model is then tested for suitability with the Hosmer Lemeshow test. If the Hosmer test shows the result of failing to reject $\boldsymbol{H_0}$, interpretation and discussion of the logistic regression model formed will be carried out so as to obtain conclusions of this research.

3. Results and Discussion

Table 2 shows the characteristics of households based on the consumption behavior of sugar-sweetened beverages and independent variables in DKI Jakarta Province in 2020.

Table 2. Household characteristics based on sugar-sweetened beverage consumption behavior in DKI Jakarta Province in 2020.

Variable	Consumption of Sugar Sweetened Beverages (%)		Total
	Yes	No	
Dependent Variable	72.70	27.30	100
Marital Status			
Not Married	65.78	34.22	100
Married	75.24	24.76	100
Gender			
Male	75.84	24.16	100
Female	60.00	40.00	100
Education Level			
Not in School	60.80	39.2	100
SD	65.17	34.83	100
SMP	72.07	27.93	100
High School	76.94	23.06	100
PT	75.08	24.92	100
Internet Access			
No	64.00	36.00	100
Yes	75.77	24.23	100

Variable	Consumption of Sugar Sweetened Beverages (%)		Total
	Yes	No	
Economic Status			
Quintile 1	52.56	47.44	100
Quintile 2	69.08	30.92	100
Quintile 3	78.57	21.43	100
Quintile 4	80.75	19.43	100
Quintile 5	82.77	17.23	100
Purpose of Internet Access			
Not Social Media	65.02	34.98	100
Social Media	76.24	23.76	100
Working Status			
Not Working	61.18	38.82	100
Working	75.08	24.92	100

Based on the table above, most households consume sugar-sweetened beverages, which amounted to 72.7%. Sugar-sweetened beverages are generally consumed by households with household heads who are married, male, with a mean age of 48 years, have a high school diploma, have internet access to access social media, economic status in quintile 5, working status, and an average of 3 household members.

Table 3. Simultaneous Logistic Regression Parameter Testing

G^2 Statistic	Degree of Freedom	p-value	Conclusion
571.5	15	0.000	Reject H_0

Based on Table 3, simultaneous testing obtained p-value <α (5%) then at a significance level of 5% the sample can show that there is at least one independent variable that affects the consumption of sugar-sweetened beverages**.**

Table 4. Logistic Regression Parameter Estimate

Variable	Estimate	Standard Error	Wald	Degree of Freedom	p-value	Odds
Constant	-0.638	0.258	6.125	1	0.013*	0.528
Marital Status (X_1)	-0.740	0.118	39.298	1	0.000*	0.477
Gender (X_2)	0.805	0.121	44.348	1	0.000*	2.236
Age of household head (X_3)	-0.011	0.003	12.588	1	0.000*	0.989
Education Level			**16.341**	**4**	**0.003***	
Education Level1(X_{41})	0.158	0.145	1.184	1	0.276	1.171
Education Level2 (X_{42})	0.277	0.150	3.433	1	0.064	1.319
Education Level3 (X_{43})	0.314	0.144	4.789	1	0.029*	1.369
Education Level4 (X_{44})	-0.045	0.164	0.074	1	0.786	0.956
Internet Access (X_5)	-0.415	0.156	7.117	1	0.008*	0.660
Economic Status			**160.645**	**4**	**0.000***	
Economic Status1 (X_{61})	0.517	0.096	29.245	1	0.000*	1.677
Economic Status2 (X_{62})	0.953	0.104	84.308	1	0.000*	2.594
Economic Status3 (X_{63})	1.133	0.109	108.412	1	0.000*	3.106
Economic Status4 (X_{64})	1.338	0.127	110.360	1	0.000*	3.810
Purpose of Internet Access (X_7)	0.394	0.138	8.095	1	0.004*	1.483
Working Status (X_8)	0.450	0.100	20.403	1	0.000*	1.569
Number of households (X_9)	0.238	0.025	88.473	1	0.000*	1.269

Based on the output of Table 4, all variables have a significance value that is less than *alpha* = 0.05. These results prove that the independent variables of marital status, gender, age, education level, and working status of the head of household, as well as internet access, economic status, purpose of internet access, and number of household members affect the consumption of sugar-sweetened beverages in households in DKI Jakarta Province in 2020.

Table 5. Hosmer Lemeshow Test

χ^2 statistic	Degree of Freedom	p-value
5.589	8	0.693

The results of testing the suitability of the model using the Hosmer and Lemeshow test in Table 5 show a p-value> 0.05 so that the decision fails to reject the null hypothesis. These results prove that the binary logistic regression model formed is fit and able to explain the relationship between predictor variables and response variables well. Therefore, logistic regression model can be interpreted and discussed.

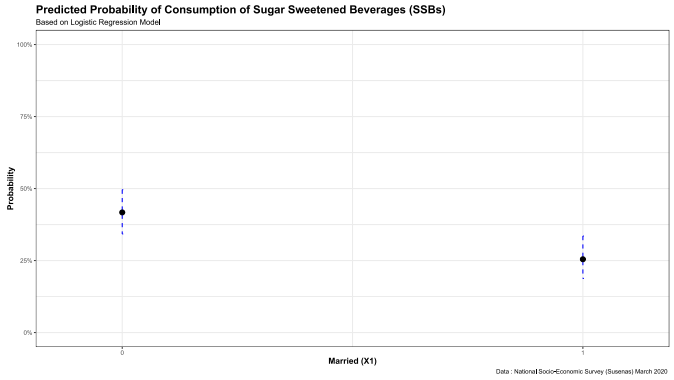


Figure 3. Predicted Probability of SSBs Consumption based on Married Status

The marital status of the household head significantly influenced the consumption of sugar-sweetened beverages in the household (Figure 3). Based on Table 4, households with married household heads were 0.477 times more likely to consume sugar-sweetened beverages than households with unmarried household heads. Previous study also show that non-married household heads have lower consumption expenditure than married or cohabiting household heads [32]. Married people may face greater stress and responsibilities, such as raising a family and managing a household. This can make them more aware of their health and tend to limit their consumption of sweetened drinks that are high in sugar. But there is also research that states that married household heads have lower consumption expenditure than married or cohabiting household heads[18,25]. The findings of Daeli & Nurwahyuni [18] showed that married household heads increased consumption expenditure on sugar-sweetened beverages compared to non-married household heads.

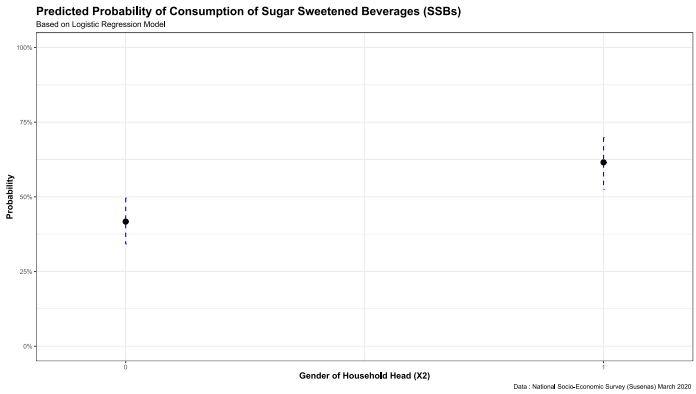


Figure 4. Predicted Probability of SSBs Consumption based on Household Head Gender

In this study, the gender of the household head was also shown to significantly affect the consumption of sugar-sweetened beverages in households in DKI Jakarta Province (Figure 4). Households with female household heads have a tendency to consume sugar-sweetened beverages 2.236 times that of households with male household heads (Table 4). This result is in line with the findings of previous studies which found that the consumption of sugar-sweetened beverages in women is higher than men [14,23]. Sugar-sweetened beverages are often considered "comfort" foods or foods that can improve your mood. Women may be more inclined to seek comfort in sugary foods or drinks in response to stress or emotional changes [19].

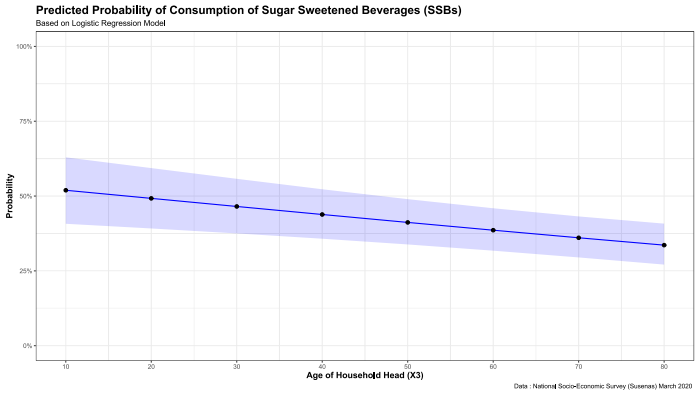


Figure 5. Predicted Probability of SSBs Consumption based on Age of Household Head

Increasing the age of the household head significantly reduces the household's tendency to consume sugar-sweetened beverages (Figure 5). The odds ratio value of 0.989 indicates that for every one year increase in the age of the household head, the tendency of a household in DKI Jakarta Province to consume sugar-sweetened beverages is 0.989 times higher than the age below (Table 4). This result shows that the older the age of the household head will contribute to a decrease in household consumption of sugar-sweetened beverages. As people get older, they tend to become more conscious of their health. They are more aware of the importance of a balanced diet and often try to avoid or reduce consumption of foods or drinks high in sugar because they know the negative impact on health, such as the risk of obesity, type 2 diabetes and cardiovascular disease. This result is also consistent with Han & Powell's [21] study which found that the prevalence of total weight consumption of SSBs increased among children, decreased among adolescents and young adults.

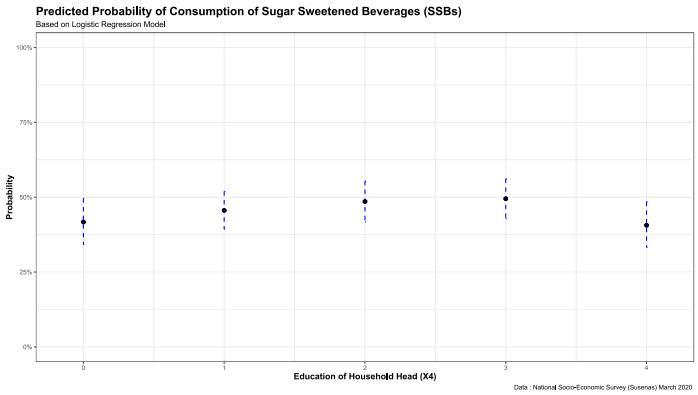
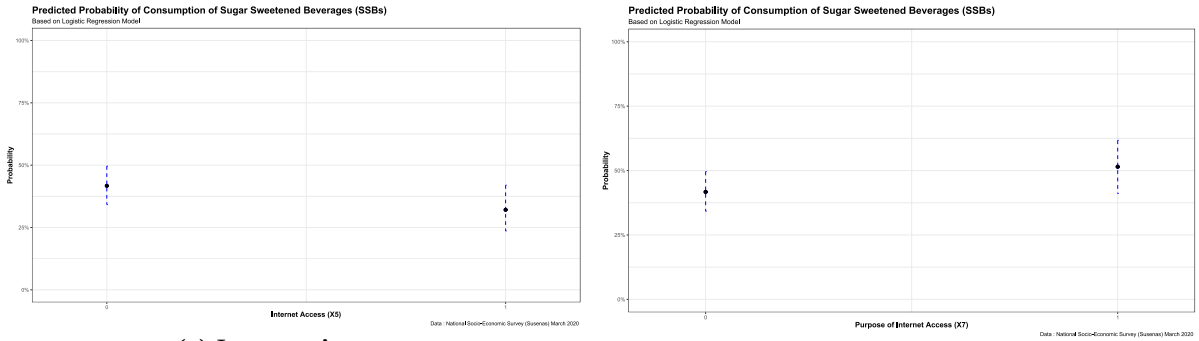


Figure 6. Predicted Probability of SSBs Consumption based on Education of Household Head

The education of the household head influences the consumption pattern of sugar-sweetened beverages in the household (Figure 6). At the senior high school education level, household heads with a senior high school education have a 1.369 times greater tendency to consume sugar-sweetened beverages than households with household heads with no schooling (Table 4). However, the education levels of elementary, junior high, and higher education did not show any difference in the tendency of consumption of sugar-sweetened beverages by households. This is reinforced by other research which states that households with educated household heads tend to have greater expenditure [25].

However, another study specific to sugar-sweetened beverage consumption by Han & Powell [21] found contradictory results to this study. Adolescents with low-educated parents had a higher chance of consuming sugar-sweetened and sugary drinks than adolescents with highly educated parents [21]. These results suggest that the higher the education of the household head, the consumption of sugar-sweetened beverages will decrease. This difference could have occurred because formal education in different regions varies greatly. Not all formal education teaches nutritional knowledge about the dangers of excessive consumption of sugar-sweetened beverages. Therefore, further research is needed on this education level variable.

On the other hand, several studies have shown that the pattern of sugar-sweetened beverage consumption reduction is influenced by the level of education [20], specifically knowledge of health literature [22] and healthy lifestyles. Previous study found that preference was identified to be the most common factor to influence the intake of sugar-sweetened and sugary drinks, followed by health literacy and community availability [17]. Nurjayanti et al. [22] also found that the consumption of sugar-sweetened beverages is influenced by a person's nutritional knowledge. In this study, it was found that most subjects with more consumption of sugar-sweetened beverages had less nutritional knowledge. Subjects with less nutritional knowledge have a 1.50 chance of consuming more sugar-sweetened beverages. Therefore, knowledge about nutrition and health needs to be given specifically.



(a) Internet Access (b) Purpose of Internet Access

Figure 7. Predicted Probability of SSBs Consumption based on Internet Variable

Internet access and the purpose of internet access significantly affect household consumption of sugar-sweetened beverages (Figure 7). Households where the head of household has internet access have a 0.660 times tendency to consume sugar-sweetened beverages (Table 4). People who have internet access are more likely to search for health information and gain a better understanding of the health risks associated with excessive consumption of sugar-sweetened beverages. This information may influence their decision to reduce their consumption of sugar-sweetened beverages. However, when viewed from the purpose of its use, the use of internet access for social media has a tendency to consume sugar-sweetened beverages 1.483 times than the use of internet access for other purposes. Research by Nurjayanti, et al. [22] found that *high screen time* has a greater chance of consuming sugar-sweetened beverages in excess. The research shows that there is a significant relationship between *screen time* and the level of consumption of sugar-sweetened beverages. Another study found that the variable of internet access is a variable that is consistently associated with a decrease in household expenditure and participation in the consumption of sugar-sweetened beverages [18]. Therefore, social media has a real influence on the tendency of household consumption of sugar-sweetened beverages.

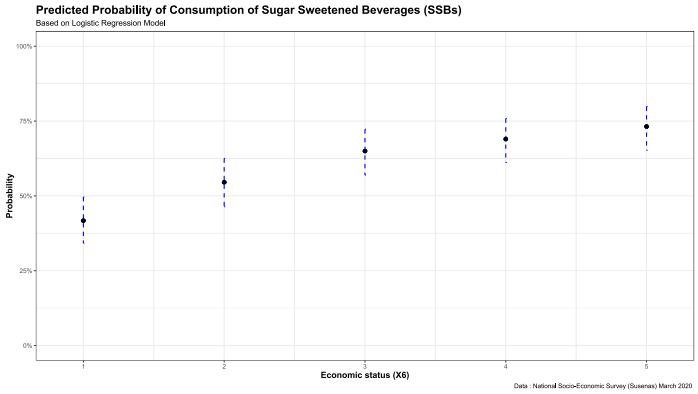


Figure 8. Predicted Probability of SSBs Consumption based on Economic Status

Household economic status affects the consumption of sugar-sweetened beverages also consistent with previous studies [20]. Expenditure quintiles 2, 3, 4, and 5 consistently have a higher tendency to consume sugar-sweetened beverages than quantile 1 (Figure 8). The value of the tendency increases as expenditure increases. This result shows that the higher the economic status of the household, the greater the tendency to consume sugar-sweetened beverages. Rich people are more likely to satisfy their desires for pleasure, including by consuming sweet foods and drinks. They have enough resources to do it without thinking about the financial impact. Previous research found among normal weight children, showed that weekly pocket money was associated with high intake of SSBs [16]. On the other hand, Han & Powell [21] found a negative relationship between economic status and SSB consumption. Their study found that low-income children had a higher likelihood of total weight SSBs consumption and higher energy intake from total SSBs and fruit drinks than high-income children.

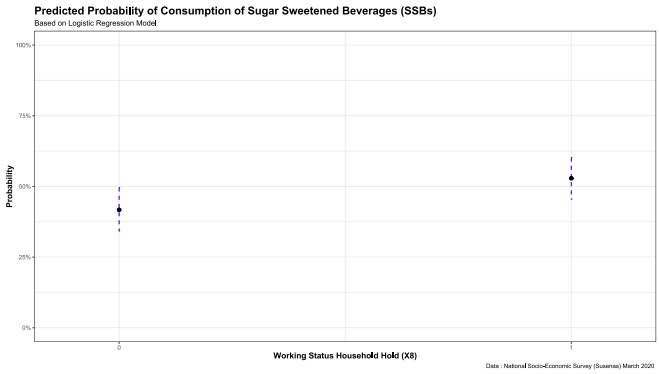


Figure 9. Predicted Probability of SSBs Consumption based on Working Status

The working status of the head of household also affects the consumption of sugar-sweetened beverages in the household (Figure 9). Households with working household heads have a 1.569 times tendency to consume sugar-sweetened beverages than households with non-working household heads (Table 4). This means that households with working household heads have consumption expenditures that tend to be higher than those with non-working household heads. Work can often lead to high levels of stress, and some people may find that sugar-sweetened beverages provide a boost of energy or comfort during a busy workday. This finding is in line with Gebreselassie & Ndlovu's [25] research in Amhara, Ethiopia which found that households with working household heads have a tendency to consume more than households with unemployed household heads.

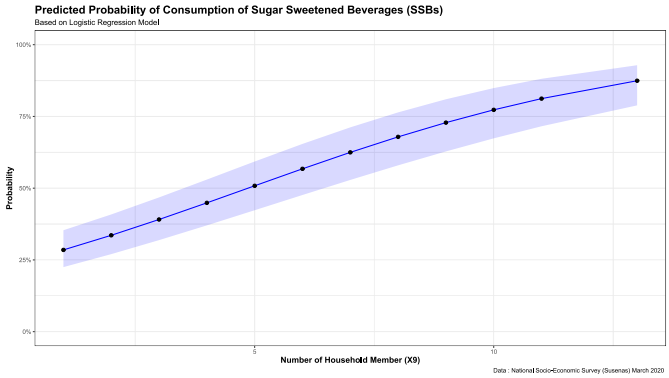


Figure 10. Predicted Probability of SSBs Consumption based on Number of Household Member

An increase of one household member also increases the tendency of households to consume sugar-sweetened beverages with a tendency of 1.269 times (Table 4). This result shows that there is a pattern of consumption of sugar-sweetened beverages that increases in line with the increase in the number of household members (Figure 10). Each family member will certainly have different taste preferences. Some family members may prefer sugar-sweetened beverages, while others may not. To satisfy these diverse tastes, it may be necessary to purchase different types of sugary drinks, which can increase overall consumption. Hone & Marisennayya [26] in their research also found that family size has a positive effect on the consumption of a household. Single families have less consumption expenditure compared to nuclear families and extended families [25].

As a means of mitigating the prevalence of NCDs and accomplishing Goal 3 Target 3.1 of the SDGs, various strategies and policies may be employed to lower the consumption of SSBs. In terms of the government, one of the policies that can be implemented is a tax on the consumption of SSBs. The imposition of taxes on SSBs consumption is recommended by WHO [33] and other international

organisations [34] and has been put into effect in numerous countries [35]. The implementation of this tax has been proven to reduce the consumption of SSBs [36,37], beneficial in terms of health [38], and potentially increase state revenue so that it can be used for development [39]. However, because SSBs tax affects low-income households more sensitively [40], its implementation needs careful consideration. Additionally, campaigns and counselling can be implemented to educate the public on the dangers of SSBs [41,42].

In addition, the government should regulate companies that produce SSBs to include the dangers of excessive consumption of sugar-sweetened beverages. As on cigarette packs, this warning can be written or presented using pictorial health warnings that are effective in changing knowledge, attention, and attitude [43]. This warning will provide initial awareness for the public to control their sugar intake, especially from sugar-sweetened beverages. Inspired by the cigarette case, three approaches can be used to warn people against excessive consumption of sugar-sweetened beverages: using fear, guilt, and financial loss. These three approaches may have different effectiveness depending on the characteristics of the SSBs consumers [44]. This study aims to serve as a guide for developing focused strategies to decrease the prevalence of NCD by aiming at households that have characteristics with a high tendency to consume SSBs.

4. Conclusion

Socioeconomic factors of household head age, household head education, household economic status, and purpose of internet access influence the tendency to consume sugar-sweetened *beverages* (SSBs) in DKI Jakarta Province. Married household heads have a greater tendency to consume sugar-sweetened beverages, as well as female household heads who have a greater tendency than male household heads. The age of the household head, economic status, and number of household members have a positive effect on the tendency of households to consume sugar-sweetened beverages. Household heads with a high school education level have a higher tendency to consume sugar-sweetened beverages than household heads who did not go to school. This result implies that formal education does not have a significant effect on reducing the consumption of sugar-sweetened beverages. The consumption of sugar-sweetened beverages is more related to the economic condition of the household, the higher the income also increases the consumption of sweetened beverages by households. Working household heads also influence the tendency of households to consume sugar-sweetened beverages to be greater. In addition, the existence of internet access and the purpose of its use for social media has a greater tendency for household consumption of sweetened beverages than internet access for other purposes. Based on the findings of this study, it is expected that several policies and campaigns will be targeted at households with a high tendency to consume SSBs in order to reduce NCDs.

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