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Contribution of Frequent Snacking to the Energy, Sugar, and Sodium Intakes of Adolescents Aged 13-18 During the COVID-19 Pandemic Under Alert Level 1 Restrictions

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Abstract:—Globally and in the Philippines, cases of overweight (OW) and obesity (OB) among adolescents have been labeled as a public health concern. Studies showed that unhealthy snacking contributes to excessive energy intake, which can lead to OW and OB. The home confinement brought by the COVID 19 pandemic resulted in increased snacking and decreased fresh food consumption among adolescents. This study aimed to determine the contribution of frequent snacking to the energy, sugar, and sodium intakes of adolescents aged 13-18 during the COVID-19 pandemic. A cross-sectional research utilizing the stratified random sampling was conducted. A total of 32 participants were enrolled in the study from schools of Timoteo Paez Integrated School in Manila; Orani National High School and Saint John Academy in Bataan. A demographic questionnaire was used to collect relevant information of the participants and a 3-day non consecutive estimated food record (FR) was used to gather their average food consumption. FRs showed that adolescents did not engage in frequent snacking. Frequent snacking is weakly correlated (r=0.360) with the total energy intake. The sugar intake taken from snacking has a moderately strong correlation (r=0.495) with the total sugar intake. Furthermore, the sodium intake from snacking has a very weak correlation (r=0.100) to the total sodium intake and is not statistically significant (p=0.586). Locally, the COVID-19 pandemic is weakly correlated with the increased energy consumption as intakes were below the recommendations across ages. Findings root that food preparation and choices during meals and snacking occasions have significantly contributed to the added sugar and sodium intakes.

Keywords:- *Frequent Snacking, Adolescents.*

I. INTRODUCTION

Overweight and obesity are characterized as abnormal or excessive fat accumulation that can harm one's health [83]. For children aged between five (5) to nineteen (19) years, overweight is classified if the BMI-for-age is greater than one (1) standard deviation above the WHO Growth Reference median and obese if greater than two (2) standard deviations above the WHO Growth Reference median [77], [78]. Cases of overweight and obesity among adolescents have already been labeled as a significant public health concern, posing a prevalence of 8.6% in Asian countries [41]. In the Philippines, 11.6% prevalence was reported among adolescents aged eleven (11) to nineteen (19) years old [28]. This can be rooted in the frequent consumption of snacks that is associated with increased energy intake and BMI [40], [65] as adolescents particularly those who are obese were found to have higher food environment sensitivity and poor self-regulatory competence that results to unhealthy snacking [66]. Studies have shown that adolescents consume approximately 20% of their daily energy intake from snacks, with the majority of snacking calories being constituted by salty and sugary foods [69]. In addition, during the Coronavirus disease (COVID-19) pandemic, about 21% to 22% increase in snacking behaviors and sweet consumption are observed in adolescents during the lockdown period as well as a 27% decrease in fresh foods consumption, such as fruits, vegetables, and meat products [85]. Accompanied by increased screen time and less physical activity, changes in adolescents' dietary practice during the pandemic involved increased consumption of unhealthy food items, including high-sugar-containing food, beverages, and fried foods [59].

Poor diet quality impairs adolescents' survival, growth, and development [36] and subsequently causes mortality and morbidity later in life (G.B.D. Diet Collaborators, 2019) such as development of type II diabetes and cardiovascular diseases from unregulated intake of added sugar and sodium [57], [30]. On average, adolescents consume about seventeen (17) teaspoons of sugar on a daily basis [14]. This contradicts the established guideline that requires a free sugar consumption of less than 10% of the total energy intake [81]. On the other hand, adolescents were found to have a mean sodium intake of three (3) grams per day, corresponding to a salt consumption of 7.5 grams per day [39]. The recorded level of sodium consumption does not comply with the daily sodium guideline of two (2) grams per day [80].

Despite its abundance internationally, there is still a lack of literature regarding the daily eating pattern of adolescents in the Philippines. Thus, this study intended to identify the

prevalence of frequent snacking in individuals aged thirteen (13) to eighteen (18) during the COVID-19 pandemic. It further pointed to determine if this significantly contributed to their energy, sugar, and sodium intakes. Along with the aforementioned objectives, this study aimed to impart knowledge that can help implement health and nutrition-related programs and policies in local government units addressing the contribution of frequent snacking to overnutrition. This paper can also serve as a support or foundation for future researchers who would like to conduct a more in-depth study and investigate other aspects of the problem.

II. MATERIALS AND METHODS

A. Study Design

This research utilized a cross-sectional method, a type of observational study that measures outcomes and exposures from a representative population at one point in time [60], [76]. This design was employed as the study aimed to identify the prevalence of frequent snacking among adolescents aged thirteen (13) to eighteen (18) years in the course of the pandemic and recognize its contribution to their energy, sugar, and sodium consumption.

B. Subjects and Study Site

Initially, this research intended to involve a total of two hundred forty four (244) respondents who are adolescents of age thirteen (13) to eighteen (18). This was based on the total number of students (n=23171) computed using the Cochran's Formula with 5% margin of error and 19.5% prevalence rate. However, due to a limited span of data collection, only 32 participants were officially enrolled in the study. The selected study sites, Manila City in the National Capital Region (NCR) and Bataan in Central Luzon (Region III), were based on the 2015 Updating of the Nutritional Status of Filipino Children and Other Population Groups of the DOST-FNRI. These urban and rural regions held the highest prevalence of overweight and obese children, ten (10) to nineteen (19) years old, with an increasing overnutrition rate of 14.7 and 16.1, and 10.8 and 12.7, respectively, in 2013 and 2015. The supposed sample size adhered to the following schools' recent data: Timoteo Paez Integrated School and Arellano University (Juan Sumulong High School) in Tondo and Sampaloc, Manila and Orani National High School and St. John's Academy Inc. in Orani and Dinalupihan, Bataan, as it has presented the highest enrollment for the school year 2021 to 2022. Moreover, significant numbers of students in these secondary schools were found to be coming from adjacent districts and municipalities, hence, representing the selected study sites. Participants were chosen through stratified random sampling with the following inclusion criteria: adolescents of both sexes enrolled in public or private high schools aged: thirteen (13) to eighteen (18) years. Meanwhile, exclusion criteria were applied to clinically diagnosed adolescents with mental incapacities and other underlying health conditions.

C. Instrumentation or Data Measures

The selected participants were asked to provide their demographic data such as name (optional), age, gender, school, contact number, and place of residence.

Dietary Assessment is the routine of collecting information regarding the food and drink consumption of either an individual or household for a specific period [17]. It is then coded with the respective food items' nutrient content and evaluated according to the recommended amount of an individual with respect to their age and gender [24].

In this study, a prospective method for dietary assessment was implemented. The participants were subjected to a 3-day non-consecutive estimated food record wherein they listed all the consumed foods and beverages, date and time of consumption, quantity consumed using household measurements, method of preparation, and place of consumption [24].

The Food Composition Tables were utilized as a database of the nutrient composition of foods consumed by the participants. If the food item indicated by the participant in the 3-day food record was not available in the Food Composition Tables, the USDA Food Data Central was utilized. This is a food composition database of the United States which provides nutrient information of food items [26]. Should some local Filipino food items such as fishball, kikiam, kwek-kwek, turon, bananacue, etc., are not available in the Food Composition Table, a local standardized recipe was used to assess their nutritional components.

Additionally, intake of added sugar and added sodium were computed by pinpointing the values from nutrition labels manifested through sodium, sugar, and added sugars as well as in local standardized recipe wherein values were isolated through the used amount of condiments (e.g., table salt, fish sauce, soy sauce, catsup) and any simple sugars (e.g., table sugar, honey, syrup, confectioners) in accordance with participant's serving intake.

The Philippine Dietary Reference Intakes is a reference table formulated by FNRI-DOST for planning and evaluating the diet of healthy population groups or individuals based on their age and gender [31]. It is a collective term for the various reference tables for energy and nutrient intakes. PDRI was used as a reference in evaluating the nutrient adequacy of energy (kcal), sugar (g), and sodium (mg) intake of the participants.

Table 1. Philippine Dietary Reference Intake (PDRI) Recommendations for Sugar, Sodium, and Energy Intake for Children aged 13-18 years old

Age Group	Sugar (Kcal)[1]		Sodium (mg)	Energy (Kcal)	
	M	F		M	F
13-15	<270	<217	500	2700	2170
16-18	<301	<228	500	3,010	2,280

Note: [1] <10% of TER

D. Data Collection Procedure

In this study, the researchers sent a request for a permit to conduct research to the Department of Education (DepEd) school division superintendents of the selected areas. The letters were then presented to the schools' administration for approval to conduct the study. All possible participants were asked to answer an informed consent together with a demographic questionnaire. As to participants below the legal age, parental consent was provided as well as assent forms for adolescents aged 13 to 15 years. Those who were able to accomplish the forms were then enrolled in the study. The dietary intake of adolescents for the estimated food record of 3-nonconsecutive days (2 weekdays and 1 weekend) were collected through email and validated through a video or voice call interview for fifteen (15) to thirty (30) minutes accompanied by their guardian or household caretaker. The data gathering took a day or one virtual meeting. The interview focused on collecting and validating the food items consumed to ensure the accuracy of the data recorded. Prior to this, a recorded video was provided discussing the necessary information about the study and instructions on how to fill in the 3-day non-consecutive estimated food record appropriately. After the interview, the dietary snacking consumption of participants was computed and averaged to determine its contribution to their energy, sugar, and sodium intake.

E. Statistical Analysis

The results for total dietary intake for three (3) non-consecutive days were averaged. Total energy intake, sugar, and sodium were presented by means and standard deviations. Also, the contribution of snacking to the total energy intake, sugar, and sodium was shown by percentages. Pearson's correlation was used to determine the relationship between the variables. A p-value of less than or equal to 0.05 was considered significant.

F. Study Limitations

Scope of the Study. The study solely focused on the contribution of frequent snacking to the energy, sugar, and sodium intakes of the participants and did not extend to the factors that influence its occurrence among adolescents aged 13-18. The research employed a cross-sectional design and showed findings at a specific point in time.

Snacks' Classification. Snacks were classified as foods taken in between major meal times. This suggests that for an instance where a participant skips a meal, their intake afterwards would not be considered snacking despite being in the timeslot.

Data Collection and Sample Size. The data gathering phase lasted for 4 weeks. This was when the alert level 1 restrictions were enacted in Manila and Bataan. The context of the pandemic largely differed compared to when the proposal was made as the Inter-Agency Task Force (IATF) allowed (1) travels without regard to age and comorbidities and (2) full on-site operations of all establishments as well as limited face to face classes for basic education [20]. Without the presence of strict regulations, home confinement was non-existent. Simultaneously, the limited time allowance has hindered the researchers to attain the proposed sample size and were able to enroll only 32 participants from chosen schools excluding Arellano University (Juan Sumulong Campus) as students failed to accomplish food records.

G. Ethical Considerations

Conflict of Interest. The researchers declare no conflict of interests.

Privacy and Confidentiality. In line with the Republic Act 10173, the personal details gathered were kept confidential. To protect the participants' identities, they were represented by a unique code/identifier (e.g., AUf01, ONm02, SJff01,TPff02) respective to the initials of chosen schools.

Informed Consent Process. The informed consent together with the demographic questionnaire were forwarded to the possible participants, upon school administration's approval. The participants who were able to accomplish the said forms and voluntarily participated were then enrolled in the study.

Vulnerability. Parental consent was also included in the informed consent form for the participants below legal age. The assent forms were also provided for participants aged 15 and below.

Assent. The assent was presented in a written form containing the simplified and necessary information about the study to guarantee their understanding. Parental consent was still included in this part.

Risks. Minimal risks were involved in the study. The participants were only tasked to attend one (1) virtual meeting with their guardian or household caretaker if applicable and accomplish a 3-day non-consecutive estimated food record form. Completing a food record form only took 15 to 30 minutes.

Benefits. The participants may not directly benefit from the study, but the data gathered will be substantial to the success of this study. Their participation can give way for future researchers to use this as a basis for their research and contribute to the existing body of knowledge addressing the contribution of frequent snacking to overnutrition.

Incentives or Compensation. Several participants received a token of gratitude (Php 500) through a raffle and was sent via GCash.

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III. RESULTS

Table 2. Adolescents' dietary intake by age group

Age Group (n=32)	Mean ± SD		
	Energy (kcal)	Sugar (g)[1]	Sodium (mg)[1]
13 - 15	1739.82 ± 595.00	43.56 ± 34.48	2677.08 ± 1611.94
16 -18	1914.16 ± 695.48	46.74 ± 29.00	3547.2 ± 2079.97

Note: [1]The values presented are added sugar and added sodium

Table 2 presents the dietary intake of adolescents aged 13-15 and 16-18. The energy intake of adolescents had a mean of 1739.82 kcal (range, 946.6 to 2815.4) and 1914.16 kcal (range, 901.2 to 3505.6), respectively. Both mean energy intakes were lower than the REI per day for 13-15 and 16-18 years old, except for a 13-year-old participant who consumed slightly more than 2,700 kcal and an 18-year-old who had an intake beyond 3,010 kcal. The mean sugar intake, 43.56 grams (range, 0.8 to 139.0) of adolescents aged 13-15 constitutes to 10% of their total energy mean while those aged 16-18 with 46.74 grams (range, 3.8 to 120.6) intake was within the less than 10% TEI recommendation. The sodium intakes were 2677.08 milligrams (range, 507.1 to 7088.5) and 3547.2 milligrams (range, 1134.3 to 8044.6), respectively. Both sodium intakes had a mean beyond the 500 mg recommendation. These were all assessed using the Philippine Dietary Reference Intakes (PDRI) 2015.

Table 3. Contribution of adolescents' snacking to their energy, sugar, and sodium intakes by age group

Age Group (n=32)	Frequent Snacking (%)		
	Energy (kcal)	Sugar (g)[1]	Sodium (mg)[1]
13 - 15	24.08	62.82	24.30
16 -18	36.08	50.47	28.17

Note: [1]The values presented are added sugar and added sodium

Table 3 presents the contribution of snacking to the energy, sugar, and sodium intakes of adolescents in terms of percentage based on age groups 13-15 and 16-18. The energy and sodium intake from snacking of adolescents aged 13-15 comprises about a quarter of the total energy and sodium intake (24.08% and 24.30%, respectively). Additionally, snacking intakes for adolescents aged 16-18 comprise more than a quarter of the total energy and sodium intake of adolescents (36.08% and 28.17%, respectively). The sugar intake of adolescents from snacking comprises more than half of the total sugar intake of adolescents for both age groups, 13-15 and 16-19 (62.82% and 50.47%, respectively).

Table 4. Adolescents' dietary intake by sex

Sex (n=32)	Mean ± SD		
	Energy (kcal)	Sugar (g)[1]	Sodium (mg)[1]
Male	1792.72 ± 531.84	33.33 ± 21.27	3101.19 ± 1774.70
Female	1841.27 ± 731.06	53.07 ± 36.23	3073.84 ± 2013.46

Note: [1]The values presented are added sugar and added sodium

Table 4 shows the dietary intake of male and female adolescents. The energy intake of male adolescents had a mean of 1792.72 kcal (range, 964.3 to 2815.4), while the female adolescents recorded a mean of 1841.27 kcal (range, 901.2 to 3505.6). Despite the females attaining slightly higher energy mean than males, both sexes' mean intakes were lower than the REI per day for males and females ages 13-18 excluding 2 female participants whose intakes were above the 2,280 kcal. The mean sugar intakes were 33.33 grams (range, 0.8 to 79.3) and 53.07 grams (range, 3.8 to 139.0), respectively. Sugar mean for males was within the less than 10% of the TEI recommendation, as compared to 11.5% for females. The mean sodium intakes were 3101.19 mg (range, 1134.3 to 7088.5) and 3073.84 mg (range, 507.1 to 8044.6), respectively, and both sodium means were remarkably higher than the 500 mg recommendation.

Table 5. Contribution of adolescents' snacking to their energy, sugar, and sodium intakes by sex

Sex (n=32)	Frequent Snacking (%)		
	Energy (kcal)	Sugar (g)[1]	Sodium (mg)[1]
Male	32.45	55.22	26.45
Female	27.83	58.26	25.89

Note: [1]The values presented are added sugar and added sodium

Table 5 shows the contribution of snacking to the energy, sugar, and sodium intakes of adolescents in terms of percentage based on sex, male and female. The energy and sodium intake from snacking of adolescents of both sexes comprises more than a quarter of the total energy (32.45% and 27.83%) and sodium intake (26.45% and 25.89%). The sugar intake of adolescents comprises more than half of the total sugar intake for both sexes (55.22% and 58.26%, respectively).

Table 6. Adolescents' dietary intake by school type

Type of School (n=32)	Mean ± SD		
	Energy (kcal)	Sugar (g)[1]	Sodium (mg)[1]
Public	1818.08 ± 665.35	44.86 ± 33.72	3198.62 ± 2020.55
Private	1840.25 ± 616.54	46.05 ± 24.99	2471.13 ± 773.26

Note: [1]The values presented are added sugar and added sodium

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Table 6 conveys the adolescents' dietary intake according to the type of school. The mean energy intake of adolescents from public schools was 1818.08 kcal (range, 901.2 to 3505.6), while adolescents from private schools had a slightly higher intake of 1840.25 kcal (range, 1310.3 to 2723.3). Both mean energy intakes were lower than REI per day for 13-15 and 16-18 years old, male and female, except for 2 public school participants whose consumptions were beyond 2700 and 3010 kcal and a participant from a private school who had an intake above 2700 kcal. The mean sugar intake, 46.05 grams (range, 11.1 to 79.3) of adolescents from private schools was higher than the 44.86 grams (range, 0.8 to 139.0) intake of public school adolescents. The sugar mean of those in private schools corresponded to 10% of TEI while those in public schools landed within the less than 10% recommendation. In contrast, public schools had a higher mean sodium intake of 3198.62 milligrams (range, 507.1 to 8044.6) as compared to private schools' sodium mean of 2471.13 milligrams. Nevertheless, both mean intakes were deemed excessive based on the 500 mg recommendation.

Table 7. Contribution of adolescents' snacking to their energy, sugar, and sodium intakes by school type

Type of School (n=32)	Frequent Snacking (%)		
	Energy (kcal)	Sugar (g)[1]	Sodium (mg)[1]
Public	30.83	59.73	26.67
Private	23.63	42.45	23.13

Note: [1]The values presented are added sugar and added sodium

Table 7 shows the contribution of snacking to the energy, sugar, and sodium intakes of adolescents in terms of percentage based on the type of school, public and private. The energy and sodium intake of adolescents from snacking for students from public schools comprises more than a quarter of the total energy and sodium intake (30.83% and 26.67%, respectively). Moreover, the sugar intake from snacking in adolescents from public schools comprises more than half of the total sugar intake. On the other hand, the energy and sodium intake of adolescents from snacking for students from private schools comprises less than a quarter of the total energy and sodium intake (23.63% and 23.13%, respectively). The sugar intake of adolescents from private schools comprises more than a quarter of the total sugar intake (42.45%).

Table 8. Adolescents' dietary intake by area classification

Area Classification (n=32)	Mean ± SD		
	Energy (kcal)	Sugar (g)[1]	Sodium (mg)[1]
Urban	2187.67 ± 441.89	94.98 ± 40.57	2739.36 ± 1535.84
Rural	1783.67 ± 660.04	39.88 ± 27.07	3120.70 ± 1942.57

Note: [1]The values presented are added sugar and added sodium

Table 8 presents the dietary intake of adolescents based on area classification. The adolescents from urban schools had a higher mean energy intake of 2187.67 kcal (range, 1695 to 2549) compared to 1783.67 kcal (range, 901.2 to 3505.6) of adolescents from rural schools. Both mean energy intakes were less than the REI per day for 13-15 and 16-18 year-old males, while urban's energy mean was slightly higher than the REI per day for 13-15 year-old females. Despite these, 2 adolescents from rural schools were recorded to have intakes above 2700 and 3010 kcal. The mean sugar intake of the urban schools of 94.98 grams (range, 59.0 to 139.0) was remarkably higher than the rural's sugar mean of 39.88 grams (range, 0.8 to 121.6). The urban's sugar mean was excessive, constituting 17% of the TEI, while the rural's sugar mean was within the less than 10% TEI recommendation. Contrarily, the mean sodium intake of rural adolescents, 3120.70 milligrams (range, 507.1 to 8044.6), was higher than urban's sodium mean of 2739.36 milligrams (range, 1365.4 to 4397.4). Nonetheless, both sodium means were notably above the 500 mg recommendation.

Table 9. Contribution of adolescents' snacking to their energy, sugar, and sodium intakes by area classification

Area Classification (n=32)	Frequent Snacking (%)		
	Energy (kcal)	Sugar (g)[1]	Sodium (mg)[1]
Urban	40.01	93.52	33.51
Rural	28.64	53.25	25.35

Note: [1]The values presented are added sugar and added sodium

Table 9 shows the contribution of snacking to the energy, sugar, and sodium intakes of adolescents in terms of percentage based on the area, urban and rural. The energy and sodium intake from snacking of adolescents from urban areas comprises less than half of the total energy and sodium intake (40.01% and 33.51%, respectively). Meanwhile, the sugar intake from snacking of adolescents from urban areas comprises nearly all (93.52%) of their total sugar intake. On the other hand, the energy and sodium intake from snacking adolescents living in rural areas comprises more than a quarter of the total energy and sodium intake (28.64% and 25.35%, respectively). The sugar intake from snacking adolescents living in rural areas comprises more than half of the total sugar intake (53.25%).

Table 10. Snacking frequency of participants by category

Adolescents (n=32)	Number	Mean Snacking Frequency
Age Group		
13-15	17	1.63
16-18	15	1.82
Sex		
Male	13	1.69
Female	19	1.74
Type of School		
Public	27	1.68
Private	5	1.93

Area Classification		
Urban	3	2.56
Rural	29	1.63

Table 10 presents the snacking frequency of adolescents based on categories. The majority of the participants had a low mean snacking frequency across all categories ranging from 1.63 to 2.56 per day. Solely, adolescents from urban areas had a mean snacking frequency of 2.56, slightly higher than the recommended 2 snacking frequencies per day.

Table 11. Relationship of frequent snacking to the energy, sugar, and sodium intakes

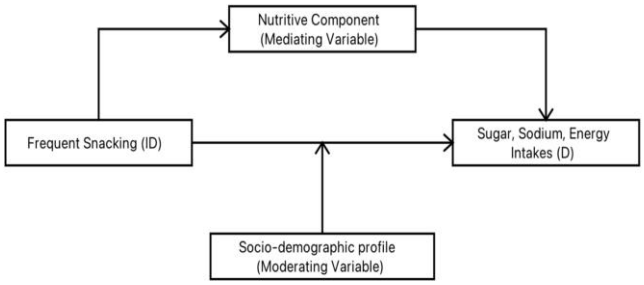
Pearson Correlation		Energy	Sugar	Sodium
Frequent Snacking	r	0.360	0.495	0.100
	p – value	0.043[1]	0.004[1]	0.586

Note: [1]Significant at the ≤ 0.05

Table 11 shows the association of frequent snacking to the energy, sugar, and sodium intakes of adolescents. Frequent snacking is weakly correlated (r=0.360) with the total energy intake. The sugar intake of adolescents taken from snacking has a moderately strong correlation (r=0.495) with the total sugar intake. Furthermore, the sodium intake from snacking of adolescents has a very weak correlation (r=0.100) to the total sodium intake and is not statistically significant (p=0.586).

➢ *Conceptual Framework*

The framework depicted the relationship of the variables in the study. This study aimed to determine if frequent snacking posed a significant contribution to the energy, sugar, and sodium consumption of adolescents by subjecting them to a dietary assessment using a 3-day non-consecutive estimated food record.



IV. DISCUSSION

➢ *Energy Intake*

The study results revealed that adolescents had low consumption of energy in their overall dietary intakes across all categories (*see Tables 2, 4, 6, & 8*). The aforementioned finding is inconsistent with the results of several studies. Frequent snacking has been strongly associated with altered, positive energy balance (wherein the energy input is greater than the energy expenditure) in adolescents inhabiting urbanized settings [43], [7], [18], [63]. Similarly, another study has observed that in 19% of men and 24% of women, their daily energy intake holds frequent snacking as its primary constituent (Ovaskainen et al., 2006). Despite numerous researches adducing the direct relationship between frequent snacking and high energy intake, in this study, the participants had presented energy intakes that were less than the recommended per day. The results may be entrenched in factors that were not inspected, such as self-reported definition in conjunction with snacking definition based on time of day. Literature has shown that the participants themselves determined each occasion of consuming as a meal or a snack [63]. Furthermore, Gatenby [29] stated that particular food items were considered a meal for others, while it has been inputted under a snack for some. The methods as discussed vary on every individual's eating routine and consumption schedule [38]. Regarding the accounts, it is evident that the study results' interpretation was affected fundamentally due to the incorrect classification of snacks. Hence, this possibly influenced the weak correlation between frequent snacking and energy intake.

➢ *Sugar Intake*

Results of the study showed a moderate correlation between snacking with the total sugar intakes of adolescents (*see Table 11*). This is consistent with the study that presented increased sugar intakes from multiple frequencies of snacking [34]. This is mainly observed in the dietary intakes of adolescents from urban areas (*see Table 8*), wherein sugar mean intakes exceeded the range of recommended less than 10% of the total energy intake [81]. According to Vilar-Compte et al. [74], these areas have more access to highly processed foods that are convenient and can cater to low income families. These products mostly include high amounts of sugar. This denotes that snacking contributes to the total sugar intakes, which can suggest that the increased sugar intake in the dietary intake of adolescents are brought by the foods and beverages consumed as snacks. Snacking occasions of adolescents were observed to be mostly composed of pre-packaged foods, desserts, and sweetened beverages. This is parallel to studies of Wang et al. [75], USDA and HHS [70], and Jensen et al. [34].

Despite studies associating frequent snacking to excessive sugar intakes, in the context of the study, generally, participant adolescents reflected within range of the recommended less than 10% of the total energy intake [81]. The results may be due to factors such as the number of snacking occasions [62], dietary habits including skipping meals, and food and beverage preferences [6]. In addition, in this present study, participant adolescents exceeding the 10% sugar intake recommendation mostly did not engage in frequent snacking occasions.

➢ *Sodium Intake*

The results of the study revealed that adolescents had high consumption of sodium in their overall dietary intakes across all categories *(see Tables 2, 4, 6, & 8)*. According to Philippine Dietary Reference Intakes (PDRI) 2015 [27], the recommended sodium intakes for the two age groups (13-15

and 16-18) must not exceed 500 mg. Despite showing remarkably high values in their overall dietary intakes, the sodium percentages from snacking only contributed more or less a quarter of their overall intake *(see Tables 3, 5, 7, & 9)*. This is due to the salt and other condiments and seasonings added to the meals in order to enhance its flavors. Most of the meals consumed by participants had considerably high amounts of condiments, excluding the salt. Fish and soy sauces were the condiments present in most of the participants' food records which are two of the highest sodium-containing condiments, consisting of 5192 mg Na/100 g and 5116 mg Na/100 g, respectively [61]. Moreover, most of the participants did not engage in frequent snacking. Snacking among the participants only occurred at least one (1) to two (2) times a day or none at all. In these occurrences, the sodium intakes were mostly from pre-packaged foods such as biscuits, chips, ready-to-drink juices, and baked goods due to its flavor-enhancing and preservative purposes [13], [71].

V. CONCLUSION

Inconsistent with the foreign studies, findings showed that locally, the COVID-19 pandemic is weakly correlated with the increased energy consumption as intakes were predominantly below the recommendations across ages 13-18. In spite of their non-engagement to frequent snacking, findings root that the adolescents' food preparation and food choices during their meals and snacking occasions, respectively, had significantly contributed to their added sugar and sodium intakes – suggesting that frequent snacking was not the sole reason for an increased added sugar and sodium consumption.

Generally, prior studies and surveys showed that Filipino adolescents continuously fail to achieve energy recommendations apt to their age and simultaneously experience poor diet quality. Coherent to the findings shown in this study, it reinforces the need to implement health and nutrition programs and policies in government agencies and local government units directed toward populations that are most at risk for deficiencies. The study may also stand as a foundation for further investigation involving larger sample size to ensure conclusiveness of results.

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