

Snacking Patterns of Filipino Children: Frequency and Contribution to Energy and Dietary Intakes

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Snacking can be defined as eating outside the three main meals in a day, regardless of the amount or type of foods consumed. Snacking patterns vary between developing and developed countries, and across nations around the globe. Utilizing data from the Philippine ENNS collected in 2018 and 2019, the authors were able to determine the distribution and frequency of snacking among Filipino children, the type of snack foods consumed, and the contribution of snack foods to their energy and dietary intakes. Results revealed that around 70% of Filipino children consume snacks once a day, usually as afternoon snacks. Moreover, consumption of snack foods decreases as the age of children increases. The snack foods frequently consumed are pastries and cookies, bread, crackers, and biscuits, along with sugar-sweetened beverages – with an average energy intake of 300.0 kcal from snack foods. Snack foods contributed 31.2% of the total daily energy intake for Filipino children aged 3–5 yr old, 25.1% in 6–9 yr old, and 21.6% in 10–12 yr old. The nutrient content of the snack foods ranged from 29.5–46.7 g protein, 295.4–347.8 mcgRE vitamin A, 5.4–7.7 mg iron, and 272.3–381.7 mg calcium. More than half of Filipino children consumed snack foods at least once a day, with a higher proportion of snackers meeting the recommended energy intakes and estimated average requirements than non-snackers. However, the promotion of healthy snack choices such as fruits and vegetables and other nutrient-dense foods needs to be strengthened. Findings support the need to develop guidance on healthy snacking among Filipino children and represent a key target for food and nutrition policies to improve the dietary quality of snacks in this population.

Keywords: energy, Filipino children, nutrition, snacking, survey

INTRODUCTION

Snacking or eating between meals is widespread among children in many parts of the world. The pattern varies between developing and developed countries and among nations from the East to the West of the globe (Wang *et al.* 2018). Consequently, the proportion of individuals who snack and the energy and nutrient contributions from snacking differ as reported by several countries. In the United States of America, the prevalence of

snacking among 2–19 yr old reached 92% in 2017-2018, contributing to 24% of American children's daily energy intake, and with a mean frequency of snacking of 2–3 times per day (USDA n/d). Similarly, with 96% of children reported to consume snacks in the 2011–2012 national surveys, snacking in Australia represented 30% of their total energy intake (Fayet-Moore *et al.* 2017). Likewise, the contribution of snacking to the daily energy intake among Chilean children was reported to be around 28% (Jensen *et al.* 2019). On the contrary, the prevalence of snacking among Chinese children was reported at 54%

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in 2009 with snacking frequency at about once per day (Wang *et al.* 2012). In Mexico, snacking among children contributed to 19% of the daily energy intake with 68% reported to have snacked (Taillie *et al.* 2015).

In the Philippines, schoolchildren customarily consume snack foods in schools during recess and at home at mid-morning (AM snack) and mid-afternoon (PM snack). However, reports on the snacking frequency and its contribution to the daily energy and nutrient intake among Filipino children are scarce. With the rising incidence of overweight and obese Filipino children based on the Department of Science and Technology–Food and Nutrition Research Institute’s (DOST-FNRI) national nutrition survey, excess amount of energy brought about by snacking becomes a valid concern. Within this context, the study aimed to determine the distribution and frequency of snacking among Filipino children, the type of snack foods consumed, and the contribution of snack foods to their energy and dietary intakes.

While there are existing food-based dietary guidelines to steer consumers in choosing healthier snack options, it is essential to understand the type of snack foods and beverages consumed by children since unhealthy snacking patterns may affect children’s eating behavior, and consequently their health. Ultimately, this study may help nutrition policymakers to better understand the homogeneity of snacking patterns among Filipino children and may result in dietary recommendations for snacking. Knowledge of snacking patterns will also guide parents and caregivers on appropriate food and beverage choices to ensure that snacking enhances nutrient intake without exceeding recommended daily energy intake and overconsumption of unhealthy foods.

MATERIALS AND METHODS

Ethics Approval

The conduct of the study, with Protocol Code FIERC-2022-018, has been granted an exemption for review by the DOST-FNRI Institutional Ethics and Review Committee (FIERC) since it involves the use of publicly available data or information.

Study Population

This study used the cross-sectional data from two surveys of the Expanded National Nutrition Survey (ENNS) conducted in 2018 and 2019 by the DOST-FNRI. The ENNS in 2018 and 2019 covered a total of 79 provinces including highly urbanized cities (HUCs). Data from a total of 42,569 children 3–12 yr old were utilized. Children were grouped as preschool-age children or 3–5 yr old ($n =$

12,155), and school-age children, 6–9 yr old ($n = 17,776$), and 10–12 yr old ($n = 12,638$) to reflect differences in energy requirements and following the age groupings in the Philippine Dietary Reference Intakes 2015 (DOST-FNRI 2015).

Briefly, the ENNS is a three-year rolling survey utilizing the 2013 Master Sample of the Philippine Statistics Authority (PSA) – with provinces, HUCs, and urban areas as its sampling domain. Participants were selected using a two-stage cluster sampling design. The first stage involved the selection of primary sampling units (PSUs), which consisted of *barangays*/ enumeration areas (EAs) or a portion of a large *barangay* or group of adjacent small *barangays*/EAs. The second stage was then followed by the selection of secondary sampling units (SSUs) composed of housing units/households within the sample PSU. The detailed sampling design of the ENNS was discussed elsewhere (DOST-FNRI 2020).

Food Consumption Survey

Trained nutritionists assessed the food intake of children 3–12 yr old using two non-consecutive 24-hr food recalls. For children aged 3–10 yr old, mothers or caregivers were the primary reporters of dietary intake, whereas children provided complementary information when the mother or caregiver was not present. Interviewers used food visuals and dietary tools like measuring cups, spoons, and matchbox to assist the participants in estimating the food and beverages consumed on the previous day.

The categorization of snacks consumed by the respondents was based on food groupings used in the Food Consumption Survey in accordance with the Philippine Food Composition Tables (DOST-FNRI 2019). In the analysis, snack foods were classified into 24 categories: rice and rice products; pasta and noodles; corn and products; bread, crackers, biscuits, and other bakery products; pastries and cookies; starchy roots and tubers; sugar, sweets, and candies; fats and oils; fish and products; meat and products; poultry and products; eggs; milk and other dairy products; dried beans, nuts, and seeds; vegetables; fruits; sugar-sweetened beverages; other beverages; cereal and products; snack curls and chips; prepared foods; soups; street foods; and other grains.

To estimate intake, food, energy, and nutrient values were calculated per 100 g of raw food consumed using the IDES (Individual Dietary Evaluation System) software, which contained the expanded Philippine Food Composition Table. The micronutrient adequacy was estimated using the PC-SIDE (PC Software for Intake Distribution Estimation) software to estimate distributions of the usual intake of nutrients and food intake groups consumed by children. Micronutrient adequacy was computed using

the estimated average requirements (EAR) cut-off point method. Children with intakes below the EAR for a given nutrient were considered to have inadequate intake.

Meals versus Snacking

Breakfast, lunch, and dinner were considered major meals, whereas snacking was defined as eating between meals or eating beyond the main meals of the day. Snacking can be between breakfast and lunch (AM snack), lunch and dinner (PM snack), or eating after dinner (night snack). The frequency of snacking was defined as the number of snack occasions reported in the past day – coded as once, twice, or three or more times. For descriptive purposes, the respondents were classified as non-snackers (0 snacks/d) and snackers (1–3 snacks/d).

Statistical Analysis

Descriptive data were presented as the proportion of children consuming snacks, frequency of snacking, percent contribution of snacking to *per capita* energy and nutrient intakes, and percent consuming by type of snack foods disaggregated by age groups 3–5 yr, 6–9 yr, and 10–12 yr. Mean weights and energy contributions of snack foods were conducted only among snackers. Sampling weights were computed based on the product of the base weighting non-response adjustment and post-stratified calibration/adjustment based on the population counts obtained from the PSA. Survey weights were applied in all datasets and calculations to represent national estimates through the complex survey design. Differences in energy and nutrient intakes were explored using chi-square and t-tests at a significance level of $p < 0.05$. Statistical analysis was performed using STATA version 16.

RESULTS

More than three-fourths (76.5%) of preschool-age children 3–5 yr old consumed snack food. The proportion gradually decreased with age with around 72% snacking among

children 6–9 yr old and 67% among 10–12 yr old (Table 1). The mean frequency of snacking was 1.5 ± 0.6 in a day. The majority (71.8%) of the children across age groups reported consuming snacks, whereas no snacks were recorded among one-fourth (23.5%) of children 3–5 yr old and 28.5 and 33.5% of children 6–9 and 10–12 yr old, respectively. There were more Filipino children who consumed snacks once a day (40.6%) than those who consumed them twice (28.2%) and at least three times a day (3.1%). Among those who consumed snacks at least three times a day, preschool-age children recorded the highest proportion at 6.9%.

Pastries and cookies, bread, crackers, biscuits and other bakery products, and sugar-sweetened beverages were the top most commonly consumed snack food across the age of children, except for milk and dairy products, which were included in the top three consumed snack food by children 3–5 yr old (Figure 1). Sweets and candies were consumed by less than one-fifth of children regardless of age. Fruits were consumed by 11.4% of children 3–5 yr old, 13.4% of children 6–9 yr old, and 17.1% of children 10–12 yr old. Nevertheless, an increasing proportion of children consuming fruits, fats and oils, and sugar-sweetened beverages and meat and products was noted as age increased (Figure 1).

Relative to energy intake from snack foods, pastries and cookies (22.2%) – including bread, crackers, biscuits, and other bakery products (21.1%) – contributed the highest energy intake coming from snacks, followed by milk and other dairy products (10.3%) and sugar-sweetened beverages (7.2%) across age groups (Figure 2). On the other hand, milk and milk products (21.6%) accounted for the second-largest energy contribution of snack foods in preschool children 3–5 yr old, but milk’s contribution decreased with age, accounting for only 4.8 and 3.0% of the total energy intake of school-age children 6–9 and 10–12 yr old, respectively.

In terms of food weight, sugar-sweetened beverages had the highest portion by weight (37.1 g) – followed by bread, crackers, biscuits and other bakery products (17.1

Table 1. Snacking frequency of Filipino children.

Group	All	3–5 yr	6–9 yr	10–12 yr
	n (% ± SE)	n (% ± SE)	n (% ± SE)	n (% ± SE)
Non-snacker	12,798 (28.2 ± 1.4)	3,080 (23.5 ± 1.4)	5,334 (28.5 ± 1.3)	4,384 (33.5 ± 1.6)
Snacker	29,771 (71.8 ± 1.4)	9,075 (76.5 ± 1.4)	12,442 (71.5 ± 1.3)	8,254 (66.5 ± 1.6)
Mean frequency	1.5 ± 0.6	1.6 ± 0.6	1.4 ± 0.5	1.4 ± 0.5
Once	17,395 (40.6 ± 0.5)	4,563 (36.8 ± 0.7)	7,383 (41.8 ± 0.6)	5,449 (43.5 ± 0.9)
Twice	11,384 (28.2 ± 1.0)	3,829 (32.8 ± 1.1)	4,851 (28.4 ± 1.2)	2,704 (22.1 ± 1.1)
At least 3x	992 (3.1 ± 0.3)	683 (6.9 ± 0.6)	208 (1.3 ± 0.1)	101 (0.9 ± 0.1)

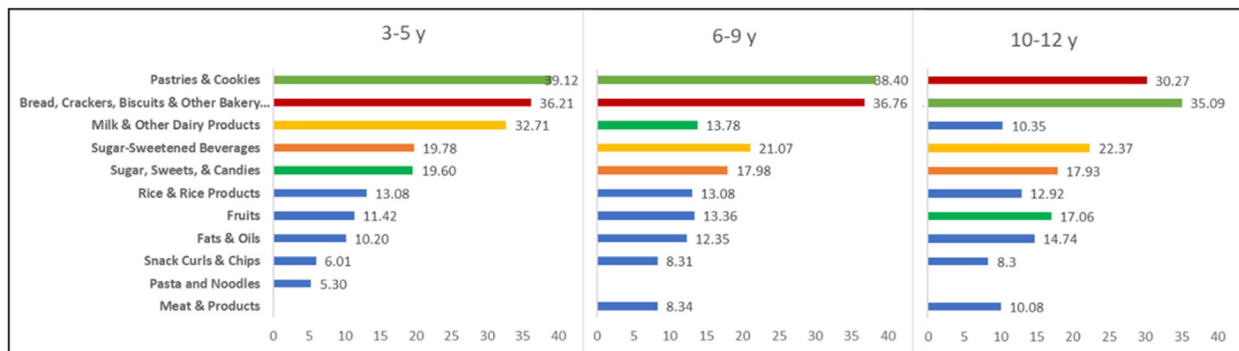


Figure 1. Top 10 most commonly consumed snack food by age group by percent consuming.

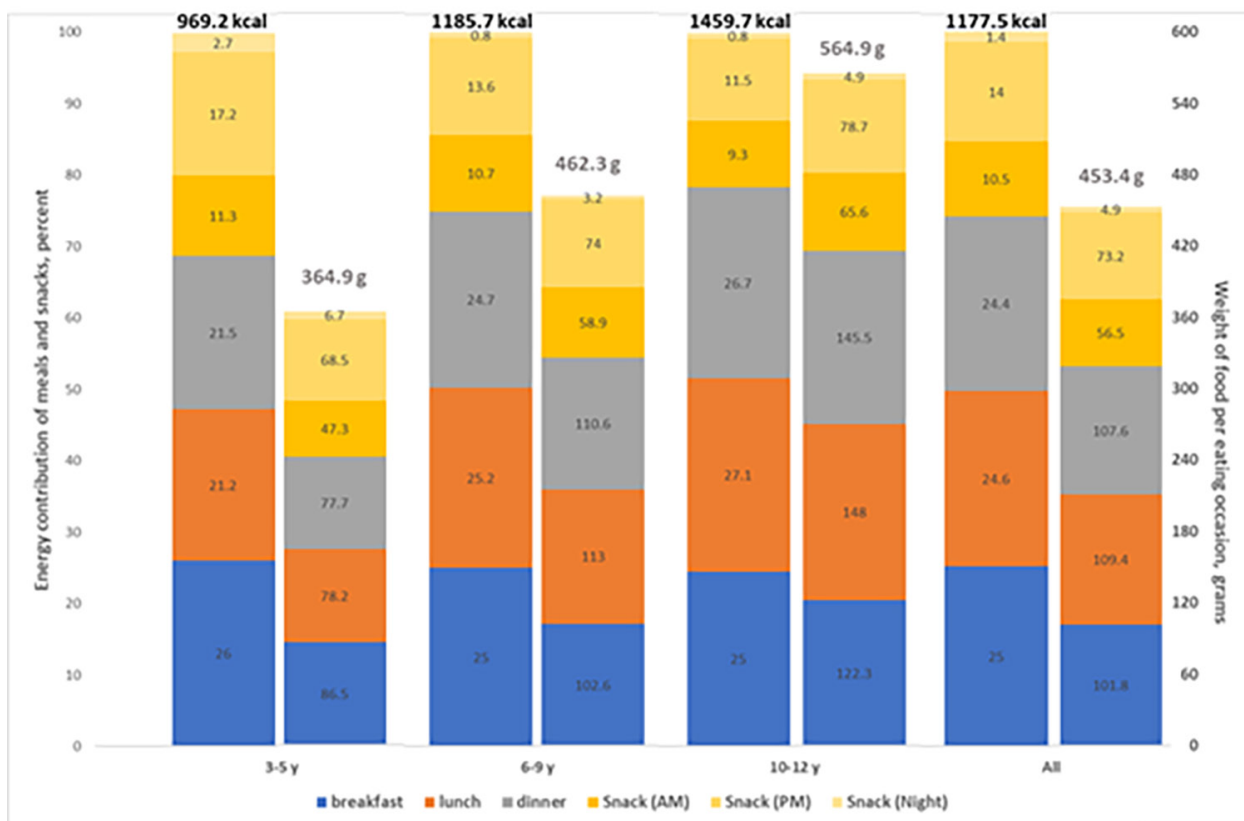


Figure 2. Energy contribution and mean weight of snack foods consumed by Filipino children per food category. *Snack food groups contributing < 1.0% to total energy for all age groups excluded.

g), pastries and cookies (15.9 g), fruits (14.1 g), and rice and rice products (11.3 g) (Figure 2). Likewise, milk and milk products (19.0 g) had the second largest portion by weight of snack foods in preschool-age children, next to sugar-sweetened beverages (31.8 g).

As expected, snacks (AM, PM, and night) provided a lower energy contribution than meals (breakfast, lunch, and dinner) in all age groups of children. Moreover, the contribution of snack food to the total daily energy intake of children decreases as the age of the children increases

(Figure 3). Snack consumption by children aged 3–5 yr old had the largest contribution to energy in a day (31.2%), and this energy contribution follows a decreasing trend as age increases (6–9 yr old: 25.1%; 10–12 yr old: 21.6%). In terms of the contribution of snacks to total food weight, PM snacks contributed the largest amount of food weight, whereas night snacks contributed the least of food weight. Nevertheless, the weight of snack foods corresponds to these energy increases as the age of children increases (3–5 yr old: 122.5 g; 6–9 yr old: 136.1 g; 10–12 yr old: 149.1

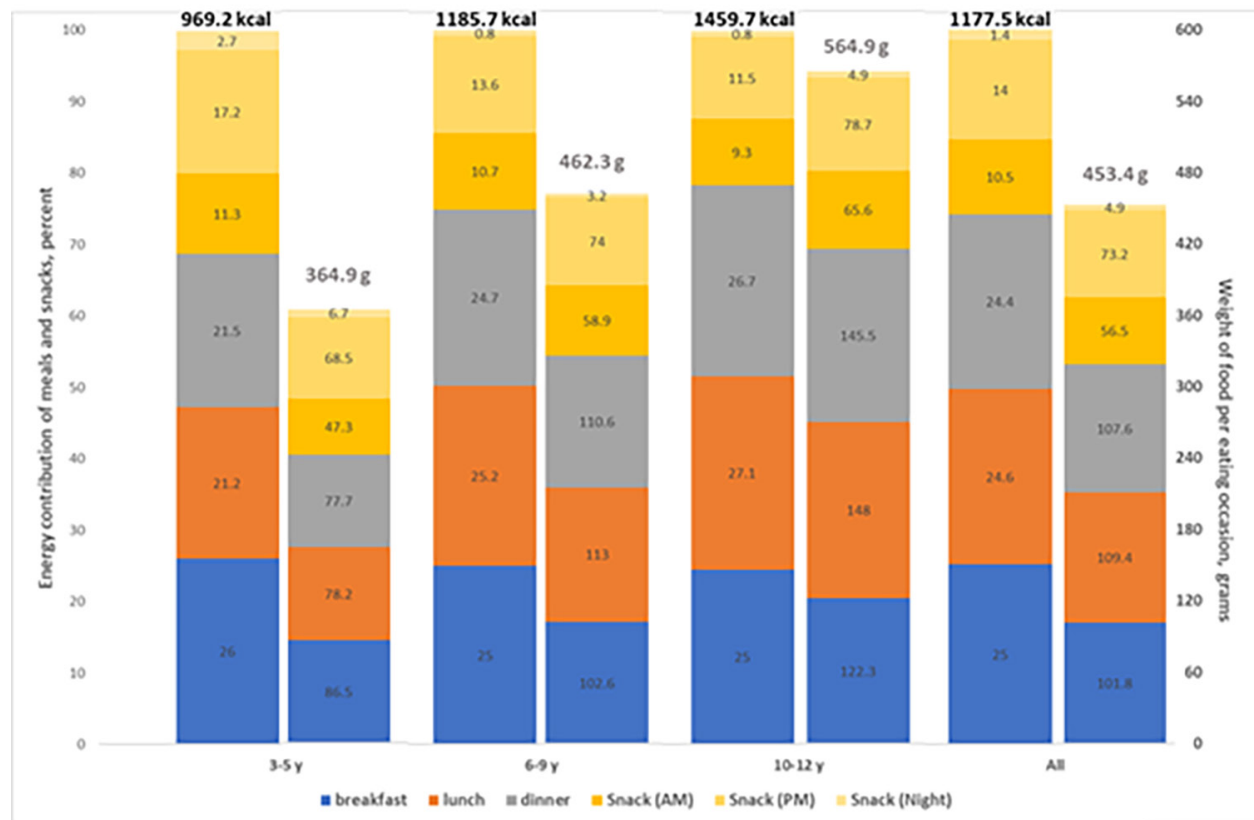


Figure 3. Mean and percent contribution of meals and snacks to total food weight and energy intake of children; Philippines, 2018–2019.

Table 2. Mean one-day energy and nutrient intakes of Filipino children, with and without snack consumption.

Energy/Nutrient	Snacker Mean (SD)				Non-snacker Mean (SD)				p-value
	3–5 yr	6–9 yr	10–12 yr	All	3–5 yr	6–9 yr	10–12 yr	All	
Energy (kcal)	969.2 (419.9)	1185.7 (486.9)	1459.7 (590.2)	1177.5 (528.0)	618.0 (300.1)	841.7 (394.3)	1075.0 (479.6)	854.7 (438.8)	< 0.001
Protein (g)	31.5 (16.7)	37.9 (18.3)	46.7 (21.9)	37.8 (19.6)	21.5 (12.0)	29.5 (16.0)	36.4 (18.3)	29.5 (16.8)	< 0.001
Iron (mg)	5.4 (4.0)	6.6 (4.4)	7.7 (4.6)	6.5 (4.4)	3.1 (2.5)	4.1 (2.9)	5.1 (3.3)	4.1 (3.0)	< 0.001
Calcium (mg)	381.7 (390.0)	272.3 (212.3)	285.3 (204.6)	314.4 (291.1)	156.8 (156.0)	173.7 (153.9)	197.3 (212.4)	176.6 (176.1)	< 0.001
Phosphorus (mg)	537.3 (317.0)	573.1 (262.6)	696.5 (313.7)	591.3 (302.4)	335.2 (179.2)	440.8 (216.9)	544.5 (245.6)	444.9 (231.8)	< 0.001
Vitamin A (ugRE)	347.8 (607.5)	295.4 (739.6)	313.8 (867.2)	318.6 (732.0)	168.8 (395.4)	201.8 (606.6)	248.1 (875.8)	207.5 (662.3)	< 0.001
Thiamin (mg)	0.5 (0.4)	0.6 (0.5)	0.7 (0.5)	0.6 (0.5)	0.3 (0.3)	0.4 (0.3)	0.5 (0.4)	0.4 (0.3)	< 0.001
Riboflavin (mg)	0.8 (0.8)	0.6 (0.6)	0.6 (0.5)	0.7 (0.6)	0.3 (0.3)	0.4 (0.4)	0.4 (0.4)	0.4 (0.4)	< 0.001
Niacin (mg)	7.3 (5.3)	9.7 (6.5)	12.5 (8.0)	9.6 (6.8)	5.8 (4.4)	8.1 (5.6)	10.1 (6.7)	8.1 (6.0)	< 0.001
Vitamin C (mg)	16.7 (26.3)	15.6 (36.4)	16.6 (30.4)	16.2 (31.6)	6.7 (14.2)	7.5 (16.4)	8.8 (18.2)	7.7 (16.4)	< 0.001

*Significant at p-value < 0.05; t-test for means

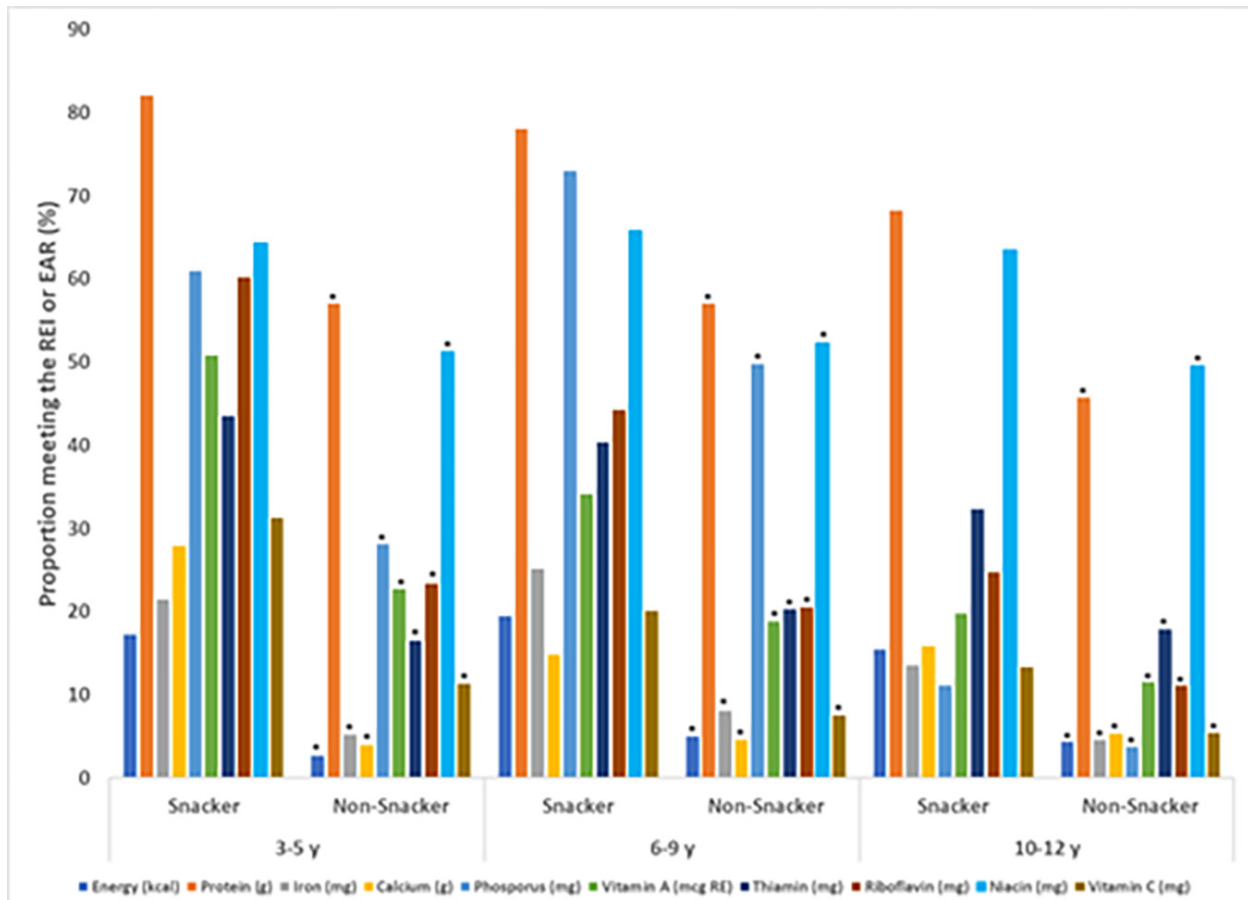


Figure 4. Proportion of children meeting the recommended energy intake and estimated average requirement, with and without snacks and according to age groups, Philippines: 2018–2019. *Significantly different from proportion of snackers ($p < 0.001$).

g), the percent contribution of these foods is in accordance to their energy contribution in a day.

Table 2 shows the comparison between the dietary intakes of Filipino children with and without snack consumption. Among preschool-age children, snackers have significantly higher intakes of iron, calcium, vitamin A, riboflavin, and vitamin C compared to their non-snacker counterparts. For school-age children, in addition to the nutrients stated above, energy, protein, phosphorus, thiamin, and niacin intakes are significantly higher in snackers than non-snackers.

The proportion of children meeting the REI and EARs in all nutrients assessed, including protein and micronutrients, was significantly higher among those who consumed snacks compared to those who did not consume snacks, and this was true across age groups (Figure 4). While snackers have higher proportions meeting the REI, merely less than 20% of children meet the energy recommendations.

DISCUSSION

This study assessed the distribution and patterns of snacking and its contribution to the energy and nutrient intake of Filipino children. Results revealed that about 69.9% of Filipino children consumed at least one snack per day and all snacking occasions account for about 26.0% of their mean daily energy consumption. Bread, crackers, biscuits, and other bakery products; pastries and cookies; and rice and rice products contributed the largest energy intakes from snacks across groups. For preschool-age children, milk and other dairy products were among the top three energy contributors.

Typically, snacking among Filipino children decreases as age increases. This trend was also observed in Chinese children wherein 58.8% of children aged 2–6 yr old consumed snacks, 54.4% among 7–12 yr old, and 46.3% among 13–18 yr old (Wang *et al.* 2012). Similarly, more younger Brazilians (2–5 yr) consumed snacks compared to their older counterparts (6–13 yr) on all eating occasions (Duffey *et al.* 2013). In Chile, around 95% of children aged

4–6 yr old reported snacking ≥ 1 snack per day, whereas among those aged 12–14 yr old, about 90% consumed one or more than one snack a day (Jensen *et al.* 2019).

The energy intakes of snackers were observed to be significantly higher than the energy intakes of non-snackers. Snacking contributes to more than 20% of daily total calories in the United Arab Emirates (Ng *et al.* 2011), 25% among Irish preschoolers (Nugent *et al.* 2018), and 33% among 18-mo to 5-yr-old Canadians (Hutchinson *et al.* 2017). In this study, around 300 kcal of energy (25.8%) is contributed by snacking across age groups. This is in congruence with the results from other studies (Taillie *et al.* 2015; Deming *et al.* 2017; Jensen *et al.* 2019; Loth *et al.* 2019).

Differences of 10-g protein, 2.5-mg iron, 0.2-mg thiamin and riboflavin, and 8-mg vitamin C were noted between snackers and non-snackers. Notably, among preschool children, snacking contributed around 200 mg more of calcium and phosphorus, and 200 mcg more of vitamin A compared to intakes of these nutrients among non-snackers. Even without snacks, snackers tend to have higher energy and nutrient intakes during breakfast, lunch, and dinner (data not shown).

One of the main concerns about snacking is the quality of the foods and beverages consumed as snacks. In this study, the most frequently reported snacks belong to the categories of pastries and cookies; and bread, crackers, biscuits, and other bakery products. Although milk and other dairy products, and fruits were reported, other snack items considered less healthy such as sugar-sweetened beverages and sugar, sweets, and candies provide a greater proportion of the energy and nutrients *per capita* from snacks. These choices are similar to those reported as snacks in other countries. In Chile (Jensen *et al.* 2019), grain-based desserts, cereal-based foods, salty snacks, and other sweets and desserts topped the list of food groups consumed as snacks. Sweets and desserts, and sugar-sweetened beverages were part of the five food groups consumed by 10–18-yr-old snackers in Brazil (Duffey *et al.* 2013).

Many nutrition professionals recommend snacking as part of healthy weight management and prevention programs (Ma *et al.* 2003; Keast *et al.* 2010; Larson and Story 2013). This extends to children and is supported by the American Academy of Pediatrics (AAP), which recommends that children consume three meals and two snacks per day (AAP 2013). In the Philippines, this recommendation is reflected in the *Pinggang Pinoy* for Kids, a food guide using a plate that aims to help parents in choosing the right kind and amount of food for their children. This guide shows how to fill up a child's plate and provides a sample of a one-day meal plan consisting of three meals and two snacks a day (fnri.dost.gov.ph).

The authors acknowledge several limitations and strengths in this study. The ENNS was a cross-sectional survey using a 24-hr food recall method; thus, it was not possible to examine the influence of snacking patterns on long-term outcomes of foods consumed as snack items on the diet quality and nutritional status of the respondents. Both under- and over-reporting of dietary data were also recognized. However, the results provide valuable insights into the snacking frequency, proportion of energy and nutrients provided by snacking, and the foods commonly consumed as snacks.

Employing registered and/or trained nutritionist-dietitians in the collection of dietary data covering two non-consecutive 24-hr food recalls is one of the strengths of this study. Moreover, the use of a large, nationally representative population of 3–12-yr-old children, increases the reliability of the results. Furthermore, the patterns described herein are consistent with other research works.

CONCLUSION

The study shows that snacking is already integrated into the daily diet and contributed to the energy and nutrient needs of preschool and school-age Filipino children. Results show considerably higher daily energy and nutrient intakes among snackers compared to non-snackers. Pastries and cookies, biscuits, breads, and sugar-sweetened beverages were the most commonly consumed items reported. Healthy food choices such as fruits and other nutrient-dense foods need to be promoted during snack time among children. Findings may help contribute to developing guidance for healthcare providers, parents, and caregivers on healthy snacking for children and may direct specific food and nutrition policies toward improving the dietary quality of snacks in this population.

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STATEMENT ON CONFLICT OF INTEREST

The authors declare no conflict of interest.

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