

Number and Type of Meals consumed by Children in a Subset of Schools in San Juan, Puerto Rico

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Objective: Eating patterns of children have been investigated in the U.S. and have been found to be changeable over extended time periods. Trends can be correlated to changes in the same periods for determinants of overall health such as body mass index (BMI). In Puerto Rico, there have been no such studies so similar correlations cannot be done. Herein, we present baseline information on the number and types of eating occasions in a convenience sample of children from the area of San Juan so that future changes in patterns can be monitored over time.

Methods: Multiple 24 hour recall questionnaires were administered to school children at 3 different grade levels. Number of eating occasions and type of meal (breakfast, lunch, dinner and snacks) were quantified. Factors considered for analysis were age, gender and BMI of the children, participation in the School Lunch Program (SLP) and if meals were eaten on a weekday or weekend day.

Results: Approximately 40% of children were categorized as overweight. There was a trend toward fewer eating occasions in older vs. younger children and fewer eating occasions on weekend days vs. weekdays. Lunch and dinner were consumed more frequently than breakfast and participants in the SLP had more eating occasions than non-participants.

Conclusion: The number of eating occasions in Puerto Rican youth is maintained at about 5 for weekdays and about 4.5 per day for weekend days with a trend toward fewer meals as a function of increasing age. This data can be used as baseline information in future studies that wish to correlate changes in dietary patterns with health. [*P R Health Sci J* 2015;34:78-82]

Key words: Meal-type, Eating occasions, Puerto Rican school children

Number of eating occasions and type of meal can be important factors influencing an individual's general health and well being. Indeed, unhealthy eating patterns can increase the risk of nutritional imbalances having undesirable consequences.

The period of childhood thru adolescence is especially important in the determination of life-long eating habits (1). A wide variety of genetic, social, emotional, ethnic as well as environmental and situational factors can influence eating behavior in these age groups (2-4) however the strength of any particular determinant may vary over time so that periodic review of current habits need to be carried out. These studies have been done in the USA (5) but to date, even baseline data are missing for Puerto Rican youth. Consequently, we herein present the first study of meal patterns in Puerto Rican schoolchildren consisting of the determination of eating occasions and type of meal consumed while examining a variety of factors with the objective of having this information available for comparative purposes over time.

Methods and Materials

Sample

Our study groups, selected by convenience, included 101 children from elementary school (5th grade), 115 children from junior high school (8th grade) and 105 children from high school (11th grade), 3 schools at each level, all within the area of Metropolitan San Juan, Puerto Rico. We have selected these 3 grade levels to permit consistency in the methods for data collection and allow measurements of patterns of dietary intake which vary greatly between childhood and adolescence

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(6,7). Height and weight were measured according to published methods (8) and body mass index (BMI) was calculated as weight in kg divided by the square of the height in m (kg/m²). Comparisons were made between children as classified as either below or equal to and above the 85th percentile for age-adjusted weight (9). In addition to grade level, gender and BMI, children's meal patterns were compared if taken on week days vs weekend days as well as influenced by participation in the School Lunch Program (SLP) as either a participant or non-participant based on self reports. Sampling was carried out for the period from August 2004 through May 2005. Consequently, it should be understood that baseline data represents snacking habits at this time period and not necessarily that of the date of publication should be used accordingly.

Data collection

The 24-hr recall questionnaire was used to collect dietary information (10). Focus was given to quantifying the number of eating occasions and the type of meal eaten being classified as breakfast, lunch, dinner or snack based on self reports. Snacks were further recorded as morning, afternoon or evening again based on self reports. To obtain more precise information, multiple recalls were taken from each student, three to four collected on Tuesday through Friday which represents intake Monday through Thursday and two or three times on Monday which represents weekend intake. Average number for the recalls was calculated. Questionnaires were interviewer-administered using the multi-pass technique developed by the USDA (11).

Informed consent

This study was carried out in accordance to regulations on research with human subjects. Approval was obtained from the Institutional Review Board of the University of Puerto Rico Medical Sciences Campus. Students and their parents signed informed consent documents. Permission to enter the schools was obtained from the Departamento de Educación de Puerto Rico as well as principals and teachers from the participating schools.

Statistical analysis

All analyses presented have been weighed to take into consideration differences in the number of recalls completed by participants. Study participant's characteristics such as demographics and body mass index percentiles based on age and gender were described and examined to assess whether differences existed between children either above or below the 85th percentile for age-adjusted weight and for SLP participants and

non-participants. Two-tailed, two independent samples t-test were used to test the statistical significance of differences in total eating occasions and meal-type classifications. Differences were identified if statistically significant if the $p \leq 0.05$. Chi-square tests were used to test the statistical significance of differences between weight and participation categories at each grade level and identified at the 5 or 1% levels of significance.

Results

Demographics are shown in Table 1. Children categorized as overweight (BMI greater or equal to the 85th percentile for age-adjusted weight) were 41%, 31% and 31% for Elementary, Junior and High school boys and 37%, 41% and 41% for Elementary, Junior and Senior High school girls respectively. There was a significantly greater percent ($p < 0.05$) of boys in normal weight category at both the junior and senior high levels (and consequently a higher percent of girls in the over-weight category). These results put our population at high risk for future weight-associated problems (12). Regarding the SLP, our sample population had an overall percent participation rate of 59% which is similar to the National Sample rate of 62% (13). Lunch participation status was significantly greater for the boys ($p < 0.01$) at the junior and senior high levels but also for girls ($p < 0.05$) at the elementary school level.

Table 2 shows number of eating occasions according to grade level and to weekday vs weekend consumption as classified by weight status. There was a trend toward less eating occasions in older vs. younger children (averaging about 5 vs 4.5) with both normal and overweight high school students consuming a fewer number of meals. Likewise there were fewer eating occasions on weekend days vs. weekdays. These findings are in agreement with studies in the USA (14, 15) with the highest percent of children at all school levels eating 5 or more times per day (16). Of greater importance, normal weight children showed a consistently greater number of eating occasions both during week days and weekend days ($p < 0.05$) than did overweight children.

Table 3 shows type of meal as according to grade level and to weekday vs weekend consumption according to weight status. There were few statistically significant differences (all

Table 1. Age and gender distribution of the study population by school level weight status and participation in the School Lunch Program

School level	N	Age (\pm sd)	Weight ^{1,2}						Participation status ²			
			Gender (%)		Male (%)		Female (%)		Male (%)		Female (%)	
			Male	Female	Normal	Over	Normal	Over	Yes	No	Yes	No
Elementary	101	10.8 \pm 0.6	38.6	61.4	59.0	41.0	62.9	37.1	59.0	41.0	71.0*	29.0
Junior	115	13.6 \pm 0.7	41.7	58.3	68.8*	31.2	58.9	41.1	66.7**	33.3	52.9	47.1
High	105	16.7 \pm 0.8	41.0	59.0	69.0*	31.0	58.7	41.3	66.7**	33.3	47.6	52.9

¹Weight category based on 85th percentile adjusted for age and gender, ²Chi-square test for homogeneity of sex between weight and participation categories, *p-value <0.05, **p-value <0.01

Table 2. Mean number of interviews, total eating occasions and eating occasions per day by school level and weight status during weekdays and weekends¹

Weekdays (mean±sd) ²	Elementary school		Junior high school		High school	
	Normal weight (n = 62)	Overweight (n = 39)	Normal weight (n = 72)	Overweight (n = 43)	Normal weight (n = 66)	Overweight (n = 39)
Number of interviews	3.53 ± .80	3.72 ± .72	3.74 ± .91	3.72 ± 1.05	3.09 ± .72	3.00 ± .72
Total eating occasions	18.73 ± 5.30	18.64 ± 5.75	18.84 ± 6.23	17.44 ± 6.60	13.74 ± 4.76	13.41 ± 4.61
Eating occasions /day	5.40 ± 1.17	5.05 ± 1.07*	5.06 ± .95	4.67 ± 1.10**	4.57 ± 1.09	4.41 ± 1.22
Weekends (mean±sd) ²						
Number of interviews	2.58 ± .59	2.51 ± .56	2.58 ± .67	2.53 ± .55	2.61 ± .68	2.59 ± .75
Total eating occasions	12.66 ± 4.65	11.67 ± 3.34	11.51 ± 3.78	10.60 ± 2.93	11.11 ± 4.09	11.31 ± 4.22
Eating occasions /day	4.89 ± 1.17	4.74 ± .91*	4.50 ± .96	4.19 ± .89**	4.35 ± 1.45	4.40 ± 1.31

¹P-values associated with two-sided two independent samples t-test, *P<0.05 **P<0.01

at the 5% level), with overweight junior High students eating fewer breakfasts on weekdays, with overweight elementary students eating fewer snacks during week days and weekends and with overweight junior high students eating fewer snacks on weekends. In this regard, data pointed to greater consumption of lunch and dinner than of breakfast during weekdays at all grade levels. This finding is also in agreement with studies in the USA (14). Other salient results show that more snacks were eaten by younger children and fewer snacks were eaten on weekend days than weekdays days especially the morning snack. This latter finding is hardly surprising since weekend sleep time is known to be greater than weekday time (17).

Table 4 shows number of eating occasions according to grade level and to weekday vs. weekend consumption. Number of eating occasions was significantly higher for participants than non-participants (p < 0.05 and < 0.01). There was a trend toward fewer eating occasions per day when classified by type of school

Table 3. Mean percent of meals and snacks consumption per day by school level and weight status during weekdays and weekends¹

	Elementary school		Junior high school		High school	
	Normal weight N = 62	Overweight N = 39	Normal weight N = 72	Overweight N = 43	Normal weight N = 66	Overweight N = 39
<i>Weekend Days (Mean)</i>						
Breakfast	83.68	86.71	82.90	71.15*	77.30	76.92
Lunch	91.16	89.92	97.97	94.12	88.64	89.10
Dinner	95.54	95.77	98.49	97.21	91.92	98.29
Snacks	73.63	66.41	55.94	52.12	48.45	45.66
Morning snack	84.89	74.11*	36.60	29.34	27.78	27.78
Afternoon snack	62.29	58.03	63.95	64.34	54.82	57.49
Evening snack	73.71	64.79*	66.22	62.65	60.61	51.71*
<i>Weekend Days (Mean)</i>						
Breakfast	92.48	95.30	89.39	90.70	79.70	79.61
Lunch	88.17	81.63	92.93	88.37	77.53	83.03
Dinner	87.64	93.59	92.81	94.96	90.40	84.62
Snacks	57.08	53.79	46.42	41.34	44.89	46.05
Morning snack	36.56	35.04	30.13	24.81	24.74	27.31
Afternoon snack	56.99	56.83	55.49	46.51*	49.52	51.07
Evening snack	74.47	66.24*	52.85	53.23	60.10	61.07

¹P-values associated with two-sided two independent samples z test for proportions, *P-value < 0.05

with elementary children having more meals per day than junior high school children with high school children eating the fewest times per day. As with results from the weight percentile classification, it was noted that eating occasions were more frequent on weekdays vs. weekend days.

Table 5 shows type of meal as a function of grade level and of weekday vs. weekend consumption

according to participation in the SLP. Percent of meal consumption was similar for both, however some statistically significant differences were noted (all at the 5% level) with NP junior high students eating fewer breakfasts on week days, with NP elementary students eating fewer snacks during both week days and weekend days, with NP junior high students eating fewer snacks during weekdays and weekend days and NP high school students eating fewer snacks during week days. The only exception when P had a lower percent than NP was with weekend snacks.

Discussion

Children’s eating patterns, especially snacking behavior can be difficult to assess due to the fact that a variety of approaches have been used to define “snacking” including time of day of consumption or a defined caloric ingestion (18-19). However, the difference between a “meal” and a “snack” often lacks

true meaning since eating occasions may not be fixed and food intake in children resembles a pattern referred to as “grazing behavior” (20). To avoid these difficulties, many studies (18), including ours simply uses the subjects self definition of the eating occasion as breakfast, lunch, dinner and snacks.

A major observation in this study is that there is consistent agreement in the number of eating occasions related to a lower weight category. Number of eating occasions and its effect on weight has been investigated extensively with general agreement that obesity rates are reduced with

Table 4. Mean number of interviews, eating occasions and eating occasions per day by school level and School Lunch Program participation status during weekdays and weekends¹

	Elementary school		Junior high school		High school	
	P (n=67)	NP (n=34)	P (n=76)	NP (n=40)	P (n=58)	NP (n=47)
<i>Weekdays (mean±sd)</i>						
Number of interviews	3.55±.86	3.71±.58	3.72±.99	3.75±.93	3.07±.70	3.04±.75
Total eating occasions	19.16±6.08	17.76±3.84	19.01±6.46	17.00±6.08	14.31±4.64	12.77±4.65
Eating occasions/day	5.48±1.17	4.85±.96**	5.14±.99	4.50±.95**	4.65±1.27	4.34±.92*
<i>Weekends (mean±sd)</i>						
Number of interviews	2.70±.49	2.26±.62	2.50±.68	2.68±.47	2.57±.68	2.64±.74
Total eating occasions	13.64±4.08	9.59±2.99	11.22±3.67	11.07±3.21	11.21±4.38	11.15±3.83
Eating occasions/day	5.00±1.14	4.50±.86*	4.52±.96	4.12±.86*	4.39±1.38	4.34±1.43

Note: P=School Lunch Program participant; NP=Non-participant, ¹P-values associated with two-sided two independent samples t-test, *P-value <0.05, **P-value <0.01

Table 5. Mean percent of meals and snacks consumption per day by school level and Federal School Lunch Program participation status during weekdays and weekends¹

	Elementary school		Junior high school		High school	
	P (n=67)	NP (n=34)	P (n=76)	NP (n=40)	P (n=58)	NP (n=47)
<i>Weekdays (mean%)</i>						
Breakfast	86.24	82.11	85.19	65.92*	79.74	73.97
Lunch	91.67	88.73	96.60	86.43	90.23	97.06
Dinner	96.57	93.78	97.68	98.67	94.25	94.33
Snacks	74.13	64.36	56.93	49.96	49.48	44.87
Morning snack	85.45	71.42*	37.00	28.03	28.74	26.59
Afternoon snack	64.08	53.87*	64.96	62.45	63.36	46.49*
Evening snack	72.87	65.15	68.43	58.18	57.76	56.7
<i>Weekends (mean%)</i>						
Breakfast	94.78	91.18	94.19	81.67*	87.01	70.60*
Lunch	87.31	82.36	91.89	90.00	79.68	79.43
Dinner	88.56	92.65	92.22	96.25	92.96	82.45
Snacks	59.26	48.94	46.70	40.41	42.70	48.56
Morning snack	40.05	27.94*	30.04	24.58	25.98	25.35
Afternoon snack	62.44	46.07*	57.46	42.08*	44.40*	57.13
Evening snack	73.64	66.67	57.13	45.83*	57.73	63.83

Note: P=School Lunch Program participant; NP=Non-participant, ¹P-values associated with two-sided two independent samples z test for proportions, *P-value < 0.05

increasing number of meals (19-26). While this finding might seem counter-intuitive at first glance, these articles point out that the current “obesogenic environment” is more a result of meal skipping (especially breakfast), increasing portion size of foods, availability of “fast foods” (especially sugar-sweetened beverages and french fries), reduced physical activity and several genetic and lifestyle factors. Simply eating with one other person increases the average amount ingested at meals by 44% and with more people present, the average meal size grows even larger (27). Related to our current study, our sample of students is classified as almost 40% being equal to or above the 85th percentile for age and gender-adjusted weight. Since this is the first documentation of eating occasions in Puerto Rican youth, comparisons to previous studies cannot be made but these data will provide a baseline for future comparisons between weight and meal patterns.

Findings in studies on weight status in children either participating or not participating in the SLP have been inconsistent with reports of increased, decreased or no change in BMI values (28-30). Our study had no differences in BMI values between participants and non-participants at any grade level (data not shown), however we have previously reported that participants receive an overall dietary intake superior to that of non-participants (31). Weekday vs. weekend day eating patterns were similar to those from the BMI classification and are in agreement

with findings from the National Sample (15).

Overall comments on the strengths and weaknesses of this study should mention that since our population was selected by convenience that our findings may not be representative of all Puerto Rican children but should be a good approximation since more than 85% of children attend public schools. As with any assessment study, reporting errors are possible especially with younger children (32). Likewise, we did not collect information on many socio-economic or environmental factors, nor physical-activity which might play a role in determining eating occasions and the type of meal eaten. Strengths of the study are multiple interviews which increase the accuracy of reporting eating patterns as well as the use of the multi-pass interview technique.

In summary, we herein provide the first study to report meal patterns in Puerto Rican children and adolescents. This information is now available as baseline data for which future comparisons can be made as to trends between such important issues as weight status and physical well being.

Resumen

Objetivo: Los patrones de alimentación de los niños en los E.U. han evolucionado con el tiempo. Los cambios de estos patrones se han asociado con cambios en las condiciones de salud de esta población, como por ejemplo del índice de masa corporal (BMI). En Puerto Rico, sin embargo, no se han hecho estudios similares por lo que estas correlaciones no se han podido establecer. En este estudio por lo tanto, evaluamos los patrones de alimentación de una muestra de conveniencia de los niños del área de San Juan de tal forma que con el tiempo se puedan evaluar los cambios que estos sufren. **Métodos:** Se administraron cuestionarios de 24 horas a niños de escuela de tres niveles. Se estudió el número de veces en que consumieron alimentos y el tipo de comidas consumidas (desayuno, almuerzo,

cena y meriendas). Se analizó la edad, género y BMI de los niños, su participación en el Programa de Alimentos Escolares (SLP) y si los alimentos fueron consumidos durante la semana o en los fines de semana. Resultados: Se encontró que aproximadamente 40% de los niños estaban sobrepeso. Se observó una tendencia hacia una menor frecuencia en el consumo de alimentos durante la semana en comparación con los fines de semana y entre los niños de mayor edad versus los de menor edad. También se observó una menor tendencia al consumo de alimentos durante el desayuno en comparación con el almuerzo y cena. Finalmente, los niños participantes del SLP mostraron una mayor frecuencia en el consumo de alimentos versus lo que no participaron. Conclusión: La juventud puertorriqueña consume alimentos a razón de 5 veces durante la semana y cerca de 4.5 veces durante los fines de semana. Esta frecuencia correlaciona negativamente con la edad. Estos datos proveen una base confiable para evaluar los cambios en los patrones de alimentación de los niños puertorriqueños y su relación con la salud de esta población.

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