Sociodemographic Determinants of Expenditure on Soft Drinks among Households in Malaysia

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Abstract: High consumption of soft drinks can lead to various chronic diseases, most notably, diabetes and heart disease. The objective of the present study is to examine sociodemographic factors associated with consumption expenditure on soft drinks among households in Malaysia. Data from the Malaysia Household Expenditure Survey (n = 52,671) were used for secondary analysis. The dependent variable was monthly household expenditure on soft drinks. The independent variables were age, gender, education, marital status, region, income and ethnicity. The present study used a two-part model to estimate factors affecting consumption and amount decisions of soft drinks. Results showed that age, gender, education, marital status, region, income and ethnicity were associated with consumption of soft drinks. Having household heads aged more than 30 years decreased the likelihood of consuming soft drinks. Soft drinks expenditure was positively associated with being married, the middle-income group, Chinese ethnicity and low-education levels. In conclusion, household expenditure on soft drinks is closely correlated with a wide range of sociodemographic factors. Findings from the present study can assist policymakers in developing a more effective approach that focuses on decreasing household consumption of soft drinks.

Keywords: consumption; expenditure; households; sociodemographic factors; soft drinks

Paper type: Empirical paper

Introduction

Diabetes is a widespread chronic disease worldwide and has been receiving significant attention from various stakeholders. Even though diabetes can be avoided, there appears to be an upward trend of diabetes prevalence. According to the 2015 International Diabetes Federation Congress, diabetes is known as one of the fastest-growing epidemics in human history (WHO, 2017). It is the current major public health concern across the globe, including Malaysia. According to the National Health and Morbidity Survey 2019, the prevalence of known diabetes and raised blood glucose was 9.4% and 8.9%, respectively. In the study by Cheah & Goh (2017), approximately three out of every ten older adults in

Malaysia suffered from diabetes. It is widely evident that diabetes is one of the main risk factors of cardiovascular diseases, renal failure, visual impairment and stroke. In terms of economic costs, diabetes possesses substantial impacts on the healthcare system and national health expenditure.

Unhealthy lifestyles, including physical inactivity and a poor diet, are the major causes of diabetes (Colberg et al., 2016). People who consume a lot of soft drinks are more likely to develop diabetes than people who live a healthy lifestyle (Choi & Curhan, 2008; Malik, et al., 2010; Zad et al., 2015). Excessive intake of soft drinks is also a significant contributor to obesity and tooth decay. Soft drinks contain water, sweeteners and flavours that can be both natural and synthetic. Based on the Classification of Individual Consumption by Purpose (COICOP), soft drinks are classified into two categories: carbonated (e.g. Pepsi, Coke and Fanta) and non-carbonated soft drinks (e.g. juices, nectars, coffee and tea).

A published article found that African American women faced higher risk of type-2 diabetes mellitus if they consumed soft drinks regularly (Palmer et al., 2008). Other researchers found that people who frequently consumed soft drinks had a higher probability of developing diabetes and other illnesses than those who did not (Basu et al., 2013; Drouin-Chartier et al., 2019; Torres-Ibarra et al., 2020). Although the harmful health effects of soft drinks have been well-documented, many people still consume soft drinks. In an international poll conducted by YouGov for the Star, about 59% of the 1022 participants said that they would consume fewer soft drinks while only 13% reported that they would stop consuming (Pakiam, 2019). When the participants were asked about their intake of soft drinks, 20% declared that they consumed soft drinks several times a week, 8% took soft drinks at least once daily and 6% consumed several times per day (Sivanandam, 2019). There was also evidence that carbonated drinks were consumed at least once a day by young adolescents (Institute for Public Health, 2017).

Policies aimed at reducing soft drink intake among consumers play a key role in lowering the prevalence of diabetes. Therefore, it is essential to understand factors affecting soft drink consumption in the Malaysian population. These factors include gender, marital status, age, educational levels, income groups, region and ethnicity. They are often seen as key variables in consumer behaviour research. Understanding how consumer preferences and buying behaviours vary across sociodemographic traits is essential for stakeholders to develop appropriate interventionist strategies (Hosaini & Rojhe, 2020). The sociodemographic determinants of soft drink consumption have been examined in countries, such as the United States (Rehm et al., 2008; Park, et al., 2016), Denmark (Friis et al., 2014), and Australia (Pollard, et al., 2016). In Malaysia, numerous studies have examined determining factors of sugar sweetened beverages consumption (Cheah et al., 2019; Gan et al., 2019; Teng et al., 2019; Foo et al., 2020). However, these studies did not specifically focus on soft drink. In order to fill this research gap, the present study aims to investigate sociodemographic factors associated with household consumption expenditure on soft drinks within a large sample from a Malaysian national survey.

The present study seeks to contribute to the body of knowledge in two ways. Firstly, to the best of our knowledge, there is a lack of research examining sociodemographic factors associated with consumption of soft drinks using a Malaysian sample. The socioeconomic status, culture, and lifestyles in other nations are likely to be different from those in Malaysia, thus the conclusions drawn from previous studies' findings may be different from the present study (Ferguson, 2011; Mullie et al., 2012; Pollard et al., 2016).

Secondly, this study utilises data from the Household Expenditure Survey (HES) 2019 (DOSM, 2020), which comprises a large sample size (n = 52,671). Hence, it offers detailed information pertaining to the variations of sociodemographic characteristics, such as age, educational levels, gender, marital status, income groups, region and ethnicity in soft drink consumption. This is in light of previous evidence that each region, ethnicity, and income group in Malaysia has different consumption patterns (Cheah et al., 2019; Gan et al., 2019; Teng et al., 2019).

Literature Review

The need for a model of health capital is justified by Grossman (2000). According to the model, individuals are born with a health capital endowment that will depreciate over time. Individuals' condition of health decreases as they aged (Grossman, 2000). However, investment in health is needed to increase the level of health. Time and market products must be combined to produce healthy workers (Grossman, 2000). For example, people spend money on buying fitness equipment and time on physical activity in an effort to improve their health. Over time, health depreciation rate will increase and health investment at higher age will no longer be insured (Cawley & Ruhm, 2012). Death occurs when the health stock falls below a certain threshold. Health consists of both consumption and investment components, even though it directly affects the utility function and determines how much time is available for market and non-market activities.

According to Grossman (2000), health is demanded and generated by consumers, and it contains longevity and illness-free days. People demand health for two main reasons, that is, consumption and investment (Grossman, 2000). The levels of quality time that people invest in these activities improve if they have access to higher quality care. Individuals who invest in their own health tend to spend less time on illnesses (Kenkel, 2000). Health status can also be improved by consuming fewer soft drinks. Reducing soft drink consumption prevents diabetes and other chronic diseases. The health inventory of individuals may also be expanded; thus, individuals could have more capacity to fill out their market and non-market activities.

In the present study, factors that may influence soft drinks expenditure were examined. Income was a variable that was linked to health behaviours (Laaksonen et al., 2003). Grossman (2000) proposed that income was positively related to health investment, with richer people investing more in health than poorer people. This could be due to the fact that wealthier people place a higher value on their health because they can gain more utility from their future market activities. Smith and Kington (1997) conducted an empirical study to incorporate household income. Contrary to Grossman's argument, there are circumstances in which wealthier people engage in more unhealthy behaviours, that is, making health disinvestment. For example, respondents with higher incomes were more likely to consume alcohol than those with lower incomes (Patrick et al., 2012). According to Yi et al. (2010), a rise in income may increase the tendency to engage in risky sexual activities. Rehm et al. (2008) stressed that individuals living in poor households were more probable to consume soft drinks than those from high-income households.

In the case of soft drink consumption, avoidance of soft drink consumption can be seen as a type of health investment. Therefore, it is reasonable to hypothesise that income may affect soft drink consumption. Other elements that may affect health investment include poverty, financial insecurity, stress at work, workplace environment, psychosocial factors, career planning and different levels of healthcare (Stringhini et al., 2011). Healthy time can be converted into income-generating activities. The increase in time needed for income-generating activities is the return on investment in health.

In order to understand health and health behaviours, education is crucial since it can increase both productive efficiency (i.e. the utilization of health inputs) and allocative efficiency (i.e. engaging in healthy behaviour). High educated individuals tend to consume more healthy foods than less educated individuals, demonstrating a positive relationship between education and health investment. Higher awareness of health and adequate health knowledge are linked to education. Education can help to raise awareness of health, since bad health habits are associated with poor education (Grossman, 2000).

Cutler & Lleras-Muney (2006) found education and health to be highly correlated. Their study concluded that well-educated people tend to have a better understanding of health information and cognitive skills, and are also more willing to invest money to safeguard their future. Education is therefore seen as a protective factor for chronic health conditions, such as diabetes and hypertension. In addition to being qualified for better work, people with higher education tend to have a better understanding about the importance of healthy behaviours.

The effects of education on health behaviours are noteworthy. Gebremaniam et al. (2017) used multilevel linear regression models to examine whether children who spent more time on screen-based sedentary behaviours, such as watching television and using computer, drank more soft drinks. The study also explored whether these associations were independent of individual and home environmental factors, and parental education. The authors found that television viewing was independently associated with soft drink consumption.

Scully et al., (2017) conducted a National Secondary School Diet and Activity survey for students aged between 8 and 11 years and found that soft drink consumption among Australian students at high schools is correlated with other unhealthy habits. To minimise adolescent soft drink use, actions must be taken to limit access to soft drinks (e.g. high taxes and ban on soft drinks in schools), as well as offering more education programmes pertaining to the risks of soft drinks.

In terms of age, older people are likely to spend more money on their health than younger people due to increasing rate of health depreciation. This phenomenon implies that age and soft drink use are positively correlated. Age was a common demographic factor that was related to health behaviours (Rangan et al., 2008). Grossman (2000) postulated that when the rate of depreciation rose with age, the opportunity cost of health capital increased. As a result, individuals chose to increase the marginal benefits of health by lowering the demand for health. As opposed to Grossman's argument, Halliday et al. (2019) argued that as people grew older, the consumption motive for health investment became more important.

Grimm et al. (2004) found that youngsters consume more energy drinks than older people. Thompson et al. (2009) observed that age and added sugar intake were correlated, with younger adults consuming more than older adults. On the other hand, findings from a study showed that soft drinks, ice cream, confection, fruit drinks and meat pies/savory pastries exhibited an increase in consumption with age (Rangan et al., 2008). Friis et al. (2014) also found that the prevalence of energy drink consumption was higher in the younger age groups. As pointed out by Park et al. (2016) and Pollard et al. (2016), there were significant age differences in the consumption of sugar-sweetened beverages as younger adults were more likely to consume than older adults. However, Cheah et al. (2020) suggested otherwise.

Grimm et al. (2004) found that males had higher carbonated drink intake than females. Similarly, Thompson et al. (2009) observed that consumption of added sugars in men was greater than that in women. In addition, Rangan et al. (2008) found consumption of extra foods of sugar-sweetened soft drinks to be higher in males than females. In the study by Deeks et al. (2009), gender had a significant impact on consumption decisions of added sugar. In addition, a study showed that men consumed more sugar than women (Bleich & Wang, 2011).

In the study by Thompson et al. (2009), the intake of added sugar varied across educational levels. People with the highest education level had the lowest added sugar intake. Similarly, Friis et al. (2014) and Park et al. (2016) also found that people with lower levels of education consumed more soft drinks than those with higher levels of education. However, in another study, adults with higher levels of education had higher consumption of added sugar than those with lower levels of education (Cheah et al., 2020).

Previous studies consistently found that income level was associated with the probability of consuming soft drinks, with low-income families having higher intake of added sugar than high-income families (Thompson et al., 2009; Park et al., 2016). On the other hand, Katzmarzyk et al. (2016) conducted a study to determine the relationship between soft drink consumption and obesity and found no association existed between soft drink consumption and income.

Methods

A. Data

Secondary data used in this study were derived from the Malaysia Household Expenditure Survey (HES) 2019 (DOSM, 2020). During the present study, HES 2019 was the most recent national research

conducted by the Department of Statistics, Malaysia, from January 2019 to December 2019. The survey covered the population in all the states in Malaysia. HES 2019 included data on household characteristics and monthly household consumption expenditure on various goods and services. The objectives of HES 2019 were to collect the data on household consumption levels and patterns for various types of products and services, provide a basis for selecting the categories of goods and services to be included in the Consumer Price Index (CPI) basket, and update the CPI weights, which were used to represent the consumption patterns of all households in Malaysia. The sample size of HES 2019 was 52,671 households, which represented 32.6 million Malaysian population in 2019. Monthly income and expenditure on products and services were reported in the survey. More information about HES 2019 was described elsewhere.

B. Variables

Based on the findings from previous studies, several variables were selected as the determinants of soft drink consumption expenditure (Grimm et al., 2004; Rangan et al., 2008; Hattersley et al., 2009; Bleich & Wang, 2011; Pollard et al., 2016; Scully et al., 2017; Cheah et al., 2019). The variables chosen reflected the household heads' characteristics. These included age, gender, education, marital status, region, income and ethnicity (Jeffrey et al., 2006). During the data collection, only the head of each household was interviewed. Hence, only household head characteristics were considered in this study. The heads were asked to provide a summary of all household members' spending.

C. Statistical analyses

All the independent variables used in the present study were evaluated using descriptive statistics. Means and standard deviations were computed for continuous variables, while percentages and frequencies were computed for categorical variables. Many respondents may report zero consumption of soft drinks. The large percentage of zeros that existed in microdata with highly disaggregated information was an important consideration when modelling. These zero observations were possible for two main reasons: 1) Survey data with brief recording periods may produce a high percentage of observations with zero consumption due to the infrequency of purchases, especially in light of the fact that the survey period was too short as it lasted only one month. 2) Not all consumers may reap benefits from consuming soft drinks because they were aware of the harmful effects of soft drinks on their health. Therefore, the choice that maximised utility among these consumers was at the corner point.

In the present study, a two-part model was used to estimate the effects of sociodemographic factors on consumption expenditure on soft drinks. It was a model to deal with multiple zeros in the dependent variable. The model developed a dichotomous framework to achieve the likelihood of having the positive value of soft drink consumption expenditure. The first part was the consumption decision which was estimated using a probit model, while the second part was the amount decision which was estimated using ordinary least squares. The two-part model was more flexible than tobit model (Matsaganis et al., 2009). The degree of independence between the error terms in the consumption and amount equations, as well as the question of dominance determined the exact form of the two-part model. This model allowed separate mechanisms to determine the decision of consumption, and the amount spent. In order to assess the likelihood of changes in soft drink consumption expenditure that were resulted from the change in the independent variables, marginal effects were estimated.

Given that not all households consumed soft drinks, the observation used in the amount equation ($n = 28,002$) was less than that used in the consumption equation ($n = 52,671$). All households were included in the consumption equation for estimating the probability of consumption. Only households that spent on soft drinks were used in the calculation of amount spent on soft drinks, since those who did not consume soft drinks reported zero expenditure. In addition, the present study identified the possible high correlations between independent variables using variance inflation factors (VIFs). All the

statistical analyses were performed using the Stata statistical software. The significance of all tests was based on a *p*-value of below 5 per cent.

Results

The surveyed respondents were analysed descriptively to obtain their general characteristics. Table 1 presents the summary statistics of the dependent and independent variables. The mean of monthly household expenditure on soft drinks was RM 8.00. The majority of household heads aged 40–49 years (24.1%), followed by those with 50–59 (23.8%), 30–39 (22.4%) and above 60 years of age (20.8%). The distribution of household income group was comprised of 46.1% B40, 38.1% M40 and 15.8% T20. More than half of the household heads were males (82.1%). Large proportions of household heads were Malays (52.6%), followed by Chinese (22.4%), those of other ethnicities (19.0%) and Indians (5.9%). The majority of household heads were married (74.7%), while only 11% were widowed/divorced. In terms of educational levels, a large proportion of household heads had secondary-level education (53.2%), while only a very small proportion had no formal education (3.6%). The numbers of household heads in Central (16.6%), East Coast (16.2%), and Southern regions (16.0%) were almost equal.

Table 1. Summary statistics of the dependent and independent variables (n = 52,671)

Variables	Frequency / Mean	Percent / Standard deviation
Soft drink expenditure	8.0	20.5
Age (years)		
<30	4,699	8.9
30–39	11,804	22.4
40–49	12,693	24.1
50–59	12,533	23.8
≥60	10,942	20.8
Income groups		
B40	24,288	46.1
M40	20,043	38.1
T20	8,340	15.8
Gender		
Male	43,219	82.1
Female	9,452	17.9
Ethnic		
Malay	27,728	52.6
Chinese	11,810	22.4
Indian	3,118	5.9
Others	10,015	19.0
Marital Status		
Single	7,517	14.3
Married	39,357	74.7
Widowed/divorced	5,797	11.0
Educational levels		
No formal	1,883	3.6

Primary	7,700	14.6
Secondary	28,028	53.2
Tertiary	15,060	28.6
Region		
Northern	12,204	23.2
Southern	8,418	16.0
East Coast	8,545	16.2
Central	8,750	16.6
East Malaysia	14,754	28.0

Source: Malaysia Household Expenditure Survey 2019

Table 2 illustrates the factors affecting consumption decision and amount decision of soft drinks. Our initial empirical task was to compute the VIFs of the regressors in order to determine any potential multicollinearity. According to Wooldridge (2020), multicollinearity was indicated by a VIF value of greater than 10, and this could lead to inaccurate statistical inference and inefficient parameter estimates. In the present study, VIFs ranged from 1.41 to 5.05, thereby indicating that multicollinearity was not a problem. Furthermore, the likelihood ratio and F-statistics were highly significant, and this implied that all the independent variables were jointly significant in determining consumption decision and amount decision of soft drinks.

Households with heads aged above 40 years were 3–16% less likely to consume soft drinks than households with heads aged below 30 years. Households of the B40 and M40 income groups had 9–17% lower probabilities of consuming soft drinks and also spent RM 12.24 and RM 7.80 less, respectively, than the T20 households. Chinese households spent RM 5.62 higher on soft drinks than Malay households. Also, they were 4% more likely to consume. Indians and those of other ethnic groups were 3–11% more likely to consume soft drinks compared to Malays. Households with married heads were 2% more likely to consume soft drinks, and they also spent RM 1.40 more than families with single heads. Compared to households with heads having tertiary-level education, those with heads having primary-level and secondary-level education were 2–3% more likely to consume soft drinks. Households residing in the Northern region had an 19% lower probability of consuming soft drinks and also spent RM 9.65 less than households residing in East Malaysia. Similarly, households residing in the Southern, East Coast, and Central regions in Malaysia were 10–23% less likely to consume soft drinks and also spent RM 9.05–10.45 less than households residing in East Malaysia.

Table 2. Factors affecting household consumption expenditure on soft drinks

Variables	Consumption		Amount
	Coefficients	Marginal effects	
Constant	0.66 (0.03)*	-	27.98 (1.08)*
Age (Years)			
<30	-	-	-
30–39	-0.06 (0.02)*	-0.03 (0.01)*	-1.20 (0.57)*
40–49	-0.08 (0.02)*	-0.03 (0.01)*	0.43 (0.61)
50–59	-0.17 (0.03)*	-0.07 (0.01)*	-0.27 (0.64)
≥60	-0.40 (0.03)*	-0.16 (0.01)*	1.04 (0.73)
Income groups			
B40	-0.44 (0.02)*	-0.17 (0.01)*	-12.24 (0.64)*

M40	-0.22 (0.02)*	-0.09 (0.01)*	-7.80 (0.61)*
T20	-	-	-
Gender			
Male	0.02 (0.02)	0.01 (0.01)	-0.25 (0.47)
Female	-	-	-
Ethnicity			
Malay	-	-	-
Chinese	0.10 (0.02)*	0.04 (0.01)*	5.62 (0.49)*
Indian	0.06 (0.02)*	0.03 (0.01)*	0.07 (0.47)
Others	0.29 (0.03)*	0.11 (0.01)*	-1.35 (0.85)
Marital Status			
Single	-	-	-
Married	0.05 (0.02)*	0.02 (0.01)*	1.40 (0.48)*
Widowed/ divorced	0.03 (0.03)	0.01 (0.01)	-0.38 (0.65)
Educational levels			
No formal	0.01 (0.04)	0.01 (0.01)	-0.38 (0.88)
Primary	0.08 (0.02)*	0.03 (0.01)*	-0.30 (0.57)
Secondary	0.04 (0.01)*	0.02 (0.01)*	-0.50 (0.42)
Tertiary	-	-	-
Region			
Northern	-0.47 (0.02)*	-0.19 (0.01)*	-9.65 (0.74)*
Southern	-0.57 (0.02)*	-0.23 (0.01)*	-9.05 (0.79)*
East Coast	-0.26 (0.02)*	-0.10 (0.01)*	-10.45 (0.71)*
Central	-0.39 (0.02)*	-0.15 (0.01)*	-9.12 (0.79)*
East Malaysia	-	-	-
Likelihood ratio	-34,448.12*	-	-
F-statistics	-	-	68.27*
Observations	52,671		28,002

Notes: Robust standard errors are shown in parentheses. *Significance at the 5% level (p<0.05).
Source: Malaysia Household Expenditure Survey 2019

Discussion

Age of household heads was negatively associated with consumption of soft drinks because older people tend to be more aware of their health than younger people. This finding somewhat supports the Grossman's theory that consumption of goods and services may be influenced by ageing (Grossman, 2000). The theory distinguishes between healthy and unhealthy consumption. Healthy consumption refers to consuming goods that are associated with good health as they reduce the rate of health deterioration, whilst unhealthy consumption improves the current utility but speeds up the rate of health deterioration. The present study's finding is also consistent with the evidence of previous studies (Grimm et al. 2004; Thompson et al. 2009; Friis et al. 2014; Park et al. 2016). For instance, Grimm et al. (2004) found that youngsters were more likely to consume energy drinks than older adults. Similarly, Thompson et al. (2009) found that the relationship between age and added sugar intake was significant, with younger adults consuming more than older adults. In contrast, Rangan et al. (2008) found that

consumption of soft drinks, ice cream/ice confection, fruit drinks, and meat pies/savory pastries was positively associated with age. Similar findings were evidenced by Park et al. (2016), Pollard et al. (2016) and Cheah et al.'s (2020), who found older adults consumed more added sugar than their younger counterparts.

Household income was positively associated with soft drink consumption. This is supported by the Laaksonen et al.'s (2003) theory that income is a general socioeconomic indicator of health behaviour. Our finding is also in line the study by Park et al. (2016), which found that high added sugar intake was associated with income. However, the findings from Katzmarzyk et al. (2016) suggested otherwise. According to Grossman (2000), income was positively related to health investment, with richer people investing more in health than poorer people. It could be due to the fact that richer people value their future more.

Soft drink consumption was correlated with ethnicity. More specifically, households of other ethnic groups consumed more soft drinks than Malay households. It is somewhat unclear why Chinese people are more likely to drink soft drinks, but culture may play an important role (Iqbal et al., 2020). This means that culture may mediate the relationship between ethnicity and soft drink consumption. For instance, the red colour of Coke packaging may enhance brand reputation because Chinese consumers treat red colour as fortune, happiness, and energy. Nevertheless, to obtain a deeper understanding of the role of ethnicity in soft drink consumption, an in-depth qualitative study needs to be conducted.

Marital status was associated with consumption of soft drinks as households with married heads were more likely to consume soft drinks and spent more than households with single heads. This finding is consistent with previous studies, which showed a significant relationship between sugar-sweetened food and marital status, with households having married heads spending more on sugar-sweetened food (Cheah et al., 2020). This is simply because households with married heads tend to have a larger household size than households having single heads. High consumption of soft drinks among adolescents may be attributed to changes in food-related lifestyles, such as television viewing and social media exposure (Salleh et al., 2020). The present study finding is, however, contrary to the study by Park et al. (2013), which found unmarried individuals to be more likely to consume sugary drinks than married individuals.

Education was one of the key factors that was examined in economic research pertaining to consumer spending behaviours. In the present study, education levels of household heads were significantly associated with soft drink consumption. Specifically, those with higher education levels had lower consumption of soft drinks. Previous studies suggested that people with lower educational levels consumed more soft drinks when compared with those having higher educational levels (Friis et al., 2014; Park et al., 2016). This outcome is supported by the theory that education is an important determining factor of health behaviours (Grossman, 2000). Heads of households with higher educational levels tend to have a better understanding of healthy behaviours than those with lower educational levels and consequently are more likely to invest in their health by consuming fewer soft drinks and adopting a healthy eating lifestyle.

Regions were significantly associated with soft drink consumption. The current finding is contradicted by the study by Cheah et al. (2019), which found that Bumiputera households in Peninsular Malaysia were more likely to consume sugary beverages than those in East Malaysia. Moreover, in a study that focused on fruit and vegetable consumption, Yen & Tan (2012) found that fruit and vegetable consumption vary across regions in Malaysia. They drew attention to the relationship between household spending patterns and financial capability. It can, therefore, be concluded that there are regional differences in soft drink intake in Malaysia, and it is worth policymakers' while to pay attention these differences.

The present study had several limitations. First, all the information gathered in the survey was self-reported; thus, reporting errors may happen. Second, because of cross-sectional data, it was difficult to determine the causal relationships between sociodemographic factors and soft drink consumption. Third, the present study used household data instead of individual data. Hence, individual consumers'

purchasing behaviours were not well-identified. If data allow, the analysis could be done at the individual level. Despite these limitations, the present study is the first to provide comprehensive information on the demographic factors influencing soft drink consumption expenditure among households in Malaysia.

Conclusion

Using nationally representative data with a large sample size, the present study found that sociodemographic factors played an important role in determining consumption expenditure on soft drinks among households in Malaysia. These findings have important implications for policies directed toward reducing the prevalence of sugar intake in the population. First, given that age was negatively associated with the likelihood of consuming soft drinks, government intervention approaches focusing on reducing soft drink consumption among young adults may yield promising outcomes. These initiatives should necessitate greater use of youth-focused social media, such as Facebook, Twitter, Instagram, and Tik Tok, to educate youngsters about the harmful effects of soft drinks, especially in light of the fact that young consumers are often the target audience for soft drink-related sponsorships and advertisements. Limiting soft drink advertisements and organising health promotion activities could be desirable moves as well.

Second, the government should consider raising the price of soft drinks by imposing a higher soda tax rate because income has a significant impact on the amount of money spent on soft drinks. Additionally, a strict intervention approach that concentrates on promoting healthy beverages among low-income people may seem worthwhile. The government should educate people with poor economic backgrounds about the importance of healthy eating lifestyles.

Third, in view of racial disparities in health behaviours, public health experts should pay special attention to reducing the prevalence of soft drink intake among Chinese households. The government should make full use of multilingual mass media, such as newspapers, magazines, television, and radio, as well as medical professionals from various ethnic backgrounds, such as nurses, pharmacists, and physicians, to discourage people from consuming soft drinks. In particular, the cons of excessive soft drink consumption must be highlighted.

Fourth, considering the fact that education has a significant impact on household consumption expenditure on soft drinks, programmes that enhance health literacy in the less-educated population could potentially contribute to a decrease in excessive intake of soft drinks. These programmes should address the need to increase the numbers of publicly available health-related classes, seminars, workshops as well as reading materials. The government should also put serious efforts into encouraging less-educated households to consume more healthy foods and beverages.

Last, given the current findings that households with married heads had a higher likelihood of consuming soft drinks compared to households with single heads, a strict approach concentrating on implementing health promotion programmes with the aim of educating married individuals about how to incorporate healthy diets into their busy lifestyles may yield desirable results. Additionally, public health authorities could make a concerted effort to raise awareness of the risk of soft drink among married adults.

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