

RESEARCH ARTICLE

Trends in beverage consumption and contribution to total energy intake in the Philippines: 2008-2019

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ABSTRACT

Background: Unhealthy diet, including high consumption of beverages with added sugars, has been attributed to the increasing trend of overweight and obesity.

Objectives: This study explored the trend in beverage consumption and estimated the percent energy contribution of beverages to the total energy intake of selected population groups in the Philippines from 2008 to 2019.

Methodology: The proportions, mean intakes, and percentile distributions of energy intake from beverages of selected population groups in 2008, 2013, and 2018-2019 used in this study were estimated using the National Nutrition Surveys by the Food and Nutrition Research Institute. Two analyses were done for the energy intake from beverages: (1) beverages excluding milk and dairy products, and (2) all beverages. The energy intake from sugars and syrups was also noted.

Results: Results showed that the mean energy intake for beverages increased from 2008 to 2018-2019 for all age groups. The mean contribution of beverages to total energy intake, excluding milk and dairy products, was generally low but increased from 2008 to 2018-2019 with ranges from 2.3-3.7% and 2.8%-5.2%, respectively. However, high beverage consumers or those consuming ≥ 120 kcal per day, even excluding milk and dairy products, were observed in 6.3% of children 6 months to 5 years, 10.3% of children 6-12 years old, 16.1% of adolescents, 23.5% of adults, and 13.0% of pregnant women in 2018-2019.

Conclusion: Behavior change communication strategies are needed to prevent obesity and other lifestyle-related diseases, particularly in the population groups with a high consumption of caloric beverages.

Keywords: *beverages, energy intake, sugar intake, obesity*

Introduction

Human preference for sweet tastes has led to a plethora of beverages in which sugar and other sweeteners are added to make them more palatable. There is an increasing concern that the intake of free sugars such as those in beverages with added sugar, increases the overall energy intake of people leading to an unhealthy diet, weight gain, and increased risk to non-communicable diseases (NCDs) [1]. Several studies have also shown the association of sugar-sweetened beverages (SSBs) with obesity and other lifestyle diseases among the different population groups because of high sugar content, low satiety, and inadequate compensation by reducing food calories [2-4]. In contrast, a previous study by Gubat *et al.* [5] showed that there was a weak association between energy intake from beverages and BMI among Filipino children.

Based on the National Nutrition Surveys conducted by the Food and Nutrition Research Institute of the Department of Science and Technology (DOST-FNRI), there has been a decreasing trend in the mean one-day per capita energy intake, from 1905 kcal in 2003 to 1810 kcal in 2013 and 1774 kcal in 2018. The bulk of the energy intake comes from cereals and products which comprise about 41.9% of food intake in 2008 and 39% in 2018. Sugar and syrups intake comprised about 2.0% of intake in 2008 and 1.0% in 2018 [6]. In contrast, there has been a general increasing trend in the prevalence of overnutrition across different population groups from 2003 to 2018 [7]. On the other hand, in developed countries like Canada, Australia, and United States, trends in beverage consumption have been declining [8-10]. However, obesity

prevalence is still on the rise [11]. The World Health Organization (WHO) recommends an intake of free sugars to less than 10% of total energy intake to prevent obesity and other diet-related diseases [1].

Given these contrasting patterns, this study looked into the trends in beverage consumption and percent contribution of beverages, the majority of which are with added sugar, to the total energy intake of different Filipino population groups. It also compared intakes of beverages to the daily recommended sugar and syrup intake of 6 teaspoons or about 120kcal per day as a potential contributor of risk to obesity.

Since beverages were purchased or received by the respondents either in liquid form such as ready-to-drink soda, juice drink or coffee, concentrates such as fruit juices, or powder form such as milk and powdered juice drinks, the analysis in this paper was done only for their energy contribution of the beverage consumed, which is the variable of interest, regardless of fluid intake. Moreover, acknowledging that milk and dairy products have other significant nutritional contributions like protein, vitamins, and minerals, and given that children, especially five years olds and below have a high milk intake, analysis of beverage contribution to total energy intake was done in two groups: beverages excluding milk and dairy products, and all beverages.

Methodology

Data Source

The study used the individual food consumption data of all members from sample households collected using a two-day non-consecutive 24-hour food recall from the 7th and 8th National Nutrition Survey (NNS) and 2018-2019 Expanded National Nutrition Survey (ENNS) in the Philippines done in 2008 (n=21,240), 2013 (n=17,341), and 2018-2019 (n=142,281), respectively. The 7th and 8th NNS sampling design utilized the 2003 Master Sample of the Philippine Statistics Authority (PSA). Both surveys employed a stratified three-stage sampling design in which the first stage of sampling was the selection of Primary Sampling Units (PSU). A PSU is a barangay or a combination of contiguous barangays with at least 500 households. Enumeration Areas (EA) with 150 to 200 households were then selected from the PSUs. The random selection of the households was the third and final stage. Meanwhile, the 2018-2019 ENNS used the 2013 Master Sample of the PSA. It is a two-stage cluster sampling design with barangays or a combination of contiguous barangays as the PSUs. It is followed by the selection of secondary sampling

units composed of housing units/households. The 7th, 8th NNS, and 2018 ENNS were included in the Dietary Survey component [7,12,13]. Sampling weights were used in the analysis of results. The questionnaires and methodology used in the 2008, 2013, 2015, and 2018-2019 nutrition surveys were reviewed and cleared by the FNRI Institutional Ethics Review Committee (FIERC).

Beverage Classification

The DOST-FNRI classified beverages into nine categories which include the following: (1) milk and dairy products, (2) chocolate-based beverages, (3) soy-based beverages, (4) fruit-flavored juice drinks, (5) 100% fruit juice drinks, (6) soft drinks, (7) coffee and tea, (8) energy drinks, (9) alcoholic beverages, and (10) other beverages except for water. The beverage classification was based on Philippine Food Composition Tables (PhilFACT) sub-grouping and was adopted in this study for ease of analysis. The PhilFACT is constantly being updated based on new food items that come out in the market but the basis for categorizing each into groups and sub-groups is the same.

Data Analysis

A computer system called Individual Dietary Evaluation System (IDES) was used to evaluate the energy and nutrient content of foods consumed by each individual subject based on a 24-Hour Food Recall. The estimation of energy and nutrient content of each food consumed was based on the PhilFACT. The energy content of beverages and percentage contribution of the energy to the total energy intake are presented in kilocalories and used for comparison between groups.

Data were organized and processed through Stata 15 [14]. Descriptive statistics were generated to analyze the proportion of the population consuming different types of beverages and the mean intakes of different population groups. The mean energy contribution of beverage to total energy intake of different population groups for 2008, 2013, and 2018-2019 was computed by getting the total energy or caloric contribution of beverages consumed and dividing it by the total energy or caloric intake from all foods and beverages in a day based on a 24-Hour Food Recall. The difference in means and percentages was compared based on 95% confidence intervals (CIs).

Different age groups and physiologic conditions have different recommended energy intakes [19]. Thus, this study analyzed beverage consumption and its energy contribution by age and physiologic groups excluding 60 years old and above. Furthermore, according to the Daily

Nutritional Guide Pyramid for Filipinos, the recommended sugar and sweets intake for children was 5-6 tsp, 6 tsp for pregnant and lactating women, and 5-8 tsp for adults. For ease of comparison, 6 tsp was used in the study as it is the same recommendation for all the age groups.

With this, it was assumed that if the energy intake from beverages exceeds 120 kcal (or equivalent to 6 tsp table sugar), then a person might over-consume the daily recommended sugar and syrup intake if other sources of sugar such as table sugar, jams, jellies, or candies are still consumed on top of the beverages. Thus, this study looked into the proportion of the population with an energy consumption from beverages exceeding 120kcal. To get the level of energy intake from high beverage consumers, percentiles were computed.

Results

Mean Energy Intakes from Beverages

The mean energy intake of different beverages among selected population groups is shown in Table 1. Results showed a general increase in mean energy intake from total beverages from 2008 to 2018-2019 for all age groups despite decreases in total energy intake. Children 6 months to 5 years old had the highest intake of energy from beverages from 145.5 to 207.7 kcal in 2008 to 2018-2019, respectively. The increase was significant from 2008 to 2013. The average intake of energy from beverages for this age group was largely contributed by milk and dairy products from 111.6 kcal to 184.1 kcal in 2008 to 2018-2019. Consumption of milk and dairy products increased from 11.3 to 26.9 kcal in 2008 to 2018-2019 among school-age children (6 to 12 years old) but markedly lower than the milk consumption of children 6 months to 5 years old.

For adolescents, the mean energy intake from beverages was relatively low from 49.7 to 69.0 kcal in 2008 and 2018-2019, respectively, although the increase was significant. In 2008, soft drinks had the highest mean energy intake among adolescents but slightly declined until 2018-2019. In contrast, the mean energy from coffee and tea increased from 2.8kcal in 2008 to 20.6kcal in 2018-2019 which was significant.

Similarly, the mean energy intake from beverages among adults increased from 65.6 kcal to 93.4 kcal, where coffee and tea had the highest significant increase in energy contribution for the 10-year period. In contrast, alcoholic drinks had a significant decrease in the same period.

Among pregnant women, the mean total energy intake from beverages slightly increased from 2008 to 2018-2019, though not significant. However, the mean intakes in milk and dairy products and coffee and tea significantly increased for the same period.

The table for the mean energy intake (kcal) from the beverage of different population groups with CIs can be seen in Annex A. Non-overlapping CIs would mean a significant increase or decrease in the mean energy intake from beverage.

Contribution of Beverages to Total Energy Intake

Excluding milk and dairy products, the percent contribution of beverages to total energy intake was low, ranging from 2.3-3.7% in 2008, 3.5-5.2% in 2013, and 2.8%-5.2% in 2018-2019. The energy contribution from beverages excluding milk and dairy products to total energy intake from 2008 to 2013 increased for all population groups. These were significant among children 6-12 years old, adolescents, and adults. From 2013 to 2019, the percent contribution of beverages to total energy intake significantly decreased among children 6 months to 5 years old and 6-12 years old while the rest of the age groups have no significant differences.

Considering all beverages, the highest consumption of beverages was observed among children from 6 months to 5 years old at 17.1%, 21.1%, and 22.8% of total food intake in 2008, 2013, and 2018-2019, respectively. The increase for this age group from 2008 to 2013 was significant. The percent contribution of beverages to total energy intake also increased for the other population groups from 2008 to 2018-2019 although significant increases were seen in all age groups except pregnant women from 2008 to 2013 only (Table 2).

Trends in Mean Energy Intakes from Sugar and Beverages

Table 3 shows the mean energy intake from sugars and syrups and all beverages for the three survey periods. There has been a significant decrease in the mean energy intake from sugars and syrups from 2008 to 2018-2019 for all population groups, except among pregnant women from 2013 to 2018-2019. In contrast, there has been a significant increase in the mean energy intake from beverages from 2008 to 2013 except among pregnant women. Meanwhile, there was also a slight increase in mean energy intake from beverages from 2013 to 2018-2019 for all age groups but the increase was not significant.

Table 1. Mean Energy Intake (kcal) from Beverage of Different Population Groups: Philippines 2008-2019

Type of Beverage	Children, 6mos-5 yrs			Children, 6-12 yrs			Adolescents, 13-18 yrs			Adults, 19-59 yrs			Pregnant women		
	2008 (n=2820)	2013 (n=2222)	2018-2019 (n=20802)	2008 (n=4053)	2013 (n=3386)	2018-2019 (n=30951)	2008 (n=2996)	2013 (n=2767)	2018-2019 (n=20504)	2008 (n=8974)	2013 (n=8786)	2018-2019 (n=68529)	2008 (n=470)	2013 (n=180)	2018-2019 (n=1495)
Milk & dairy products	111.6	147.9 ^a	184.1 ^b	11.3	17.0 ^a	26.9 ^b	5.5	7.7	12.6 ^b	6.7	6.3	9.0 ^b	27.8	28.1	42.8
Chocolate-based beverages	16.3	17.2	9.5 ^b	12.7	12.8	10.1 ^b	8.4	7.2	6.1	4.5	3.8	2.8	14.7	8.5	7.0
Soy-based beverages	0.0	0.1	0.3	0.0	0.0	0.5	0.0	0.1	0.8 ^b	0.1	0.2	0.3	0.0	0.0	0.3
Softdrinks (carbonated drinks)	6.9	5.5	3.7 ^b	11.3	11.0	9.2	20.8	21.3	18.4	23.0	22.7	19.4	14.2	12.2	10.2
100% Fruit concentrate	0.9	0.3	0.1	12.0	1.4	0.6	1.3	1.5	0.8	1.4	1.6	0.6 ^b	2.5	4.3	0.9
Other Fruit Juice Drinks	7.2	10.5 ^a	4.8 ^b	10.0	13.4 ^a	6.7 ^b	6.9	10.1 ^a	5.7 ^b	4.5	5.5	3.5 ^b	9.4	6.6	3.2
Coffee & tea	1.5	3.4 ^a	4.5	1.8	7.0 ^a	9.4	2.8	15.8 ^a	20.6 ^b	5.3	35.2 ^a	45.1 ^b	4.3	20.2 ^a	26.6
Energy drinks	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.3	0.3	0.2	0.6 ^a	0.5	0.0	0.0	0.2
Alcoholic beverages	0.0	0.0	0.0	0.0	0.0	0.0	3.0	2.7	1.9	19.0	16.3	10.8 ^b	0.1	0.0	0.0
Other beverages	1.0	2.1	0.6 ^b	0.4	2.2 ^a	1.9	0.8	2.1	1.8	1.1	0.9	1.5	0.1	0.0	1.8 ^b
Total beverages	145.5	187.1^a	207.7	48.6	65.1^a	65.3	49.7	68.8^a	69.0	65.5	93.3^a	93.4	73.0	79.8	93.0
Other Food	697.7	644.0 ^a	591.0 ^b	1343.0	1225.1 ^a	1122.0 ^b	1819.2	1561.7 ^a	1522.2	1851.1	1568.0 ^a	1543.7	1659.7	1453.6 ^a	1418.9

^aSignificant between 2008 and 2013 (95% CI)
^bSignificant between 2013 and 2018-2019 (95% CI)

Table 2. Mean Contribution of Energy from Beverages to Total Energy Intake: Philippines 2008-2019

Age group	Beverages excluding milk & dairy product (% of total energy intake)												All Beverages (% of total energy intake)											
	2008				2013				2018-2019				2008				2013				2018-2019			
	%	SE	CI		%	SE	CI		%	SE	CI		%	SE	CI		%	SE	CI		%	SE	CI	
			LL	UL			LL	UL			LL	UL			LL	UL			LL	UL			LL	UL
Children, 6mos-5yrs	3.7	0.1	3.4	4.0	4.4	0.2	4.0	4.8	2.8	0.1	2.6	3.0	17.1	0.6	16.0	18.2	21.1	0.6	20.0	22.3	22.8	0.8	21.2	24.4
Children, 6-12yrs	2.6	0.1	2.4	2.7	3.7	0.1	3.5	3.9	3.1	0.1	2.8	3.4	3.3	0.1	3.1	3.5	5.0	0.1	4.7	5.3	5.5	0.1	5.2	5.7
Adolescents, 13-18yrs	2.3	0.1	2.1	2.4	3.8	0.1	3.5	4.0	3.6	0.1	3.3	3.8	2.6	0.1	2.4	2.8	4.3	0.1	4.0	4.5	4.4	0.1	4.1	4.7
Adults, 19-59yrs	2.8	0.1	2.7	3.0	5.2	0.1	4.9	5.4	5.2	0.2	4.8	5.6	3.2	0.1	3.0	3.4	5.6	0.1	5.3	5.8	5.8	0.2	5.4	6.2
Pregnant women	2.6	0.2	2.2	2.9	3.5	0.3	2.9	4.1	3.6	0.2	3.2	4.0	4.1	0.3	3.5	4.6	5.2	0.4	5.9	5.9	6.4	0.2	5.9	6.8

Table 3. Mean Energy Intakes (kcal) from Sugars and Syrups and All Beverages by Different Age Groups: Philippines 2008-2019

Age group	2008						2013						2018-2019											
	Sugars and syrups			All Beverages			Sugars and syrups			All Beverages			Sugars and syrups			All Beverages								
	Mean	SE	CI		Mean	SE	CI		Mean	SE	CI		Mean	SE	CI		Mean	SE	CI					
			LL	UL			LL	UL			LL	UL			LL	UL			LL	UL				
Children, 6mos-5yrs	33.9	1.3	31.5	36.4	145.5	5.4	134.8	156.2	28.0	1.5	25.0	31.0	187.1	7.5	172.2	201.9	18.5	0.6	17.2	19.8	207.7	8.6	189.3	226.0
Children, 6-12yrs	39.5	1.2	37.2	41.9	48.6	1.7	45.3	51.9	33.7	1.3	31.1	36.2	65.1	2.1	60.9	69.2	25.3	1.2	22.6	28.0	65.3	2.0	61.0	69.5
Adolescents, 13-18yrs	49.6	1.5	46.6	52.6	49.7	2.1	45.5	53.8	40.2	1.5	37.2	43.2	68.8	2.3	64.3	73.4	32.5	1.2	29.9	35.2	69.0	2.4	63.9	74.2
Adults, 19-59yrs	52.9	1.1	50.8	55.0	65.6	1.9	61.8	69.3	43.4	1.0	41.3	45.5	93.3	2.2	89.0	97.5	36.1	1.2	33.6	38.6	93.4	3.2	86.7	100.2
Pregnant women	44.2	2.4	39.5	48.9	73.0	5.2	62.8	83.2	26.3	3.2	20.0	32.6	79.8	5.3	69.3	90.3	25.8	2.0	21.6	30.1	93.0	3.2	86.1	100.0

Energy Intakes from Beverages vis-a-vis Daily Nutritional Guide Pyramid Recommendation

This study tried to compare the energy intake from beverages with the recommended sugar and syrups intake from the Daily Nutritional Guide Pyramid for Filipinos [15] of 6 tsp or about 120kcal. Looking at the percentile distribution of consumption by the different population groups, the median consumption for all population groups from 2008 to 2018-2019 was below 120kcal either excluding milk and dairy products or all beverages (Table 4). Excluding milk and dairy products, the energy intakes from beverages of the 75th percentile were still below 120kcal for all population groups and survey periods. However, looking at the 90th percentile, adolescents, adults, and pregnant women have exceeded 120kcal and have steadily increased from 2008 to 2018-2019.

Excluding milk and dairy products, adults had the highest percentage of the population consuming 120 kcal or more per day from beverages for the 10-year period followed by adolescents and pregnant women. There was a significant increase in the percentage of the population consuming >120kcal from beverages excluding milk and dairy products from 2008 to 2013 among adolescents and adults. From 2013 to 2018-2019, there were significant decreases in the percentage of the population consuming \geq 120kcal from beverages excluding milk and dairy products among children 6 months to 5 years and adults. Meanwhile, there were significant increases in the percentage of the population consuming >120kcal from all beverages from 2008 to 2013 for all population groups except pregnant women. Changes in the percentage of the population consuming >120kcal were not significant for all population groups from 2013 to 2018-2019 (Table 5).

Discussion

The trend in the mean energy intake from all beverages increased over 10 years from 2008 to 2018-2019 for all the population groups in this study. However, the mean and median intakes from beverages were still low for all age groups over the same period. The trend in Gross Value Added (GVA) on the manufacture of beverages also showed an increase from 3.4% in 2008 to 4.6% in 2019 [29].

A systematic assessment of the beverage intake in 187 countries revealed that countries in Southeast Asia, including the Philippines, have a relatively low consumption of sugar-sweetened beverages (SSBs), fruit juice, and milk compared to other regions of the world [17]. A trend analysis done by

Popkin and Hawkes in 2016 [18] showed that a major focus of global beverage companies is to push consumption in less saturated emerging markets beyond Western countries.

Among the different age groups, children aged 6 months to 5 years old had the highest energy intake from beverages for the three survey periods, which was mostly contributed by milk and dairy products. Milk and dairy products are important sources of protein, calcium, vitamin D, and other nutrients among children as well as other population groups such as adolescents, pregnant and lactating women, and older persons. Hence, the consumption of milk and dairy products is one of the key messages in the Nutritional Guidelines for Filipinos [19]. Factors that influence the intake of sugary drinks among children include parental knowledge and practices on SSBs, exposure to advertisements, more daily TV time, and more fast food intake [20-22].

Adolescents had an increasing mean energy intake from beverages from 2008 to 2018-2019, contributed mainly by soft drinks and coffee and tea. In Korea, factors that affect consumption of SSBs among youth include gender, weekly allowance, and having an experience of depression in the past 12 months [23]. In the US, factors that may have contributed to the decreasing trend in the intake of soda among high school students include new programs such as the Smart Snacks in School, nutrition standards that eliminated the sale of non-diet soda in high schools, and other existing policies in local districts that limited sales in sodas and SSBs [24]. Moreover, in Canada, a declining sugary drink intake was expected due to shifting consumer preferences, increased public health concern related to the health implications of SSBs, and public health interventions that discouraged consumption of sugary drinks [25].

An increasing consumption of beverages, both with natural and added sugars, is similarly observed among adults and pregnant women. In Mexico, pregnant women had a lower than recommended fluid intake but a majority of their intake is contributed by SSBs [26]. In the Philippines, the beverage consumption of pregnant women was mostly milk and dairy products, coffee and tea, soft drinks, and choco-based drinks. The mean energy intake from beverages for pregnant women was below 120kcal for the 10-year period, however, there is a proportion of women who have a high consumption of beverages particularly starting at 75th percentile in 2018-2019 (Table 4). In a cohort study by Petherick [27], women who consumed four cups of sugar-sweetened cola beverages had higher odds of preterm delivery when compared to women who did not consume these beverages.

Table 4. Distribution of Total Energy Intake (kcal) from Beverages by Population Groups: Philippines, 2008-2019.

Age group	Survey year	Beverages except milk and dairy products			All beverages		
		Median	P75	P90	Median	P75	P90
6mos-5yrs	2008	0.8	48.6	102.1	61.4	192.5	418.3
	2013	3.0	50.6	101.5	91.7	241.4	522.4
	2018-2019	0.0	8.9	91.9	95.5	276.3	578.3
6-12yrs	2008	4.8	51.2	110.5	19.8	69.0	138.4
	2013	32.3	71.3	122.4	47.5	96.5	161.2
	2018-2019	0.0	68.5	115.8	13.8	98.1	176.3
13-18yrs	2008	4.8	58.6	122.0	10.7	68.6	137.2
	2013	45.0	95.0	156.4	48.6	98.4	175.7
	2018-2019	1.8	98.1	162.2	17.9	107.8	183.7
19-59yrs	2008	8.1	465.6	148.3	17.9	78.5	163.8
	2013	51.0	117.6	198.0	58.8	126.7	211.7
	2018-2019	38.6	112.7	213.9	66.1	125.5	221.1
Pregnant women	2008	14.7	66.2	125.2	41.7	104.3	173.0
	2013	39.8	90.2	127.3	61.3	119.4	173.7
	2018-2019	4.9	98.0	141.5	82.9	150.6	222.4

Table 5. Percentage of the Population Consuming ≥ 120 kcal (or equivalent to 6 tsp table sugar) from Beverages by Age Groups: Philippines, 2008-2019

Age group	Beverages excluding milk & dairy product											All Beverages												
	2008			2013			2018-2019			2008			2013			2018-2019								
	% (≥ 120 kcal)	SE	CI		% (≥ 120 kcal)	SE	CI		% (≥ 120 kcal)	SE	CI		% (≥ 120 kcal)	SE	CI		% (≥ 120 kcal)	SE	CI					
			LL	UL			LL	UL			LL	UL			LL	UL			LL	UL	LL	UL		
Children, 6mos-5yrs	7.7	0.6	6.6	8.9	7.8	0.6	6.6	9.1	5.4	0.3	4.8	6.1	34.6	1.2	32.3	36.8	42.0	1.3	39.4	44.6	44.5	1.2	42.0	47.0
Children, 6-12yrs	8.7	0.6	7.6	9.8	10.3	0.7	9.0	11.7	8.9	0.6	7.6	10.1	12.9	0.7	11.5	14.2	17.4	1.0	15.5	19.4	19.1	0.7	17.6	20.6
Adolescents, 13-18yrs	10.5	0.7	9.2	11.9	16.3	0.9	14.5	18.1	14.3	0.6	12.9	15.7	12.7	0.8	11.1	14.2	19.3	0.9	17.4	21.1	19.4	0.8	17.7	21.2
Adults, 19-59yrs	13.5	0.5	12.5	14.5	24.1	0.8	22.6	25.6	20.5	0.9	18.5	22.4	15.8	0.6	14.7	16.9	26.6	0.8	25.0	28.2	24.1	0.9	22.1	26.1
Pregnant women	10.5	1.6	7.3	13.7	10.3	2.5	5.2	11.5	11.5	1.2	9.0	14.0	19.0	2.1	14.9	23.1	24.8	3.3	18.4	31.2	29.6	1.4	26.6	32.6

In general, the mean intake of beverages in terms of caloric contribution in the country increased but was still below the recommended limits for sugars and syrups. Although the study only assumed that the calories from beverages are free sugars, the percent contribution to total energy intake of each individual was within the WHO recommendation of less than 10% of total energy intake to prevent obesity and other diet-related diseases.

However, high caloric beverage consumers or those consuming ≥ 120 kcal per day, even excluding milk and dairy products, were observed in pockets of the population

particularly 5.4% of children 6 months to 5 years, 8.9% of children 6-12 years old, 14.3% of adolescents, 20.5% of adults, and 11.5% of pregnant women in 2018-2019.

In 2018, the Philippines implemented an excise tax on sugar-sweetened beverages to reduce the intake reportedly associated with overweight and obesity. A month after its implementation, there was a decline of 8.7% in sales of SSBs in convenience stores [28]. However, based on the 2018-2019 ENNS data, while the mean energy intake of beverages increased from 2013 to 2018-2019, the percent contribution of beverages to total energy intake did not significantly differ

between these survey periods among population groups, except children 6 months to 5 years whose beverage intake was largely milk and dairy products that are not included in the tax. Although, it might still be too early to observe the effect of the tax on consumption as it was implemented in 2018 when the survey was ongoing. Thus, monitoring of actual consumption of beverages in the succeeding years is needed to determine its effect on consumption patterns as well as its long-term impacts on nutritional status and health.

Conclusion

The contribution of beverages to total energy intake excluding milk and dairy products was generally low but increased from 2008 to 2018-2019 with ranges from 2.3-3.7% and 2.8%-5.2%, respectively. However, high beverage consumers or those consuming ≥ 120 kcal per day, even excluding milk and dairy products, were observed in 5.4% of children 6 months to 5 years, 8.9% of children 6-12 years old, 14.3% of adolescents, 20.5% of adults, and 11.5% of pregnant women in 2018-2019. Moreover, the caloric intake from beverages is increasing despite decreasing total energy intake from foods in the past 10 years. Adults had the highest percent of the population consuming ≥ 120 kcal per day from beverages which may be a cause of concern if they also consume other sugars and syrups on top of beverages regularly. Behavior change communication strategies are needed to promote the consumption of healthy beverages and balanced meals to prevent obesity and other lifestyle-related diseases particularly in the high caloric beverage consumers.

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ANNEX

Annex A. Mean Energy Intake (kcal) from Beverage of Different Population Groups: Philippines 2008-2019

Age group	Children, 6mos-5 yrs											Children, 6-12 yrs												
	2008 (n=2820)				2013 (n=2222)				2018-2019 (n=20802)			2008 (n=4053)				2013 (n=3386)				2018-2019 (n=20802)				
	Mean	SE	CI		Mean	SE	CI		Mean	SE	CI		Mean	SE	CL		Mean	SE	CI		Mean	SE	CI	
			LL	UL			LL	UL			LL	UL			LL	UL			LL	UL			LL	UL
Milk & dairy products	111.6	5.3	101.2	121.9	147.9	6.3	135.6	160.3	184.1	8.2	166.5	201.7	11.3	0.7	9.9	12.7	17.0	1.1	14.8	19.2	26.9	1.0	24.6	29.1
Chocolate-based beverages	16.3	0.9	14.6	18.0	17.2	3.2	10.8	23.5	9.5	0.5	8.6	10.5	12.7	0.6	11.4	13.9	12.8	0.7	11.5	14.2	10.1	0.4	9.2	11.0
Soy-based beverages	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.3	0.3	0.1	0.1	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5	0.2	0.0	1.0
Softdrinks (carbonated drinks)	6.9	0.5	6.0	7.9	5.5	0.5	4.5	6.6	3.7	0.2	3.2	4.2	11.3	0.7	9.9	12.7	11.0	0.7	9.6	12.4	9.2	0.7	7.7	10.6
100% Fruit concentrate	0.9	0.4	0.2	1.6	0.3	0.1	0.1	0.5	0.1	0.0	0.1	0.2	1.2	0.4	0.4	1.9	1.4	0.6	0.3	2.6	0.6	0.2	0.3	0.9
Other Fruit Juice Drinks	7.2	0.5	6.2	8.3	10.5	0.8	9.0	12.0	4.8	0.5	3.6	5.9	10.0	0.7	8.5	11.4	13.4	0.7	12.0	14.8	6.7	0.6	5.3	8.1
Coffee & tea	1.5	0.4	0.7	2.3	3.4	0.4	2.6	4.1	4.5	0.4	3.7	5.3	1.8	0.2	1.4	2.3	7.0	0.5	6.0	8.0	9.4	0.8	7.7	11.1
Energy drinks	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.2	0.1	0.0	0.0	0.1
Alcoholic beverages	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other beverages	1.0	0.3	0.5	1.5	2.1	0.3	1.4	2.8	0.6	0.1	0.5	0.8	0.4	0.1	0.2	0.7	2.2	0.3	1.5	2.8	1.9	0.2	1.0	2.4
Total beverages	145.5	5.4	134.8	156.2	187.1	7.5	172.2	201.9	207.7	8.6	189.3	226.0	48.6	1.7	45.3	51.9	65.1	2.1	60.9	69.2	65.3	2.0	61.0	69.5
Other Food	697.7	9.6	678.8	716.6	644	9.3	625.8	662.2	591.0	6.4	577.3	604.7	1343.0	12.9	1317.7	1368.2	1225.1	14.7	1196.1	1254.1	1122.0	11.9	1096.4	1147.6

Age group	Adolescents, 13-18 yrs											Adults, 19-59 yrs												
	2008 (n=2820)				2013 (n=2222)				2018-2019 (n=20802)			2008 (n=4053)				2013 (n=3386)				2018-2019 (n=20802)				
	Mean	SE	CI		Mean	SE	CI		Mean	SE	CI		Mean	SE	CL		Mean	SE	CI		Mean	SE	CI	
			LL	UL			LL	UL			LL	UL			LL	UL			LL	UL			LL	UL
Milk & dairy products	5.5	0.6	4.4	6.6	7.7	0.6	6.5	8.9	12.6	0.7	11.0	14.2	6.7	0.3	6.0	0.3	6.3	0.3	5.6	6.9	9.0	0.4	8.2	9.8
Chocolate-based beverages	8.4	0.6	7.2	9.6	7.2	0.5	6.1	8.3	6.1	0.4	5.3	6.8	4.5	0.2	4.0	5.0	3.8	0.3	3.3	4.4	2.8	0.2	2.4	3.2
Soy-based beverages	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.2	0.8	0.2	0.4	1.1	0.1	0.0	0.0	0.2	0.2	0.1	0.0	0.5	0.3	0.1	0.2	0.4
Softdrinks (carbonated drinks)	20.8	1.0	18.9	22.7	21.3	1.0	19.3	23.4	18.4	0.9	16.5	20.4	23.0	0.8	21.5	24.5	22.7	0.8	21.2	24.2	19.4	1.1	17.0	21.7
100% Fruit concentrate	1.3	0.3	0.6	1.9	1.5	0.6	0.3	2.7	0.8	0.1	0.6	1.1	1.4	0.2	1.0	1.8	1.6	0.2	1.2	2.1	0.6	0.1	0.5	0.8
Other Fruit Juice Drinks	6.9	0.8	5.4	8.4	10.1	0.6	8.8	11.4	5.7	0.5	4.6	6.7	4.5	0.3	3.9	5.1	5.5	0.4	4.8	6.3	3.5	0.3	3.0	4.1
Coffee & tea	2.8	0.4	2.1	3.6	15.8	0.9	14.0	17.7	20.6	1.1	18.2	23.0	5.3	0.3	4.7	5.8	35.2	1.1	33.1	37.4	45.1	1.7	41.4	48.7
Energy drinks	0.1	0.0	0.0	0.2	0.3	0.1	0.1	0.4	0.3	0.1	0.2	0.4	0.2	0.0	0.1	0.2	0.6	0.1	0.4	0.7	0.5	0.1	0.4	0.7
Alcoholic beverages	3.0	1.0	1.0	5.0	2.7	0.8	1.1	4.3	1.9	0.6	0.7	3.2	19.0	1.5	16.1	21.8	16.3	1.3	13.8	18.8	10.8	1.3	8.0	13.6
Other beverages	0.8	0.2	0.4	1.3	2.1	0.3	1.4	2.8	1.8	0.2	1.4	2.2	1.1	0.2	0.8	1.4	0.9	0.2	0.6	1.2	1.5	0.1	1.2	1.7
Total beverages	49.7	2.1	45.5	53.8	68.8	2.3	64.3	73.4	69.0	2.4	63.9	74.1	65.6	1.9	61.8	69.3	93.3	2.2	89.0	97.5	93.4	3.2	86.7	100.2
Other Food	1819.2	17.3	1785.2	1853.1	1561.7	17.8	1526.7	1596.8	1522.2	10.6	1499.5	1544.9	1851.1	11.0	1829.5	1872.6	1568.0	13.5	1541.4	1594.6	1543.7	8.8	1524.8	1562.6

Age group	Pregnant women											
	2008 (n=2820)				2013 (n=2222)				2018-2019 (n=20802)			
	Mean	SE	CI		Mean	SE	CI		Mean	SE	CI	
			LL	UL			LL	UL			LL	UL
Milk & dairy products	27.8	3.1	21.6	33.9	28.1	4.6	19.0	37.2	42.8	3.5	35.4	50.3
Chocolate-based beverages	14.7	1.6	11.4	17.9	8.5	1.9	4.6	12.3	7.0	1.6	3.6	10.5
Soy-based beverages	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.0	0.8
Softdrinks (carbonated drinks)	14.2	1.6	11.1	17.3	12.2	2.3	7.6	16.7	10.2	1.3	7.4	13.1
100% Fruit concentrate	2.5	1.2	0.1	0.5	4.3	1.8	0.8	7.9	0.9	0.3	0.3	1.5
Other Fruit Juice Drinks	9.4	1.8	5.8	13.0	6.6	1.7	0.3	9.9	3.2	0.8	1.6	4.8
Coffee & tea	4.3	1.1	2.2	6.4	20.2	2.9	14.5	25.8	26.6	2.3	21.6	31.6
Energy drinks	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.6
Alcoholic beverages	0.1	0.1	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other beverages	0.1	0.1	0.0	0.2	0.0	0.0	0.0	0.0	1.8	0.4	0.8	2.7
Total beverages	73.0	5.2	62.8	83.2	79.8	5.3	69.3	90.3	93.0	3.2	86.1	100.0
Other Food	1659.7	30.5	1599.7	1719.7	1453.6	43.5	1367.7	1539.5	1418.9	37.8	1337.7	1500.0

ANNEX

Annex B. Percent of the Population Consuming Different Beverages by Age Groups: Philippines, 2018-2019

Age group	Children, 6mos-5 yrs												Children, 6-12 yrs											
	2008 (n=2820)				2013 (n=2222)				2018-2019 (n=20802)				2008 (n=4053)				2013 (n=3386)				2018-2019 (n=20802)			
	Mean	SE	CI		Mean	SE	CI		Mean	SE	CI		Mean	SE	CL		Mean	SE	CI		Mean	SE	CI	
			LL	UL			LL	UL			LL	UL			LL	UL			LL	UL			LL	UL
Milk & dairy products	48.4	1.2	46.0	50.8	53.2	1.3	50.6	55.7	52.2	0.8	50.5	53.9	21.7	0.9	20.0	23.3	23.5	1.0	21.5	25.4	20.4	0.6	19.1	21.6
Chocolate-based beverages	27.8	1.1	25.6	29.9	20.1	1.1	17.9	22.3	9.1	0.4	8.3	9.9	26.0	1.0	24.0	28.0	21.4	0.9	19.6	23.2	10.5	0.4	9.7	11.3
Soy-based beverages	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.3	0.1	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.1	0.4
Softdrinks (carbonated drinks)	13.8	0.8	12.2	15.4	13.1	1.2	10.8	15.4	5.4	0.4	4.6	6.3	16.5	0.9	14.8	18.1	18.2	1.0	16.3	20.2	8.9	0.7	7.5	10.3
100% Fruit concentrate	1.3	0.3	0.8	1.9	1.0	0.2	0.6	1.4	0.3	0.1	0.2	0.4	1.7	0.3	1.1	2.2	2.4	0.3	1.8	3.0	0.8	0.2	0.4	1.1
Other Fruit Juice Drinks	14.0	0.8	12.3	15.6	20.3	1.2	18.0	22.6	5.3	0.5	4.1	6.5	18.1	0.9	16.4	19.9	26.6	1.2	24.3	28.9	7.0	0.6	5.7	8.3
Coffee & tea	20.2	1.0	18.3	22.1	16.0	1.1	14.0	18.1	10.4	0.9	8.5	12.2	31.3	1.1	29.3	33.4	29.4	1.1	27.2	31.6	18.5	1.5	15.2	21.7
Energy drinks	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.2	0.2	0.1	0.0	0.3	0.4	0.2	0.1	0.7	0.1	0.0	0.0	0.2
Alcoholic beverages	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.2	0.0	0.0	0.0	0.0
Other beverages	2.0	0.3	1.4	2.6	3.1	0.4	2.2	3.9	0.7	0.1	0.6	0.9	0.4	0.1	0.2	0.6	3.2	0.4	2.3	4.0	1.5	0.2	1.0	1.9
At least one type of energy-containing beverage	79.4	1.1	77.2	81.6	8.2	1.0	79.9	84.0	70.1	1.0	67.9	72.3	71.5	1.0	69.4	73.5	77.1	1.0	75.2	79.0	55.5	1.3	52.7	58.2

Age group	Adolescents, 13-18 yrs												Adults, 19-59 yrs											
	2008 (n=2820)				2013 (n=2222)				2018-2019 (n=20802)				2008 (n=4053)				2013 (n=3386)				2018-2019 (n=20802)			
	Mean	SE	CI		Mean	SE	CI		Mean	SE	CI		Mean	SE	CL		Mean	SE	CI		Mean	SE	CI	
			LL	UL			LL	UL			LL	UL			LL	UL			LL	UL			LL	UL
Milk & dairy products	13.1	0.8	11.5	14.6	13.3	0.9	11.6	15.0	10.0	0.4	9.0	10.9	15.0	0.5	14.0	16.0	11.1	0.5	10.0	12.1	7.7	0.2	7.2	8.2
Chocolate-based beverages	16.0	0.8	14.4	17.5	11.8	0.7	10.4	13.2	6.0	0.3	5.3	6.7	9.7	0.4	8.8	10.5	5.8	0.3	5.3	6.4	2.9	0.1	2.9	3.2
Soy-based beverages	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.2	0.5	0.1	0.3	0.7	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.2	0.1	0.0	0.1	0.2
Softdrinks (carbonated drinks)	24.7	1.0	22.8	26.7	28.2	1.0	26.2	30.2	14.7	0.8	13.0	16.4	26.9	0.7	25.6	28.2	29.3	0.7	27.9	30.7	15.5	0.8	13.8	17.1
100% Fruit concentrate	2.5	0.4	1.7	3.2	2.4	0.4	1.7	3.1	1.3	0.1	1.0	1.6	1.8	0.2	1.5	2.2	2.7	0.2	2.2	3.2	0.8	0.1	0.6	1.0
Other Fruit Juice Drinks	13.4	0.8	11.8	14.9	20.7	1.0	18.7	22.7	6.2	0.5	5.2	7.1	9.7	0.4	8.9	10.6	12.2	0.6	11.0	13.4	3.7	0.3	3.1	4.3
Coffee & tea	41.7	1.2	39.3	44.0	42.0	1.2	39.6	44.4	30.2	1.8	26.3	34.2	68.7	0.7	67.3	70.0	71.0	0.7	69.5	72.4	62.3	1.2	59.7	64.9
Energy drinks	0.4	0.1	0.2	0.7	0.8	0.2	0.4	1.1	0.4	0.1	0.2	0.5	0.6	0.1	0.4	0.8	1.5	0.1	1.2	1.8	0.7	0.1	0.5	0.9
Alcoholic beverages	0.8	0.2	0.4	1.1	0.9	0.2	0.5	1.4	0.3	0.1	0.2	0.5	6.4	0.3	5.7	7.0	6.1	0.4	5.4	6.8	2.8	0.2	2.3	3.3
Other beverages	0.8	0.2	0.4	1.1	3.0	0.5	2.1	3.9	1.5	0.1	1.2	1.7	1.0	0.1	0.8	1.2	1.1	0.1	0.8	1.3	1.1	0.1	0.9	1.3
At least one type of energy-containing beverage	72.3	1.0	70.3	74.4	75.7	1.0	73.7	77.7	57.3	1.2	54.7	60.0	86.1	0.5	85.0	87.1	86.9	0.5	85.8	87.9	76.4	0.9	74.5	78.3

Age group	Pregnant women											
	2008 (n=2820)				2013 (n=2222)				2018-2019 (n=20802)			
	Mean	SE	CI		Mean	SE	CI		Mean	SE	CI	
			LL	UL			LL	UL			LL	UL
Milk & dairy products	34.0	2.5	29.1	38.9	30.3	4.1	22.2	38.4	27.7	1.8	23.8	31.7
Chocolate-based beverages	26.3	2.3	21.9	30.7	11.9	2.6	6.7	17.1	7.4	1.6	4.0	10.7
Soy-based beverages	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.5
Softdrinks (carbonated drinks)	21.1	2.0	17.1	25.0	18.5	2.9	12.7	24.4	10.0	1.1	7.5	12.4
100% Fruit concentrate	1.8	0.6	0.6	3.0	5.2	1.3	2.6	7.9	1.2	0.4	0.4	2.0
Other Fruit Juice Drinks	17.1	1.9	13.4	20.8	19.1	3.3	12.6	25.7	3.8	0.7	2.3	5.3
Coffee & tea	49.3	2.5	44.4	54.3	50.9	3.8	43.4	58.5	39.8	2.9	33.6	45.9
Energy drinks	0.3	0.3	0.0	0.8	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.5
Alcoholic beverages	0.2	0.2	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other beverages	0.8	0.4	0.0	1.6	0.0	0.0	0.0	0.0	1.4	0.3	0.7	2.2
At least one type of energy-containing beverage	85.9	1.8	82.4	89.4	87.3	2.5	82.4	92.2	77.3	1.7	73.5	81.0