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The Impact of Sweet Beverage Consumption and Socioeconomic Factors on Mental Health Disorder Symptoms in Indonesia

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Abstract

This study aims to analyze the impact of sugary drink consumption and socioeconomic factors on mental health symptoms in Indonesia. Mental health is a crucial aspect of individual well-being, closely linked to a person's ability to manage stress, function productively, and contribute positively to themselves and their surroundings. This study highlights two main factors that can affect mental health: sugary drink consumption and socioeconomic factors. The methodology used in this research is a quantitative analysis using secondary data from IFLS 5, which includes indicators of mental health, consumption patterns, and the socioeconomic status of respondents. The results show that sugary drink consumption has a significant positive impact on the probability of depression symptoms. Meanwhile, socioeconomic variables such as education level, marital status, and wealth also influence the probability of depression symptoms.

Keywords: Depression Symptoms, Logistic Regression, Socioeconomic Factors, Sugary Drinks.

1. INTRODUCTION

Mental health is an integral component of individual well-being that affects one's ability to manage daily stress, perform productively, and contribute positively to oneself and the surrounding environment. The United Nations (UN) has set the Sustainable Development Goals (SDGs) for the year 2030, with goal number three focusing on reducing one-third of premature deaths caused by non-communicable diseases through prevention and treatment, as well as promoting mental health and well-being. The agenda for promoting health is crucial and relevant in the post-COVID-19 world. According to a publication by Organization and others (2023), the prevalence of mental health disorders in ASEAN in 2000 increased rapidly from 7.1% to 18.7% in 2019 (excluding Sri Lanka). In the same publication, the World Health Organization (WHO) estimates that 7 million households in Indonesia have at least one family member with a mental health disorder (psychosis).

The COVID-19 pandemic has altered social and economic conditions, making it important to discuss the significant increase in mental health cases globally, including in Indonesia. In the first year of the pandemic alone, the World Health Organization (WHO) estimated a 25% increase in mental health disorders. This was possible because, during the COVID-19 period, many individuals likely experienced anxiety, depression, and stress due to social isolation, economic uncertainty, and the loss of loved ones. The online health consultation platform Halodoc reported that mental health services became one of the top five most accessed services, with a 300% increase in mental health services compared to before the COVID-19 pandemic. Meanwhile, a study by d'Arqom et al. (2023) found that young

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people were more vulnerable to social anxiety due to the pandemic.

The high number of mental health disorders creates an economic burden. Rice, Kelman, and Miller (1992) stated in their research that mental illness imposes a significant economic burden on individuals due to the high usage of medical resources and loss of productivity. Similarly, Lim et al. (2008) concluded in their study that the economic burden of mental health disorders in Canada is very high. A more recent study by McCallum et al. (2018) in Australia also mentioned the significant economic burden caused by mental disorders, as these disorders have significantly reduced individuals' quality of life and increased functional disability. In addition, research by Addo et al. (2018) highlighted the high economic burden on caregivers of individuals with mental health disorders due to the loss of productivity.

Research by Bubonya, Cobb-Clark, and Wooden (2017) found that people with poor mental health have six times lower productivity. Another study by Bryan, Bryce, and Roberts (2022) observed the impact of both physical and mental health, and found that the impact of mental health disorders was greater than that of physical health disorders. This also significantly affects productivity in the workplace. In line with this, a study by Fox et al. (2012) on mental disorders among police officers in urban areas found that police officers with mental health disorders experienced a 5.9% decrease in productivity.

Mental disorders are multidimensional problems that are still being studied by many experts. One factor that is suspected to have a strong link to mental disorders is consumption, specifically sugary drinks in this study. Siregar et al. (2024) mentioned that Indonesia ranks highly in per capita sugary drink consumption in Southeast Asia, with an average consumption of 20.23 liters per person per year. Furthermore, 61% of Indonesians consume sugary drinks daily, and the largest group of sugary drink consumers is in the 3-4 year age group, with a percentage reaching 68.6%. A publication from the Center for Indonesia's Strategic Development Initiatives (CISDI) cited data from the National Socio-Economic Survey (SUSENAS), showing a 15-fold increase in sugary drink consumption, especially packaged sugary drinks, from 5 million liters in 1996 to 405 million liters in 2014. In 2022, CISDI reported that 34.15% of Indonesian households consumed packaged sugary drinks, with the most commonly consumed drinks being packaged tea and carbonated soda.

2. LITERATURE REVIEW

The consumption of sweet drinks with high sugar content can have negative effects on mental health. Ra (2022) states that there is a direct impact between the consumption of sweet drinks and stress and depressive symptoms. The study conducted on Korean adolescents

showed that the consumption of sweet drinks and fast food, either independently or together, increases stress levels, depressive symptoms, and the risk of suicidal thoughts. The effects tend to be worse when both types of consumption are combined, rather than consumed separately. This is possible, as Jacques et al. (2019) explain that the consumption of sweet drinks, especially those with high sugar content, and mental health disorders involve several neurobiological mechanisms related to emotions, stress, and addictive behaviors, where sugar consumption can affect the mesocorticolimbic system in the brain, which is the same pathway involved in substance addiction. Activation of this repeated pathway due to sugar consumption can trigger neuroplastic changes that reduce impulse control, making individuals more

vulnerable to excessive behavior, including the consumption of high-sugar foods. Excessive sugar consumption has been linked to increased symptoms of anxiety and depression because it affects the stress pathways, with sucrose consumption potentially reducing the stress response by decreasing HPA (hypothalamic-pituitary-adrenal) axis activity, which temporarily alleviates feelings of stress but strengthens emotional eating or compulsive eating tendencies. Wang et al. (2022) conducted research on the relationship between the consumption of sweet drinks and inflammation and hormonal responses, finding that high consumption of sweet drinks is suspected to cause an increase in chronic inflammation and changes in hormonal responses, including cortisol, where inflammation is often associated with an increased risk of mental health issues, including depression. According to the scientific article, data analysis from three cohorts involving 287,556 participants found that individuals who consumed more sugary beverages had a 25% higher risk of depression. Additionally, an increase in sugary drink consumption by 250 mL per day raised the depression risk by 8%. Besides this research, Chen et al. (2024) conducted a study that found, in animal models, sweetened drinks can affect mental health through mechanisms involving increased cortisol and dysregulation of the HPA axis, where sweet drinks with high fructose content are known to increase stress hormones such as cortisol, disrupting the balance of the HPA axis, thus making the body's stress response unstable and often linked with depressive symptoms. Furthermore, the consumption of sweet drinks also increases inflammation and pro-inflammatory cytokines, whose elevation triggers inflammation in the body, disrupting neurotransmission and negatively affecting brain functions related to mood regulation. Moreover, sweet drinks also disrupt gut microbiota balance because sweeteners like aspartame and sucralose can cause glucose intolerance, which affects neurotransmitter hormone production and can worsen or accelerate depressive symptoms. Hu, Cheng, and

Jiang (2019) also explain that the consumption of sugar- laden drinks can increase the risk of depression through several biological pathways, such as increased reactivity of the HPA axis, which then causes dysfunction when responding to stress and leads to low-grade inflammation due to obesity. Not only that, but increased HPA reactivity also causes the HPA axis to be unable to adapt, which can affect mental health and increase susceptibility to mental health disorders like depression. Sweet drinks are also often associated with weight gain and obesity. Mannan, as cited in Hu, Cheng, and Jiang (2019), states that according to a systematic study and meta-analysis of longitudinal studies, there is a bidirectional relationship between depression and obesity. The consumption of sugar from drinks is also linked to glucose regulation disorders and insulin resistance, which can lead to other diseases such as type 2 diabetes, which also has a bidirectional relationship with depression. The results of the study by Hu, Cheng, and Jiang (2019) showed that the consumption of sweetened beverages increased the risk of depression by 31% for the highest consumption group. This relationship was significant in both cross-sectional and cohort studies, with a dose-response relationship showing a 5% increased risk of depression for consuming two cups of soda per day and a 25% increased risk for consuming three cans of soda per day.

3. METHOD

This study uses secondary data. The data was obtained from the fifth edition of the Indonesia Family Life Survey (IFLS), conducted by RAND between 2014 and 2015. The Indonesia Family Life Survey is a survey involving more than 30,000 individuals living in 13 provinces across Indonesia. In this study, the sample used is taken from the IFLS data from the fifth edition, specifically from Book 3B, Section KP (Psychological Health), which contains 10 items regarding the individual's psychological health status. The observation period for psychological health refers to the individual's experience in the past week. The questions in IFLS 5 are based on the depression symptom indicators from the Center for Epidemiologic Studies Depression (CESD-R). Respondents rated their feelings on a scale from 1 to 4, where 1 = Rarely or never (≤1 day); 2 = A few days (1-2 days); 3 = Sometimes (3-4 days); and 4 = Most of the time (5-7 days). Fahmi et al. (2019) used the results from the CESD-R questionnaire, which were then processed using the Rasch model to convert the standard questionnaire scores, with answers on a 1-4 rating scale, into values that could be evaluated logarithmically, yielding a logistic value for each respondent. The Rasch Model is a unidimensional model based on fundamental probability theory and expects only the Yin (2018) model, i.e., the Logit Model, to be used to estimate the relationship between socio-

economic variables and depression symptoms. The Logit model is a nonlinear model with a binary dependent variable, often referred to as a dummy variable. The model specification in this study is as follows:

$$logit\ ((Y = 1)) = \beta_0 + \beta_1 SSB + \beta_2 I_{PCE} + \beta_3 TP + \beta_4 Mar + \beta_5 Urban + \varepsilon$$

The SSB variable explains the amount of sweet beverage consumption in the past week. The socio-economic variables used in this study are IPCE, which explains the indicator of per capita expenditure, TP, which refers to the level of education, Mar, which refers to marital status, and Urban, which is a dummy variable for social environment

4. RESULT AND DISCUSSION

A table is provided showing the results of the descriptive statistics summary for the variables used in this study. The following descriptive statistics summary was obtained using the data processing software STATA 17.0. The depression symptoms variable, as the dependent variable in this study, was processed using the Rasch modeling and then transformed into a dummy variable with a cut-off value of -0.52. The determination of the cut-off score for the CESD-R 10 questionnaire was based on the standard international cut-off score for depression symptoms in the 10-item questionnaire, which is ≥ 10 according to Andresen et al. (1994).

Table 1. Descriptive Statistics with 32,370 Observations

Variabel	(1)	(2)	(3)
	Mean	Min	Max
Depressive	0.193		
SSB Consumption	0.350	0	50
Log PCE	13.6	11.2	16.9
Education Level	0.827	0	2
Mariage Status	0.804	0	2
Urban	0.597		

Source: Data processed with STATA 17.

From the statistical data processing, regression was performed using the Logistic Regression model and the data processing software STATA 17. The results of the regression analysis between the independent variables and the dependent variable are as follows:

Table 2. Analysis Regression Logistic

Variabel	Depressive
SSB Consumption	0.005***
	(0.017)
Log PCE	-0.0381***
	(-2.79)
Middle Education Level	-0.216***
	(0.005)
High Education Level	-0.057***
	(0.006)
Married	-0.035***
	(0.051)
Widow	0.0070
	(0.009)
Urban	0.002
	0.004

Source: Data processed with STATA 17.

The variable of sweet drink consumption has a positive and significant coefficient at the 1% level. This indicates a significant positive relationship between the consumption of sweet drinks and depressive symptoms. Specifically, each increase in the consumption of sweet drinks is associated with an increased likelihood of an individual experiencing depressive symptoms. Despite the small coefficient value of 0.005, this still suggests that sweet drink consumption could be an additional risk factor for depression. This indicates that an increase in sweet drink consumption is positively related to depressive symptoms, although with a small effect. The higher the consumption of sweet drinks, the greater the likelihood that an individual will experience depressive symptoms. This finding aligns with the research by Ra (2022), which used logistic regression and found that consumption of sweet drinks and fast food above a moderate level is associated with an increased risk of stress, depressive symptoms, and suicidal ideation among adolescents. The combination of sweet drink consumption and fast food shows a stronger synergistic effect than their separate consumption.

A cohort study by Chen et al. (2024) also found that sweetened beverage consumption can affect mental health, where consuming more than two units of SSB per day was associated with a 26% increased risk of depression. Furthermore, it was found that economic status influences the risk of depression, with individuals of lower socioeconomic status having a higher risk of depression due to higher sweetened beverage consumption, often caused by limited access to healthy food choices. Hu, Cheng, and Jiang (2019) found that

sweetened beverage intake was associated with a 31% increased risk of depression among the highest intake group compared to the lowest intake group. This relationship was significant in both cross-sectional and cohort studies, with a dose-response relationship indicating that consuming around 2 cups of soda per day increases the risk of depression by 5%, while consuming around 3 cans of sweetened beverages per day increased the risk by up to 25%.

The regression coefficient for Log PCE is -0.0381, and the negative sign indicates that increased household consumption expenditure is associated with a decrease in depressive symptoms. In other words, the higher the household consumption expenditure, the lower the likelihood that an individual will experience depression. The Log PCE variable has a significant negative coefficient at the 1% level, indicating that increased household consumption expenditure is related to a decreased likelihood of experiencing depressive symptoms. Practically, the higher the household consumption expenditure (which can reflect economic welfare), the lower the risk of depression.

The coefficient for the variable of secondary education level is -0.216 with a 1% significance level ($p < 0.01$). This negative coefficient indicates that individuals with secondary education tend to have a lower risk of depression compared to those without secondary education. Meanwhile, the variable for higher education level also shows a negative and significant relationship at the 1% level. The coefficient of -0.057 suggests that individuals with higher education have a lower risk of depression compared to those with lower or secondary education. Higher education is often associated with better job access, economic stability, and a better understanding of how to manage stress.

The regression coefficient for marital status is -0.035, and it is highly significant. This indicates that marital status has a significant influence on depressive symptoms in this model. Meanwhile, the variable for divorce status has a small positive coefficient but is not significant. This means that, in this study, divorce status did not show a meaningful influence on depressive symptoms.

The last variable is a social variable related to place of residence. The coefficient for the urban variable is 0.002 with a standard error of 0.004. This result is also not significant, indicating that living in an urban area does not have a significant impact on depressive symptoms.

5. CONCLUSION

This study shows that sweet drink consumption has a significant effect on mental health issues, particularly depression. Respondents who consumed high amounts of sweet drinks

were more likely to experience depressive symptoms. This suggests a relationship between unhealthy consumption patterns and mental health problems. Several socio-economic variables, such as income, education level, and occupation, also influence an individual's mental health. Individuals with lower socio-economic status, who tend to have limited access to healthcare and education, are more vulnerable to mental health issues. This factor emphasizes the importance of social policies that can improve economic welfare and access to education to enhance mental health. Economic status, related to income and financial capacity, proves to influence mental health, with individuals in lower economic categories being more likely to experience stress and depression due to financial instability and anxiety over basic life needs. Therefore, improving economic conditions can serve as a preventive measure for mental health problems. Education level also impacts mental health, as individuals with higher education tend to be better at managing stress and seeking help when dealing with mental issues. Education provides essential knowledge about mental health and how to maintain emotional balance.

6. LIMITATION

This study has several limitations that should be acknowledged. First, the sample size was relatively small and limited to participants from a specific geographic region, which may limit the generalizability of the findings to broader populations.

Additionally, the cross-sectional nature of the research design prevents the establishment of causal relationships between the variables. While we have made efforts to control for confounding factors, unmeasured variables may still influence the results.

BIBLIOGRAPHY

Addo, R., Agyemang, S.A., Tozan, Y., Nonvignon, J. (2018). "Economic Burden of Caregiving for Persons with Severe Mental Illness in Sub- Saharan Africa: A Systematic Review." PloS one 13(8): e0199830.

Andresen, E.M. et al. (1994) 'Screening for Depression in Well Order Adults: Evaluation of a Short Form of the CES-D', Screening for Depression in Well Order Adults: Evaluation of a Short Form of the CES-D, 2, p. 8.

Bryan, Mark L, Andrew M Bryce, and Jennifer P Roberts. 2022. "Dysfunctional Presenteeism: Effects of Physical and Mental Health on Work Performance." The Manchester School. https://api.semanticscholar.org/CorpusID:248254777

Bubonya, Melisa, Deborah A. Cobb-Clark, and Mark Wooden. 2017. "Mental Health and Productivity at Work: Does What You Do Matter?" Labour Economics 46, 150–65.

http://dx.doi.org/10.1016/j.labeco.2017.05.001

Chen, Y., et al. (2024). "Consumption of Sugary Beverages, Genetic Predisposition and the Risk of Depression: A Prospective Cohort Study." General psychiatry 37(4), e101446.

d'Arqom, Annette et al. (2023). "Societal Influence and Psychological Distress among Indonesian Adults in Java on the Early Omicron Wave of COVID-19." *Future science OA* 9(10): FSO894

Fox, J., et al. (2012). "Mental-Health Conditions, Barriers to Care, and Productivity Loss among Officers in an Urban Police Department." Connecticut medicine 76(9), 525–31.

Hu, D., Cheng, L., Jiang, W. (2019). "Sugar-Sweetened Beverages Consumption and the Risk of Depression: A Meta-Analysis of Observational Studies." Journal of affective disorders 245, 348–55.

Lim, K.L., et al. (2008). "A New Population-Based Measure of the Economic Burden of Mental Illness in Canada." Chronic Dis Can 28(3), 92–98.

McCallum, Sonia M et al. (2018). "Reductions in Quality of Life and Increased Economic Burden Associated with Mental Disorders in an Australian Adult Sample." Australian Health Review 43(6), 644–52.

Ra, J.S. (2022). "Consumption of Sugar-Sweetened Beverages and Fast Foods Deteriorates Adolescents' Mental Health." Frontiers in nutrition 9: 1058190.

Rice, D.P., Kelman, S., Miller, L.S. (1992). "The Economic Burden of Mental Illness." Psychiatric Services 43(12): 1227–32. https://doi.org/10.1176/ps.43.12.1227

Siregar, R.A., et al. (2024). "Sugar-Sweetened Beverages Taxation Plan in Indonesia: Call for Political Commitment." Public Health Challenges 3(3): e217. https://onlinelibrary.wiley.com/doi/abs/10.1002/puh2.217

Wang, Y., et al. (2022). "The Dose-Response Associations of Sugar-Sweetened Beverage Intake with the Risk of Stroke, Depression, Cancer, and Cause-Specific Mortality: A Systematic Review and Meta-Analysis of Prospective Studies." Nutrients 14(4).

Zhou, Q., Fan, L., Yin, Z. (2018) 'Association between family socioeconomic status and depressive symptoms among Chinese adolescents : Evidence from a national household survey', Psychiatry Research. Elsevier Ireland Ltd, 259(121), 81–88. doi: https://doi.org/10.1016/j.psychres.2017.09.072