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PERCEPTION AND REALITY BEHIND NUTRITIONAL STATUS AMONG PRESCHOOL CHILDREN IN KOTA BAHARU, KELANTAN, MALAYSIA

Ruhaya Hasan*, Wan Muhamad Amir W Ahmad*, Mohamad Shafiq Bin Mohd Ibrahim*, Nor Azlida Aleng**, Hemala Munisamy**, Nurfadhlina Abdul Halim**** & Zalila Ali*****

* School of Dental Sciences, Health Campus, Universiti Sains Malaysia (USM), Kubang Kerian, Kelantan, Malaysia

** School of Health Sciences, Health Campus, Universiti Sains Malaysia (USM), Kubang Kerian, Kelantan, Malaysia

*** School of Mathematics Sciences, Universiti Sains Malaysia (USM), Minden, Pulau Pinang, Malaysia

**** School of Informatics and Applied Mathematics, Universiti Malaysia Terengganu (UMT), Kuala Terengganu, Terengganu, Malaysia

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Abstract:

Background: High consumption of sugar-added food or beverages which is low in nutrient and high in calorie lead to an adverse effect on children general health. The objective of this study is to assess the relationship between the family socioeconomic status (SES) and nutritional status with frequency of sugar-added foods and beverages consumption of preschool children from Jabatan Kemajuan Masyarakat (KEMAS) in Kota Bharu District, Kelantan. **Method:** This study was conducted to determine the most significant factor that has a strong relation to the expenditure factor of a studied family. There are 219 participants from 15 TABIKA (KEMAS) in Kota Bharu, Kelantan were involved and bayesian regression approach was used as a tool to determine the most regular type of food according to their food expenditure. **Results:** There were no much in differences in number of male and female preschool children in this study where female were (49.3%) and male were (50.7%). Bayesian regression analysis, showed that both of variables have a significant on the *p* value towards expenditure factor, sweets variable with the value of $(\beta_1 = -40.57; CI\ -77.0829,-4.0670;\ p = 0.015248;)$ and the lokchen (fast sweet foods) variable with the value of $(\beta_1 = -50.4053; CI: -100.0619,-0.7491;\ p = 0.023970;)$ which had significantly lower ($p<0.05$). **Conclusion:** As a conclusion, preschool children in Kelantan had higher expenditure on candy and lockhen.

Key Words: Nutritional, Sugar Added Food & Beverage

1. Introduction to Sugar-Added Food and Beverage Consumption in Global:

A systematic assessment by Singh *et al*., (2015) on global beverage intake among adults in year 2010 showed that the sugar-sweetened beverages consumption averaged 0.58 (95%UI: 0.37, 0.89) 8 oz servings/day. The highest consumption were in men with those aged 20 to 39 years old (1.04, 95%UI: 0.63, 1.7 servings/day) and the lowest consumption were among the women aged above 60 years old (0.34, 95%UI: 0.20, 0.53 servings/ day). The review also showed that the upper-middle income countries and lower-middle income countries have higher consumption of sugar sweetened beverages compared to high-income or low-income countries (Singh *et al*., 2015). When comparing consumption of sugar-sweetened beverages among the different world region it is revealed that the highest consumption was among the Caribbean (1.9, 95%CI: 1.2, 3.0 servings/day) and lowest in East Asia (0.20, 95% CI: 0.16, 0.25 servings/day) (Singh *et al*., 2015). Other regions like Central Latin America, high-income North America, and Andean Latin America also recorded as region with high consumption of sugar sweetened beverages with the average intake of more than 0.8 serving per day of sugar sweetened beverages (Singh *et al*., 2015). East Asia country includes China, Hong Kong Special Administrative Region (SAR) (China), Macau Special Administrative Region (SAR) (China), Democratic People's Republic of Korea, Taiwan (Singh *et al*., 2015).

A research done by Bleich *et al*., (2008), to observe the trends of sugar sweetened beverages consumption among United States (US) adults (>20 years old) through analysing dietary information obtained from third National Health and Nutrition Examination Survey (NHANES III, 1988–1994) and NHANES 1999–2004 survey, where the data showed that the consumption of sugar sweetened beverages consumption had increased from 58% to 63%. These shows clear evidence that the consumption of sugar sweetened beverages are increasing among US adults. In both the time frame the highest consumption per capita was recorded among young adults (20 – 44 years old) with 231–289 kcal/day and the lowest consumption per capita was recorded by

the elderly with 68–83 kcal/day (Bleich *et al*., 2008). While comparing among the race-ethnicity groups in US it is revealed that the young black of US have the highest sugar sweetened beverages consumption compared to white and Mexican American adults in both time period of 1988-1994 (78%) and 1999-2004 (82%) (Bleich *et al*., 2008). Meanwhile in a cross-sectional study conducted at Philippines among 6 to 12 years old children to see the prevalence of dental caries and sugar consumption revealed that the average consumption of sugar among the children's is 59 g/day and 21 kg/year (Yabao *et al*., 2005). This amount is actually twice than recommended amount by the WHO which is 27.40–30 g of sugar/day or 10 kg of sugar/year. The regularly consumed dietary source of sugar are hard candies (89%), banana cue (84.9%), camote cue (traditional snacks coated with brown sugar) (84.9%), soft drinks (84.4%), peanut butter (76.6%), chocolate (78.4%), brown sugar (74.3%), milo (70.4%), cream cookies (75.4%), polvoron (68.1%), powder juice (80.3%), ice cream (70.2%) and ice candy (69.1%) (Yabao *et al*., 2005).

1.2 Sugar-Added Food and Beverage Consumption in Malaysia:

From the food consumption study among Malaysian aged between 18 years old to 59 years old it is found that the most frequently consumed beverages (daily) is plain water where with an average of 6 glass daily and this if followed by the consumption of tea, coffee, chocolate-flavoured drink, and cordial where with an average consumption of a cup between 1.8 times to 1.4 timed daily (Norimah *et al*., 2008). From the study also it is reported that consumption of soft drinks or carbonated drinks are not in the top five type of beverages consumed.

In addition, it is also reported most of the teenagers (< 20 years old), from rural area and women consume less plain water and frequently consumed other beverages such as tea, coffee, chocolate-flavoured drink, and cordial (Norimah *et al*., 2008). It is important to take note that tea, coffee, chocolate-flavoured drink, and cordial are all included in sugar sweetened beverages although the soft drinks or carbonated drinks were not in the top five beverages consumed among Malaysian population. Meanwhile in another study among preschool children in Titiwangsa, Kuala Lumpur shows that the highest frequency of sugar consumption is twice a day (40%) with boys 41.4% and girls 38.1% (Zahara, *et al*., 2010). The frequency of consumption of sugar once a day and more than three times a day is the same which is 30% in total of boys and girls (Zahara, *et al*., 2010). Sugar consumption frequency for once a day is higher among girls (33.3%) compared to boys (27.6%) but for the frequency of consumption three times a day is otherwise where the boys (31.0%) are higher compared to girls (28.6%) (Zahara, *et al*., 2010).

Among the same population the frequency of consumption of sugary drink are highest in the consumption of more than three times a day with 57.1% of them being girls and 37.9% of them are boys (Zahara, *et al*., 2010). Second highest frequency is once days (34%) with 34.5% of them are boys and 33.3% of them are girls. This is followed by twice a day with (20%) with 57.1% of them are girls and 37.9% of them are boys (Zahara *et al*., 2010). The frequency of consumption more than three times in a day is not in line with WHO recommendation (i.e. 15kg per year) (Zahara *et al*., 2010).

1.3 Nutritional Status of Preschool Children in Global:

The prevalence of childhood obesity and overweight have been increasing globally (De Onis *et al*., 2010). According to De Onis *et al*., (2010), the prevalence of childhood obesity and overweight had increased from 4.2% (95% CI: 3.2%, 5.2%) in 1990 to 6.7% in 2010 (95% CI: 5.6%, 7.7%) with a relative increase of 60% and it is believed the trend will continue to progress until a prevalence value of 9.1% (95% CI: 7.3%, 10.9%) in 2020 with expected relative increase of 36% from 2010 from the study that was conducted among children 0 to 5 years old. In Africa the estimated prevalence of childhood overweight and obesity in 2010 is 8.5% (95% CI: 7.4%, 9.5%) which is higher than Asia where the estimated prevalence of childhood overweight and obesity in 2010 is 4.9% (De Onis *et al*., 2010).

Although the estimated prevalence in Asia for childhood obesity and overweight is lower than Africa but when looking at it as an absolute number it can be seen that Asia have an higher number of overweight and obese children (De Onis *et al*., 2010). This is because more than half of the children with childhood obesity and overweight were from developing country are located in Asia (De Onis *et al*., 2010). The same scenario at the sub-regions, it is estimated that most of the children who are overweight in 2010 is from South Central Asia (6.6 million) which consists country like Bangladesh, India, and Pakistan (De Onis *et al*., 2010). Meanwhile another study among preschool children from 94 developing country shows that the prevalence of overweight is low (3.3%) where the rate of wasting is higher compared to overweight (De Onis & Blossner, 2000). Three of the countries which is Uzbekistan, Kiribati, and Algeria shows double burden problem where they are facing both overweight and wasting problems (De Onis & Blossner, 2000). The study on developing country shows there is problem of under nutrition among the pre-schoolers remain as a nutrition problem although there is increasing level of overweight is some countries (De Onis & Blossner, 2000). The different result on the nutritional status might be due to the differences in culture, genetic and also as geographical condition (Muhammad Faiz & Naleena Devi, 2012).

1.4 Nutritional Status of Preschool Children in Malaysia:

In a study conducted by Muhammad Faiz & Naleena Devi (2012), among preschool children in Selangor, Malaysia found that the urban and rural preschool children's nutritional status are different. The prevalence of children for severely stunting (33.3%), severely underweight (33.3%), severely wasted (31.0%) are higher among preschool children living at the rural area when compared to those living in the urban area. At the urban area, the children's prevalence for severely stunting is 10.0%, severely underweight is 15.0%, severely wasted is 16.0% (Muhammad Faiz & Naleena Devi, 2012).

Urban population have higher prevalence of overweight and obesity compared to rural population with the prevalence of overweight is 10.0% and obesity is 9.0% while in the rural population the prevalence of overweight is 2.4% and obesity is 7.1% (Muhammad Faiz & Naleena Devi, 2012). Both urban and rural have almost the same the prevalence for normal body weight (BMI-for age) with urban prevalence is 39.0% and rural is 31.0% (Muhammad Faiz & Naleena Devi, 2012). The difference in urban and rural population weight status and height might be due to factors like socioeconomic status and mother's knowledge who can give adequate food for their children (Muhammad Faiz & Naleena Devi, 2012).

1.5 Factors Associated with Nutritional Status:

Factors such as household income, education level of parents and size of the family, and have significant association with the nutritional status of children. Other factors include, imbalance food intake pattern, and physical activity.

1.5.1 Socioeconomic Factors: The socioeconomic factors includes household income, parent's education level and size of the family.

1.5.2 Household Income, Parental Education and Others: When the socio economic factor was analysed to see the relation on the nutritional status of school children from the urban poor of Bangalore, India, it is revealed that the household income have an effect on the nutritional status of children. D'Souza et al., (2013) stated that the children with stunted status is more prevalent in medium income household with 52% and in low income with 49%. Furthermore, the stunted status among the high income household is recorded 37% and those with normal nutritional status among high income household is 62% (D'Souza et al., 2013). Household income is one of the important indicator in socioeconomic status (SES) (Petrauskiene, et al., 2015). This finding is also consistent with a research on the impact of socioeconomic status on children (5 to 11 years old) nutritional status where the children's from the higher socioeconomic class have significant ($p<0.05$) higher BMI compared to those children's from low socioeconomic class (Babar et al., 2010). In a study among 7 to 8 years old children from Lithuanian shows that the parent's higher education and income have a significant impact on the health dietary habits of children which include daily consumption of breakfast and consumption of fresh fruit compared to those families with lower socioeconomic status (Petrauskiene, et al., 2015). Higher maternal education can have an effect on their children health because this mother have greater courage to accept latest developmental in healthcare and also able to accept and use modern healthcare against traditional beliefs and attitudes but this maternal education might not be significant in a condition where insufficient resources (Babar et al., 2010).

2. Sample Size Determination:

Sample size was calculated by using a formula by Daniel (1999), based on study by Ruhaya *et al.*, (2012), it shows the prevalence of overweight among preschool children in Pasir Mas, Kelantan, Malaysia is 5.5%. Sample size is calculated using single proportion as follows:

$$n = \left(\frac{1.96}{0.05}\right)^2 0.055(1-0.055)$$

Where

Δ = width of the confidence interval

$z = 1.96$ when $\alpha = 0.05$

p = Anticipated population proportion

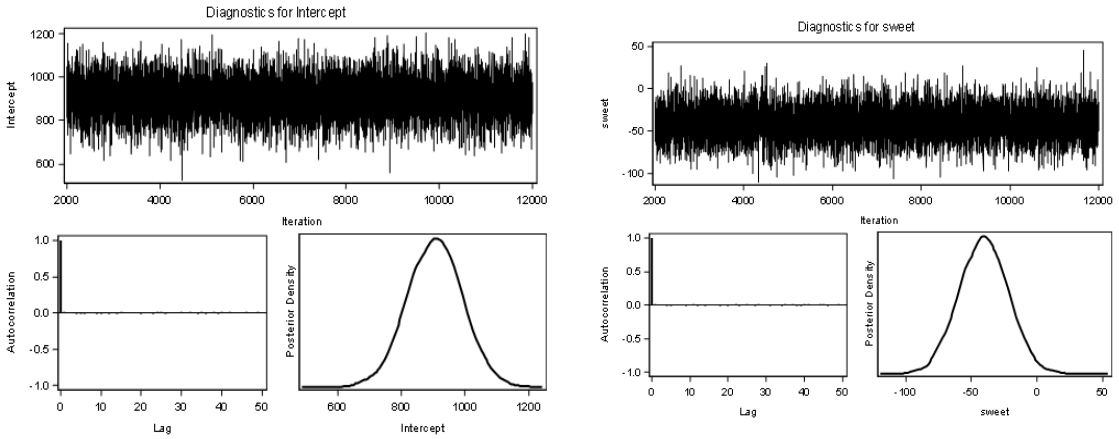
After taking into account an estimated drop-out rate of 20% and also the design effect of 2, the estimated sample size for this study was 80 +(80 $\times$ 0.2) = 96 subjects. Minimum 96 subject were required at this stage of analysis.

3. Results From Bayesian Multiple Linear Regression:

Table 1: Analysis of Maximum Likelihood Parameter Estimates "Bayesian Multiple linear Regression"

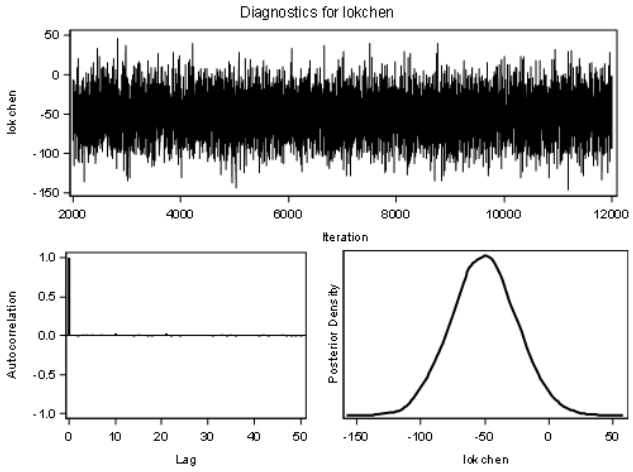
Parameter	Estimate	Standard Error	Wald 95% Confidence Limits		P value
			Lower	Upper	
Intercept	903.4994	86.4529	734.0548	1072.944	
Sweets	-40.5750	18.6268	-77.0829	-4.0670	0.015248
Fast sweet Lokchen	-50.4053	25.3352	-100.061	-0.7491	0.023970

*Significant at $\alpha = 0.05$



(a) Intercept

(b) Sweet



(c) Lokchen

Figure1. Results of trace plot for (a) Intercept, (b) Sweets and (c) Lokchen

3.1 Diagnostic for Assessing Convergence:

Bayesian approach is more emphasize on the probability and providing more on intuitive framework for explaining the results of an analysis. Beside that, this method also provide a way to build models, performing estimation and inference for the model building and analysis. In Bayesian analysis, we have to check convergence before we work with the resulting posterior statistics. The information from trace plots, can determine convergence or unconverged Markov chain. For the case of an unconvergence, it tell us about Markov chain does not explore the parameter space sufficiently, and the samples studied cannot approximate the target distribution well. At the stage of inference, we should not be based on unconverged Markov chains, because it will misleading the results. As a guidance, we need to check the convergence of all the studied parameters, not just the ones of interest. From the output that produse by SAS, the Geweke statistic give the results that compares means from early and late parts of the Markov chain to see whether they have converged.

Table 2.Diagnostic Test

Geweke Diagnostics		
Parameter	z	Pr > |z|
Intercept	0.6323	0.5272
sweet	-0.8221	0.4110
lokchen	0.1335	0.8938
Dispersion	1.1278	0.2594

The z-values of the Geweke statistics are all nonsignificant ($p > 0.05$). this indicate that satisfactory convergence of both variable. We also can assess convergence by visualization examination through trace plot. Trace plot consist of the plot sampled values of a parameter versus the sample number. Figure 1 summarize the result of trace plot of our finding. The Figure 1 (a), (b) and (c) shows the behaviour of the trace plots. From the plot, we can see that all parameters have relatively good mixing properties. Good mixing of the chain indicate that we can get the good results and the samples stay close to the high-density region of the target distribution.

The result for Multiple Bayesian Linear Regression (MBLR) is given in Table 1 and it can be summarize as follows:

(Y) = 903.4994 -40.5750- 40.5750 (x_1)
-50.4053 (x_2)

Where

(x_1) is Candy

(x_2) is LokChen

Fitted Bayesian Multiple linear Regression with standard error is given as follows:

(Y) = 903.4994 - 40.5750 (x_1) -50.4053 (x_2)

Std. Err (86.4529) (18.6268) (25.3352)

The present study found that candy with the value of $\beta_1 = -40.57$; CI : -77.0829-4.0670 $p = 0.01524$ and the lokchen variable with the value of $\beta_1 = -50.4053$ CI : -100.0619-0.7491 $p = 0.02397$ had a significant *p* value which is less than <0.05. According to the research that conducted by Saavedra et.al, 2013 they mention that more preschoolers are most prefer to have sweets or sweetened beverages than a serving of fruit or a vegetable on a given day. Many studies indicate that the consumption of candy and sugar-sweetened beverages and energy-dense foods has been identified as a dietary risk factor for childhood obesity [American Dietetic Association, 2013 and Barlow SE, 2007].

4. Summary and Discussion:

In our study, an expenditure of a family also lead to the sweets, sweetened food and beverages especially for preschool children. Parents and caretakers should be also educated on the nutrition and healthy eating behaviour to ensure they will continuously monitor their children from preventing them to develop unhealthy behaviour in later years when they enter primary school, through peer influence. Apart from that parents were also need to be taught to maintain their own health eating behaviour because it is believed children tend to learn eating practices from their parents at home. From the previous study, about 68% of 2-year-olds and 74% of 3-year-olds consumed desserts and candy at least once in a day and 44 and 48% consumed sweetened beverages, respectively (Fox et. al, 2010). A significant cause for concern is the early introduction and rapid rise in the consumption of low-nutrient, energy-dense sweets (e.g. desserts, cookies, and candy) and sweetened beverages among infants and young children. The consumption of sugar-sweetened beverages and energy-dense foods has been identified as a dietary risk factor for childhood obesity [American Dietetic Association, 2013 and Barlow SE, 2007]

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