

Beverage Consumption of Filipino Children and Adolescents (7th National Nutrition Survey): Nutritional Concerns and Potential Policy Implications

**Maria Julia Goloso-Gubat, Edward Vincent J. Magtibay, Glen Melvin P. Gironella,
Merlyn G. Tajan, and Ma. Adrienne S. Constantino**

Food and Nutrition Research Institute, Department of Science and Technology
DOST Complex, Bicutan, Taguig City

The extent of contribution of beverage intake to obesity in Filipino children and adolescents is unknown. The present study determined the amount of beverages consumed by Filipino children and adolescents and the association of energy intake from beverages with BMI. This is a cross-sectional study utilizing 24-hr food recall data from the 7th National Nutrition Survey (NNS). Mean amounts of beverages consumed and corresponding energy intake from beverages were calculated utilizing descriptive statistics; one-way ANOVA to determine and compare mean energy intake from beverages by BMI-for-age z-scores category. Pearson's correlation analysis was utilized to test the association between the mean energy intake per day from beverages and BMI. Beverages contributed 17% and 3% to mean energy intake per day of pre-school children, and schoolchildren and adolescents, respectively. Association between energy intake from beverages and BMI was significant but weak. Results indicated that beverages contribute a small amount to mean energy intake of children and adolescents. Although consumption of sugar-sweetened beverages was noted, caloric intake from beverages was weakly associated with BMI. Nevertheless, beverage consumption pose potential nutritional consequences that can be translated into home and school guidelines/ recommendations and strengthen national policy options that would encourage healthy beverage choices.

Key Words: caloric intake, childhood obesity, sugar sweetened beverages

INTRODUCTION

Survey data from different countries indicated a growing epidemic of childhood obesity in developed and urbanized populations (Ebbeling et al. 2002; Lobstein et al. 2004; Wang and Lobstein 2006) and in developing countries (Wang and Lobstein 2006; Gupta et al. 2012). In the Philippines where undernutrition coexists, there is a continued increase in the prevalence rates of overweight

and obesity in children and adolescents from 2003 to 2011 (FNRI-DOST 2010; FNRI-DOST 2012).

Among the important dietary changes in children and adolescents are the increased consumption of sugar-sweetened beverages and decreased milk intake (Blum et al. 2005; Striegel-Moore et al. 2006; Garriguet 2008) which were associated with BMI (Blum et al. 2005; Striegel-Moore 2006; Collison et al. 2010), waist circumference, dietary choices (Collison et al. 2010) and greater risk for overweight and obesity over time (Ludwig et al. 2001; Berkey et al. 2004).

*Corresponding author: juliagubat@gmail.com

In the Philippines, studies examining dietary patterns, food choices and childhood obesity are largely limited. A single local cross-sectional observational study intended to determine the association between BMI and food choices reported an association between BMI and milk and milk products but a lack of association with other food groups, i.e. sugars and fats, fruits and vegetables and fiber (Gonzalez-Suarez et al. 2009). However, this study acknowledged the limitations in its tools and methodologies which could have precluded a clear understanding of food intake and BMI.

Recognizing the relative contribution of beverages in the diet of children, the present study utilized beverage intake data from the 7th National Nutrition Survey (NNS) in 2008 to (i) determine the percentage contribution of selected beverages to mean energy intake/day, (ii) determine the proportion Filipino pre-school children (6 months to 5 years), school-aged children (6 to 12 years) and adolescents (13 to 19 years) consuming selected beverages, (iii) estimate their mean intake per day for selected beverages and, (iv) examine the association between BMI and intake of selected beverages. As to the authors' knowledge, this the first study to analyze beverage intake in Filipino children and adolescents, and investigate its relationship with BMI.

METHODS

Sampling procedures

The 7th National Nutrition Survey (NNS) covered a total of 17 regions and 79 provinces, utilizing the 2003 master sample of the Philippine Statistics Authority, formerly the National Statistics Office's (NSO). The sampling design of the 2008 NNS was detailed in a separate publication (FNRI-DOST 2012). At the individual level, food consumption data was collected using two-day non-consecutive 24-hour food recall by on-site trained dietary researchers. Respondents were interviewed face-to-face using a structured questionnaire and tools, e.g., cups, tablespoons, rulers, food models and pictures to aid in recall of description of food items and estimation of amounts consumed. Individual food consumption data were converted to As Purchased/ Edible Portion (AP/EP) values using the Individual Dietary Evaluation System (IDES). IDES converted each food item consumed per individual into nutrients with reference to the Food Composition Tables (FCT) database and computed energy and nutrient intakes of participants/ respondents relative to Recommended Energy and Nutrient Intakes (RENI) for particular age groups.

Participants

Participants for this study were categorized into 3 age groups: pre-school children (6 months to 5 years old), school-aged children (6 to 12 years old) and adolescents (13 to 19 years old).

Beverage classification

While data on beverage consumption is the focus of this paper, food consumption data were initially classified into 10 groups: (1) cereals and cereal products, (2) starchy roots and tubers, (3) meat, fish, poultry and egg, and products, (4) beverages, (5) dairy products, (6) fruits and vegetables, (7) beans, nuts and seeds, (8) sugars, (9) fats, (10) miscellaneous. For clarity, dairy products were limited to cheeses, yogurt, and ice cream while milk included products that were taken as beverage, and thus were classified as such. Beverages included in the study were categorized into: (1) milk, (2) chocolate-based beverages, (3) soy-based beverages, (4) fruit-flavored juice drinks, (5) softdrinks (cola), (6) coffee and tea, (7) energy drinks, (8) alcoholic beverages and (9) other beverages. Specific types of beverages were identified based on these beverage categories (Figure 1). Amounts consumed were expressed in mL. Mean intakes for powdered milk, powdered chocolate-flavored beverages and powdered fruit-flavored juiced were translated into mL using the standard dilution ratio indicated in packages of their commercially available counterparts, i.e. 40 mL water per 14.3 g infant formula, 200 mL water per 30 g whole/ full cream/ filled milk, 200 mL water per 20 g chocolate powder drink and 1000 mL water per 30 g fruit-flavored powder juice.

Statistical Analyses

Percentage (%) contribution of beverages to mean energy intake per day of preschool children, schoolchildren and adolescents were computed using the 7th NNS data. Mean amount of intake per day (mL) and consequential mean energy intake per day (kcal) from consumption of beverages were estimated utilizing descriptive statistics. Following the World Health Organization's (WHO) cutoffs, children and adolescents were classified either as wasted ($\leq 2SD$) normal or overweight ($2SD$) based on body mass index (BMI)-for-age z scores. Pearson's correlation analysis was utilized to test the association between the mean energy intake per day (kcal) for the beverages included in the study and BMI, with significance set at $p < 0.05$. One-way analysis of variance (ANOVA) was used to determine and compare differences in mean energy intake/ day for different beverages across age groups and BMI category. All statistical analyses were performed using SPSS version 13.0 and STATA version 11.0.

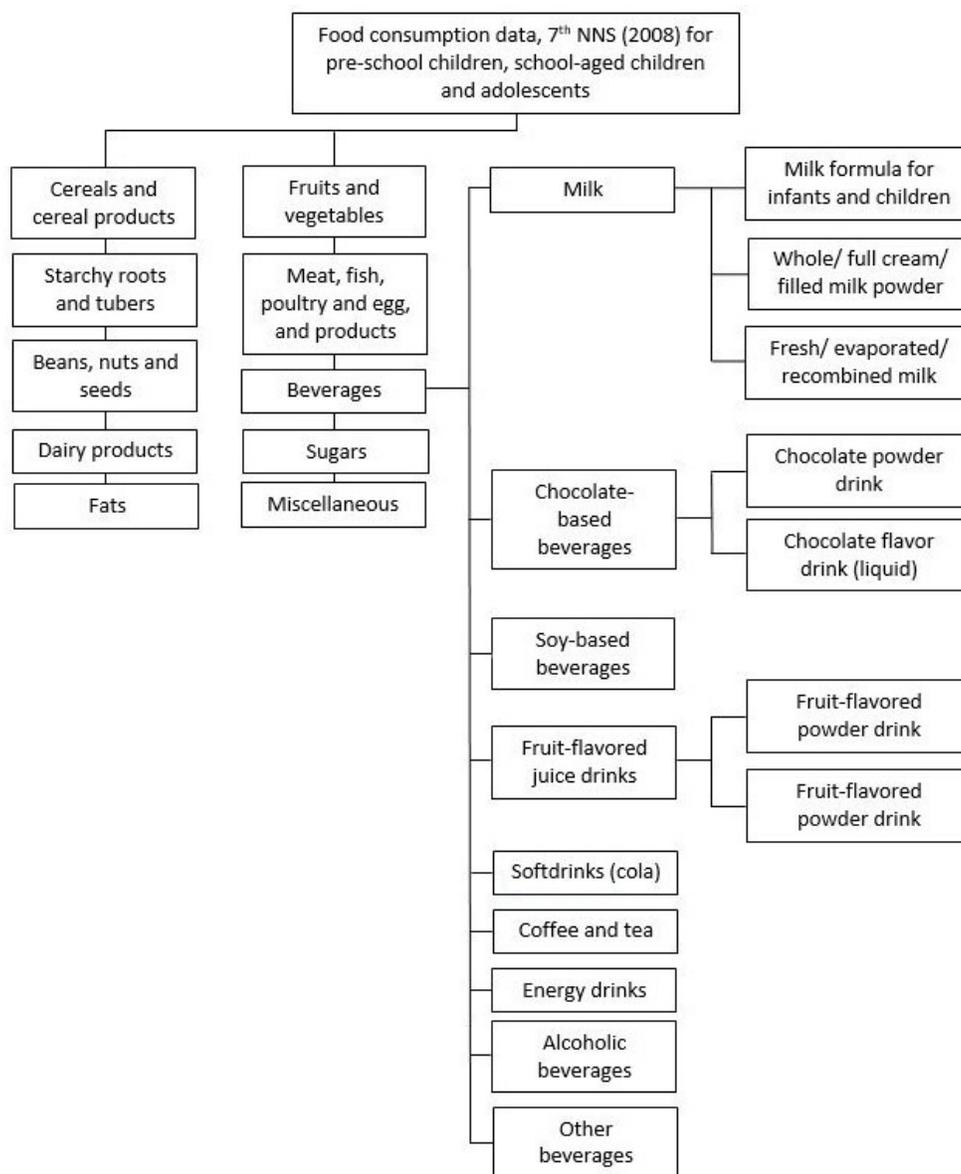


Figure 1. Procedural framework for grouping and classification of beverages.

RESULTS

This study covered beverage consumption data of Filipino pre-school children, school-aged children and adolescents from the 7th National Nutrition Survey (Table 1).

The percentage contribution of beverage intake and other food groups to mean energy intake per day of pre-school children, schoolchildren and adolescents (Figure 2) indicated that, of the average one-day energy intake of pre-school children amounting to 843 kcal, 64% (approximately 540 kcal) was from the consumption of cereals and products, 17% (approximately 143 kcal) from beverage consumption, 9% (approximately 76 kcal) from intake

Table 1. Sample size on beverage consumption data for pre-school children, school-aged children and adolescents, categorized by sex (NNS, Philippines: 2008).

Group	n		
	Male	Female	Total
Pre-school children (6 months to 5 years)	1,486	1,334	2,820
School-aged children (6 to 12 years)	2,102	1,951	4,053
Adolescents (13 to 19 years)	1,788	1,503	3,291

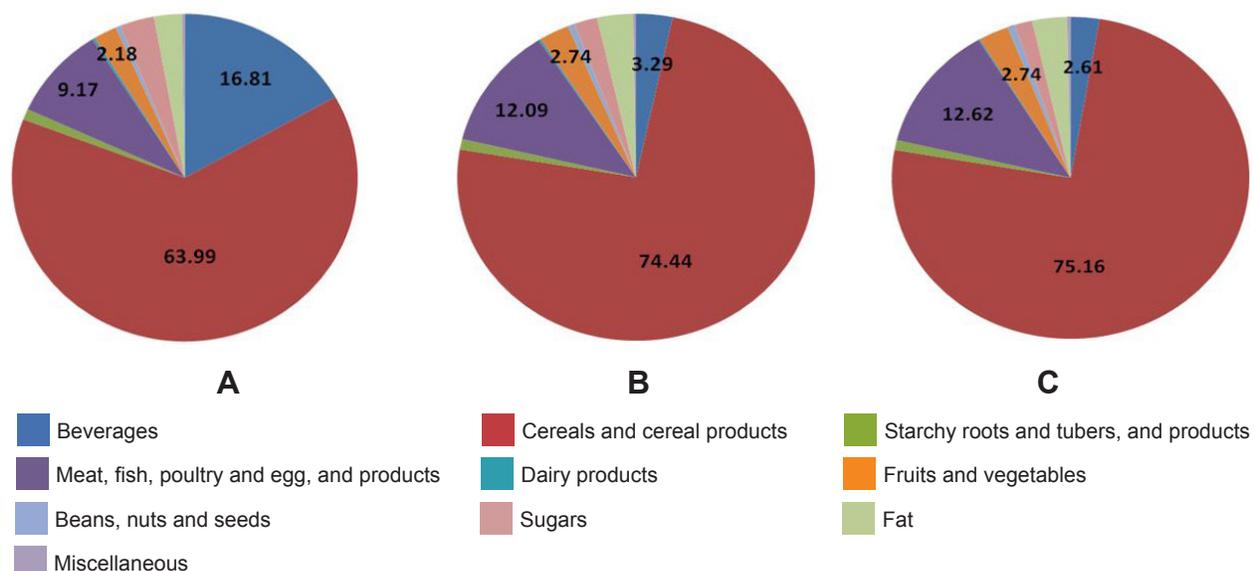


Figure 2. Percentage (%) contribution of beverage consumption to mean energy intake/day in (A) pre-school children, 6 months to 5 years old, (B) school-aged children, 6 to 12 years old and (C) adolescents, 13 to 19 years old, NNS, Philippines: 2008.

of meat, fish, poultry and eggs, and 2% (approximately 17 kcal) from fruits and vegetables. Among school-aged children, average one-day energy intake of 1392 kcal was largely contributed by cereals and products (75% = approximately 1044 kcal) while intake of meat, fish, poultry and egg contributed 12% (approximately 167 kcal), and both fruits and vegetables, and beverages contributed 3% (approximately 42 kcal) to average energy intake. For adolescents, average one-day energy intake of 1878 kcal was contributed primarily by cereals and products, i.e., 75% (approximately 1409 kcal), 13% (approximately 244 kcal) from meat, fish, poultry and egg, and 3% (approximately 56 kcal) from intake of fruits and vegetables and beverages.

The proportion (%) of consumers for selected beverages in different age groups, classified by sex (Table 2) showed that most pre-school children consumed milk and chocolate-based beverage, while others consumed coffee and tea, other beverages and softdrinks. Among school-aged children, the proportion of milk consumers was slightly higher than consumers of coffee and tea and chocolate-based beverages, while a minor proportion consumed softdrinks. Adolescents were mainly consumers of coffee and tea and softdrinks, and only a small proportion consumed milk, other beverages and chocolate-based beverages.

Mean amounts of beverage intake per day (mL) among pre-school children, school-aged children and adolescents

Table 2. Proportion (%) of pre-school children, school-aged children and adolescents consuming different types of beverages by sex, NNS, Philippines: 2008.

Beverage	Proportion (%) of consumers, by age group and sex					
	Pre-school children		School-aged children		Adolescents	
	Male	Female	Male	Female	Male	Female
Milk	85.25	86.50	37.55	37.83	18.57	23.15
Chocolate-based beverages	29.69	25.66	26.58	25.31	14.80	16.23
Soy-based beverages	0.00	0.10	0.00	0.00	0.00	0.00
Fruit-flavored juice drinks	0.17	0.25	0.32	0.21	0.23	0.40
Softdrinks	14.07	13.46	16.20	16.73	24.66	26.67
Coffee and Tea	18.97	16.50	28.74	28.24	41.59	35.65
Energy drinks	1.14	0.00	7.00	0.00	15.81	1.77
Alcoholic beverages	0.00	0.00	0.00	0.07	1.80	0.31
Other beverages	15.65	16.87	20.71	22.08	15.84	20.76

(Figure 3) indicated that among pre-school children, intake for fruit-flavored juice drinks was highest while mean intake for softdrinks was low. Among school-aged children, mean intake for fruit-flavored juice drinks was high; intake for softdrinks and chocolate-based beverages were modest while milk intake was low. In adolescents, mean intakes for alcoholic beverages and fruit-flavored juice drinks were remarkably high while intake for milk was low.

Mean energy intake per day (kcal/day) for the beverages included in the present study (Figure 4) demonstrated that among pre-school children, mean energy intake for milk was high while mean energy intake for chocolate-based beverages, fruit-flavored juices and softdrinks were relatively low. In school-aged children, mean energy intake/day were comparable between chocolate-based beverages, softdrinks, fruit-flavored juices and milk. In adolescents, mean energy intake/day was highest from consumption of softdrinks while mean energy intake from chocolate-based beverages, fruit-flavored juices and milk were comparatively low. Male adolescents' mean energy intake from consumption of alcoholic beverages was higher compared with females.

Tables 3A to 3C show the mean energy intake for selected beverages categorized by BMI classification (wasted, normal, overweight) and its association with BMI (indicated by the *r*-value from Pearson's correlation analysis). Overall, mean energy intakes from beverages were not significantly different across BMI classification in all age groups. Pearson correlation value (*r*-values) showed an association between BMI and caloric intake from different beverages, although this relationship is weak.

DISCUSSION

The present study examined the dynamics of beverage consumption in Filipino children and adolescents utilizing data from the 7th National Nutrition Survey (NNS) conducted in 2008. As to the authors' knowledge, this is the first study in the Philippines which determined the extent of energy intake from beverage consumption and their relative contribution to average energy intake of children and adolescents. Association between beverage consumption and BMI in children and adolescents was also evaluated in view of the rising prevalence of childhood obesity in the country.

The present data demonstrated that in pre-school children, beverages contributed to about 17% of the average energy intake per day but among school-aged children and adolescents, caloric contribution from beverage consumption markedly decreased to 3%. High milk consumption in pre-school children and low milk intake

in schoolchildren and adolescents apparently explains this discrepancy. This is further supported by our findings that the percentage of school-aged children and adolescents who consumed milk was remarkably lower than the proportion of pre-school children who consumed milk. Seemingly, the preference for milk declines in children at school age and onwards. Our data also indicated that sweetened beverages, i.e., chocolate-based beverages, fruit juices and softdrinks were the most consistently consumed beverages by Filipino children and adolescents. Among the sweetened beverages included in this study, softdrinks (cola) is seemingly the most popular. This particular observation is validated by findings from other studies. Adair and Popkin (2005) identified softdrinks as a common energy source for snacks among a cohort of Filipino children. Softdrinks also listed as among the affordable and most commonly consumed food item by Filipino children (6-12 years old) and consequential source of dietary sugar (Yabao et al. 2005). While the present data is cross-sectional and do not demonstrate a causal relationship, they lend support to the notion that sweetened beverages displace milk intake in children and adolescence. Other studies demonstrated that intake of sweetened beverages increase while milk intake tends to decrease as children get older (Fisher et al. 2001; Bowman 2002; Briefel & Johnson 2004; Keller et al. 2009). This is of nutritional concern as decreased milk intake has been associated with poor bone health, short stature, greater risk of osteoporosis and bone fracture, and obesity (Black et al. 2002; Kalkwarf et al. 2003). Conversely, increased consumption of sweetened beverages has been associated with lower intakes of important nutrients including protein, calcium, magnesium, phosphorous and vitamin A (Ballew et al. 2000; Mrdjenovic and Levitsky 2003) as well as contributory to dental caries (Yabao et al. 2005; Tahmassebi et al. 2006).

Findings from the present study also showed that coffee and tea are consumed by Filipino children, especially by adolescents. This is in line with the results reported in another study where increased coffee consumption has been noted in adolescents as part of the changes in their dietary habits and lifestyle (von Post-Skagegard et al. 2002). While our data is limited in the fact that we did not clearly categorize various coffee variants consumed by the study participants, we presume that coffee products that are mainly targeted for young consumers are convenience type, i.e. ready to drink (RTD) coffee and instant coffee. In the Philippines and Asian countries in general, exposure and risk assessment studies on caffeine are largely limited, but reports from other studies indicated that coffee consumption in children and adolescents may lead to caffeine exposure above the recommended threshold (Waizenegger et al. 2011; Lachenmeier et al. 2013). Although the literature on nutritional and health

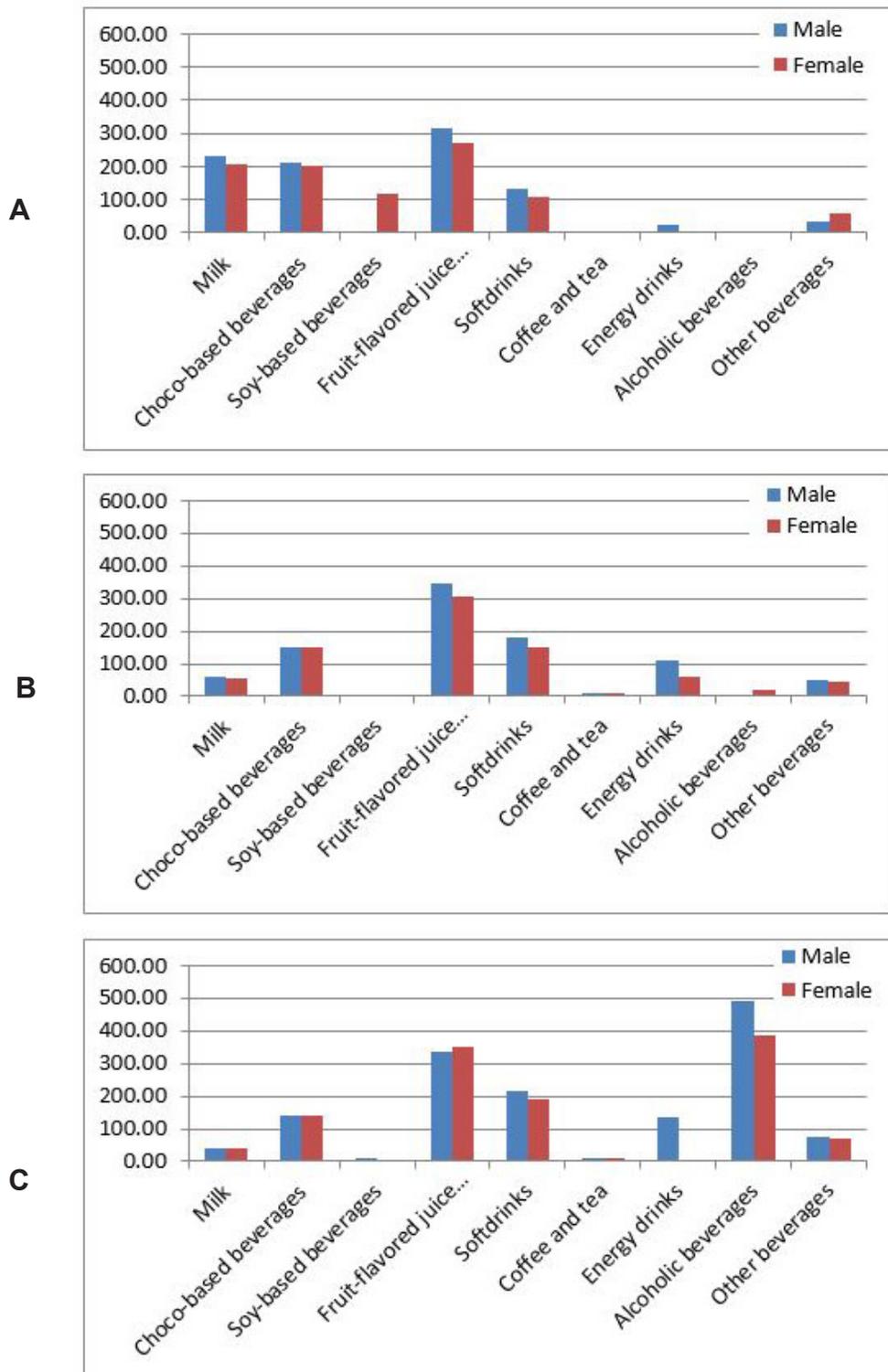


Figure 3. Mean amount of intake per day (mL) for selected beverages (milk, chocolate-based beverages, soy-based beverages, fruit-flavored juice drinks, softdrinks, coffee and tea, energy drinks, alcoholic beverages and other beverages) among (A) pre-school children, 6 months to 5 years old, (B) school-aged children, 6 to 12 years old and (C) adolescents, 13 to 19 years old, by sex, NNS, Philippines: 2008.

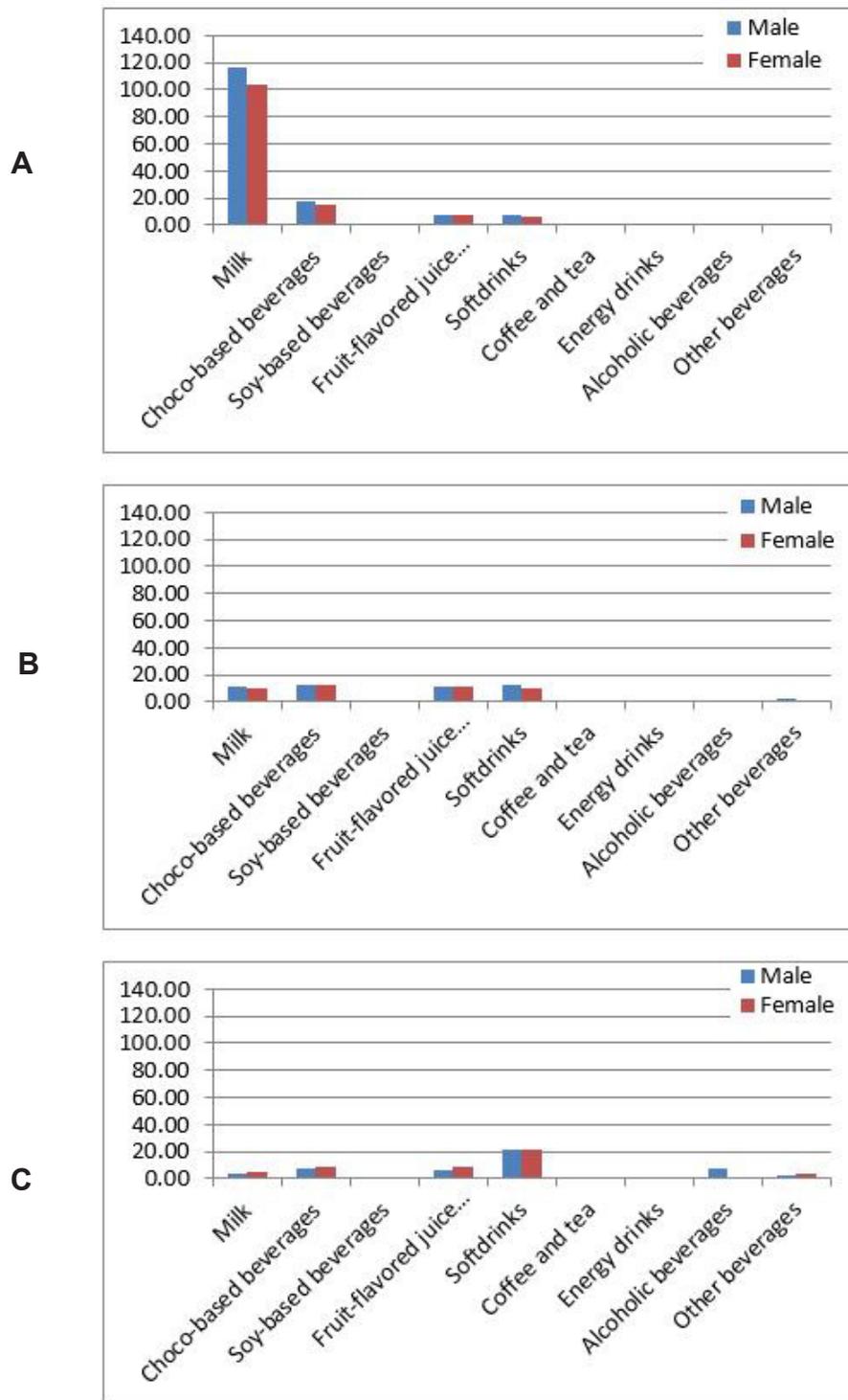


Figure 4. Mean energy intake per day (kcal/day) from consumption of selected beverages (milk, chocolate-based beverages, soy-based beverages, fruit-flavored juice drinks, softdrinks, coffee and tea, energy drinks, alcoholic beverages and other beverages) among (A) pre-school children, 6 months to 5 years old, (B) school-aged children, 6 to 12 years old and (C) adolescents, 13 to 19 years old, by sex, NNS, Philippines: 2008.

Table 3A. Association of mean energy intake (kcal) ± SE per day for selected beverages and BMI classification (wasted, normal and overweight) in pre-school children (6 months-5 years old), NNS, Philippines: 2008.

Beverage	Mean energy intake ± SE			r-value ¹
	Wasted	Normal	Overweight	
Milk	34.28 ± 3.41	26.77 ± 0.86	32.32 ± 3.66	0.074*
Fruit-flavored juice drinks	7.45 ± 2.48	5.22 ± 0.26	5.81 ± 0.99	-0.055*
Chocolate-based beverages	6.57 ± 0.86	6.92 ± 0.29	7.05 ± 1.57	-0.024*
Softdrinks	3.40 ± 0.56	4.93 ± 0.19	4.33 ± 0.76	-0.028*
Coffee and tea	0.26 ± 0.08	0.41 ± 0.14	0.13 ± 0.04	0.005*
Other beverages	3.68 ± 1.08			0.103*

¹based on Pearson's correlation of energy intake from beverages and BMI-for-age z-scores

*significant at 0.01 level

Table 3B. Association of mean energy intake (kcal) ± SE per day for selected beverages and BMI classification (wasted, normal and overweight) in school-aged children (6-12 years old), NNS, Philippines: 2008.

Beverage	Mean energy intake ± SE			r-value ¹
	Wasted	Normal	Overweight	
Milk	3.84 ± 0.46	3.56 ± 0.18	3.20 ± 0.54	-0.014*
Fruit-flavored juice drinks	4.75 ± 0.72	3.85 ± 0.18	2.69 ± 0.38	-0.086*
Chocolate-based beverages	3.27 ± 0.21	3.71 ± 0.11	2.85 ± 0.31	-0.035*
Softdrinks	5.27 ± 0.46	4.49 ± 0.16	4.12 ± 0.28	-0.101*
Coffee and tea	0.17 ± 0.04	0.21 ± 0.01	0.12 ± 0.03	0.036*
Other beverages	3.70 ± 0.92	2.17 ± 0.20	2.52 ± 0.64	-0.023*

¹based on Pearson's correlation of energy intake from beverages and BMI-for-age z-scores

*significant at 0.01 level

effects of caffeine in children remains controversial and inconclusive, the possibility of metabolic and pharmacokinetic effects cannot be fully discounted. With intake of other sources of caffeine (softdrinks and energy drinks) in addition to coffee and tea, it may be worthwhile to examine exposure levels and potential toxicological risks associated with high caffeine consumption.

Our results further demonstrated consumption of alcoholic beverages in Filipino adolescents. The demographics and prevalence of alcohol use among Filipino youth has been elaborately reported in the Global School-based

Student Health Survey (GSHS) country report (Miguel-Baquilod 2004). The GSHS report further accounted that most alcohol use started at home and with parental and media influences (Miguel-Baquilod 2004). Although little is known as to the extent of consequences of alcohol consumption in children and adolescents, we cannot negate the fact that behavioral, health and nutritional risks are probable.

Taken together, our findings on nutrition dynamics of beverage consumption in Filipino children and adolescents underscore the timeliness and relevance of guidelines

Table 3C. Association of mean energy intake (kcal) \pm SE per day for selected beverages and BMI classification (wasted, normal and overweight) in adolescents (13-19 years old), NNS, Philippines 2008.

Beverage	Mean energy intake \pm SE			r-value ¹
	Wasted	Normal	Overweight	
Milk	2.02 \pm 0.46	2.47 \pm 0.51	1.33 \pm 0.52	0.061*
Fruit-flavored juice drinks	2.97 \pm 0.79	3.34 \pm 0.55	2.45 \pm 0.56	-0.039*
Chocolate-based beverages	2.37 \pm 0.36	2.80 \pm 0.20	3.47 \pm 1.18	0.048*
Softdrinks	4.96 \pm 0.55	4.24 \pm 0.19	4.35 \pm 0.72	-0.089*
Coffee and tea	0.16 \pm 0.03	0.18 \pm 0.02	0.08 \pm 0.03	0.019*
Energy drinks	1.25 \pm 0.14	1.17 \pm 0.70	-	-0.470*
Alcoholic beverages	5.07 \pm 3.09	12.29 \pm 4.36	-	0.003*
Other beverages	3.99 \pm 1.21	2.20 \pm 0.38	4.10 \pm 1.61	0.106*

¹based on Pearson's correlation of energy intake from beverages and BMI-for-age z-scores

*significant at 0.01 level

and policy options geared towards shaping healthier dietary habits and food choices. Creating a healthy food environment starts at home and school as they remain the largest sources of food access for children. For parents and homemakers, limiting the purchase of sugar-sweetened beverages may reduce its intake and increasing the availability of milk and milk-based beverages in homes may encourage milk consumption in children and adolescents. Modeling healthy beverage choices at home and when eating out may also improve intake of healthier beverage options.

In the light of the present data, implementation of school nutrition standards must be given sufficient priority and strengthened for implementation. The Department of Education (DepEd) Order No. 8 Series of 2007 states that "school canteens shall serve as a venue for developing desirable eating habits of pupils/ students". In particular, the guidelines stipulate that beverages sold in public elementary and secondary schools shall include milk, and shakes and juices prepared from fruits and vegetables in season and sale of carbonated drinks, sugar-based synthetic or artificially-flavored juices is prohibited. This national policy initiative requires support and regulatory actions, i.e. quad-media promotion to increase general awareness and encourage involvement of parent-teacher-children associations (PTCAs) and creation of monitoring teams to evaluate and ensure adherence to school nutrition standards.

Further, current proposition on additional tax on sugar-sweetened and carbonated beverages (House Bill 3365) may also be considered. Similar schemes have been

implemented in several developed countries; however potential implications of such propositions in the Philippines must be taken into account. An analysis of empirical data on softdrink taxation policies suggested that taxation scheme alone may not be large enough to bring about meaningful behavioral change (Fletcher et al. 2010). While taxes may bring about reduction in sales of sweetened beverages, this effect may be insignificant if such beverages remain accessible and available in homes, schools, convenience stores and other outlets. Thus, integration of policy and program options coupled with effective education programs, informed media campaigns aimed for parents and children alike may be the most advantageous choice.

Finally, our results demonstrated an association between caloric intake from beverages and BMI but the relationship was weak. As such, we recognize that our study is limited primarily because our data is cross-sectional in nature and thus, our findings do not reflect causality. Possible confounders which include demographics, physical activity, eating habits and food preferences of children and adolescents were not considered in the analysis and the possibility of over- or under-reporting during data collection is also possible. It would be valuable to conduct prospective, observational analysis of nutritional status and beverage consumption patterns in a representative sample of Filipino children classified by gender and socio-economic profile.

CONCLUSION

Analysis of beverage consumption data from the NNS 2008 demonstrated that beverages contributed a small amount to mean energy intake of Filipino children and adolescents. The proportion of milk consumers was high in pre-school children while consumers of sugar-sweetened beverages were high in school-aged children and adolescents. Findings reflect the timeliness and relevance of action-oriented goals and public health efforts that will require involvement of parents and homemakers, school authorities, industry keyplayers and policymakers towards creating a healthy food environment for Filipino children and adolescents.

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