

## What is breakfast for Mexican children?

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**SUMMARY:** In order to face with the concerning rising prevalence of overweight and obesity in childhood, Mexican government has implemented Nutritional Indications (NI) for preschool and schoolchildren. The aim of our study is to investigate what Mexican children have for breakfast and if they meet NI, which recommends that daily breakfast should include one food from each of the three recommended food groups (grains and tubers, animal source food and legumes, fruits and vegetables). We considered a sample of 120 male children aged 3-14 years, their mothers were asked to complete a questionnaire and to fill a breakfast diary for one week. Food was grouped in the three recommended food groups and a further group including fats and sweets was considered. Only 32 children met NI at least once a week (compliant children) and nobody followed NI throughout the week. The analysis on breakfast records showed a low intake of the fruits and vegetables food group. Children were more likely to follow NI when they had breakfast with family members. We show that children do not meet breakfast's NI, but further researches are needed to investigate the long-term impact of NI on Mexican children eating patterns.

**Key words:** Breakfast, children, Mexico, nutritional recommendations.

**RESUMEN. ¿Qué es un desayuno para los niños mexicanos?** Para hacer frente al aumento de la prevalencia de sobrepeso y obesidad en la infancia, el Gobierno Mexicano ha implementado las indicaciones nutricionales (IN) para niños en etapas preescolar y escolar. El objetivo de nuestro estudio es investigar los componentes del desayuno en la dieta de niños Mexicanos, además del cumplimiento con las IN, que recomiendan que el desayuno diario debe incluir un alimento de cada uno de los tres grupos alimenticios recomendados (granos y tubérculos, alimentos de origen animal, y legumbres, frutas y verduras). Se consideró una muestra de 120 niños (de género masculino) con edades entre 3 y 14 años. Se solicitó a sus madres completar un cuestionario y realizar un registro diario de los componentes del desayuno durante una semana. Los alimentos se agruparon según dictan las IN; además, un grupo que incluye grasas y dulces fue también considerado. Sólo 32 niños cumplieron con las IN al menos una vez a la semana (los niños que cumplen) y ninguno siguió las IN durante toda la semana. El análisis sobre los registros diarios mostró un bajo consumo del grupo de alimentos compuesto por frutas y verduras. El justo seguimiento de las IN ha sido más probable cuando el desayuno se ha realizado con miembros de la familia. Se demuestra que los niños no cumplen el IN del desayuno, pero se necesitan más investigaciones para investigar el impacto a largo plazo de IN sobre los hábitos alimenticios de los niños mexicanos

**Palabras clave:** Desayuno, niños, México, recomendaciones nutricionales.

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### INTRODUCTION

The rising prevalence of pediatric overweight and obesity, especially among Latino children and adolescents, represents a worryingly health care burden (1).

The Encuesta Nacional de Salud y Nutrición

(2) (ENSANUT) shows that the prevalence of overweight and obesity in Mexican children under 5 years was increased from 8.8% in 1999 to 9.7% in 2012. Regarding children between 5 and 11 years the prevalence of overweight and obesity was increased from 26.9% in 1999 to

34.4% in 2012 and the prevalence of obesity is higher among boys than girls.

The risk of developing cardiovascular (coronary artery disease, hypertension) and metabolic (type 2 diabetes) diseases in early adulthood is higher among children and adolescents who are obese (3). Additionally, it has been demonstrated that Latino children are at higher risk (than non-Latino ones) of suffering from impaired glucose tolerance due to beta-cell dysfunction, which represents the preliminary stage of type 2 diabetes (4). Thus, the need for preventive policies promoting healthy lifestyle and nutrition.

In order to face with overweight and obesity epidemic and its consequences, especially among children and adolescents, Mexican government provides the “Estrategia contra el sobrepeso y la obesidad” (5) which promotes a specific action program that takes place in preschools, primary schools and secondary schools, starting from 2010-2011 academic year. It aims to promote physical activity and healthy eating habits (reduction of fat and sugar intake, increasing consumption of fruits, vegetables and cereals). To implement the project, Mexican government carries out an educational program that involves Mexican families in order to improve eating habits of children also outside school: it suggests what type of food children should take in different eating occasions (breakfast, lunch, dinner and snacks), taking into account that dietary habits play a key role in influencing the risk of childhood obesity. More specifically, it has been shown that breakfast patterns are related to weight gain and nutrient intake of children and adolescents: several studies (6-9) demonstrate that breakfast skipping is associated with increased risk of overweight and obesity among children (10). Additionally, subjects who skip breakfast are reported to present a lack of many nutrients (particularly of vitamins, minerals and dietary fiber) (11). Not only breakfast skipping, but also breakfast composition is important: having a

balanced breakfast appears to be associated with children’s better food habits and nutrient intake (12).

Given the importance of breakfast consumption and composition in children’s weight gain, dietary patterns and nutrient intake, in this study we aim to investigate what Mexican children have for breakfast and if they follow the Nutritional Indications (NI) provided by the “Estrategia contra el sobrepeso y la obesidad”.

## MATERIALS AND METHODS

### *Study design*

The present study was based on data from a market survey conducted in three Mexico’s cities (Mexico D.F., Monterrey, Guadalajara) between 27th March and 21st June 2011. The aim of the market survey was to have a complete picture of what people had for breakfast. Participants (3-55 years of age) were selected using a stratified sampling technique.

A questionnaire was administered to the participants. It investigated socio-economic characteristics of the enrolled subjects, their breakfast habits (where they usually have breakfast, what they usually do while having breakfast), their attitudes towards breakfast and towards the types of food they choose for breakfast. They were also asked to fill a breakfast diary every day for one week in which they recorded what food they had for breakfast. Mothers filled the questionnaire and breakfast diaries for their children until 14 years of age.

We considered data from 120 male children (3-13 years of age). Socio-economic characteristics regarded child’s age, household size, mother’s age, working status and educational level. Mother’s attitude towards children’s breakfast was assessed using a 17 items questionnaire. Regarding breakfast diaries, we collected 437 breakfast records among 120 children. Every breakfast record reported what

children had for breakfast, what they did while they were having breakfast, with whom they had breakfast and how long did it take.

#### *Nutritional indications (NI)*

The aim of our study is to investigate if children follow the NI for breakfast recommended by the “Estrategia contra el sobrepeso y la obesidad” (13). The project, in order to face with obesity epidemic, provides an educational program towards Mexican families recommending what type of food children should take in different eating occasions (breakfast, lunch, dinner and snacks). The NI are based on “el Plato del Bien Comer”: it shows the classification of food groups (fruits and vegetables, grains and tubers, legumes and animal source food) and in what proportion should take them, considering the specific features of Mexican population (it is established from the official Mexican norm NOM 043-SSA2-2005 (13)).

Regarding breakfast, the NI provided by the “Estrategia contra el sobrepeso y la obesidad” recommends that children should take one food from every food group (fruits and vegetables, grains and tubers, legumes and animal source food). In order to investigate if children follow these NI, we classify food reported in breakfast records into the three recommended food groups using the Sistema Mexicano de Alimentos Equivalentes (14). To classify all the food children have for breakfast, we consider a further food group (not suggested from the NI) including fats and sweets.

Beverages are classified separately from food. We classify beverages using the “Recomendaciones sobre el consumo de bebidas para la población mexicana” (15): the first level includes water, the second one is represented by skim or low fat (1%) milk and sugar free soy beverages, the third consists of coffee and tea which are not recommended for children due to caffeine. The fourth level

includes non-caloric beverages containing artificial sweeteners, while beverages corresponding to the fifth level provide a high caloric intake but do not contribute to better health status (e.g. fruit juices, whole milk, alcoholic and sports drinks). Finally, the sixth level is represented by beverages that are high in sugar but provide low nutrient intake (soft drinks and other beverages high in sugar such as flavored waters, sweetened coffee and tea). The classification is inversely proportional to the suggested consumption: from the less recommended (Level 6, which should be drink rarely) to the most recommended (Level 1: water, which should be the first source of hydration).

#### *Compliance with Nutritional Indications (NI)*

The analysis of compliance with NI was conducted both on breakfast records and on individual basis. For the analysis on individual basis, we considered compliant children when they follow NI at least once a week. Following NI means that breakfast composition includes one food from each of the three recommended food groups (3/3 NI). Not following NI means that breakfast composition:

- includes food from only two or one of the recommended food groups (2/3 NI, 1/3 NI)
- includes food from only the fats and sweets group (which is not recommended from the NI) and not from the three recommended food groups
- in addition to the recommended food groups, includes food from also the fats and sweets group (3/3 NI + fats and sweets, 2/3 NI + fats and sweets, 1/3 NI + fats and sweets).

#### *Statistical Analysis*

Descriptive data analysis of the compliance with NI has been performed and reported using percentages (absolute numbers). The 95% confidence intervals (C.I.) were obtained by bootstrap method (1,000 sample replications).

Basic exploratory data analysis has been performed and reported using percentages (absolute numbers), and Chi-square is used to test variations across compliance with NI groups. Analyses were performed using the R System.

## RESULTS

Table 1 shows that only 26.66% (26.56; 27.07 95% C.I.) of children followed NI (3/3 NI) at least once a week (compliant children), corresponding to 7.35% (7.30; 7.42 95% C.I.) of the breakfast

records. Nobody followed NI throughout the week, and most of compliant children followed NI only once a week (Figure 1).

The majority of breakfast records didn't follow NI because breakfast composition included food from only two (2/3 NI) of the recommended food groups (44.41%, 44.40; 44.63 95% C.I.) or one (1/3 NI) of the recommended food groups (31.88%, 31.71; 31.92 95% C.I.). When only two food groups were included in breakfast composition, the less represented food

TABLE 1. Compliance with NI and beverages consumption analyzed both on breakfast records and on children.

	Breakfast records (n=734)			Children (n=120)		
3/3 NI	7.35	(7.30; 7.42)	54	26.66	(26.56; 27.07)	32
2/3 NI	44.41	(44.40; 44.63)	326	89.16	(89.01; 89.35)	107
GT + AL	41.96	(41.95; 42.17)	308	86.66	(86.50; 86.87)	104
GT + FV	1.36	(1.33; 1.38)	10	8.33	(8.30; 8.63)	10
AL + FV	1.08	(1.07; 1.12)	8	6.66	(6.45; 6.73)	8
1/3 NI	31.88	(31.71; 31.92)	234	75.00	(74.79; 75.29)	90
GT	24.93	(24.77; 24.97)	183	65.83	(65.81; 66.33)	79
AL	5.85	(5.82; 5.93)	43	24.16	(23.91; 24.38)	29
FV	1.08	(1.04; 1.09)	8	6.66	(6.51; 6.80)	8
3/3 NI + FS	3.26	(3.21; 3.29)	4	10.00	(9.79; 10.13)	12
2/3 NI + FS	9.94	(9.83; 9.97)	73	41.66	(41.41; 41.98)	50
GT + AL + FS	9.53	(9.42; 9.56)	70	40.00	(39.61; 40.18)	48
GT + FV + FS	0.27	(0.25; 0.28)	2	1.66	(1.54; 1.69)	2
AL + FV + FS	0.13	(0.12; 0.14)	1	0.83	(0.76; 0.87)	1
1/3 NI + FS	2.45	(2.41; 2.48)	18	11.66	(11.58; 11.95)	14
GT + FS	2.17	(2.15; 2.21)	16	10.00	(9.94; 10.27)	12
AL + FS	0.27	(0.25; 0.27)	2	1.66	(1.58; 1.72)	2
FV + FS	0	(0.00; 0.00)	0	0	(0.00; 0.00)	0
Only FS	0.13	(0.12; 0.14)	1	0.83	(0.80; 0.90)	1
Beverages consumption, % (95% C.I.), n						
Level I	9.80	(9.72; 9.85)	72	30.00	(29.72; 30.25)	36
Level II	1.22	(1.19; 1.24)	9	2.50	(2.38; 2.55)	3
Level III	0.54	(0.54; 0.57)	4	1.66	(1.52; 1.66)	2
Level IV	0	(0.00; 0.00)	0	0	(0.00; 0.00)	0
Level V	58.44	(58.31; 58.53)	429	91.66	(91.54; 91.85)	110
Level VI	16.07	(15.99; 16.16)	118	60.00	(59.89; 60.45)	72

Data are percentages (95% Confidence Interval), absolute number. NI, Nutritional Indications; GT, Grains and Tubers; AL, Animal Source Food and Legumes; FV, Fruit and Vegetables; FS, Fats and Sweets.

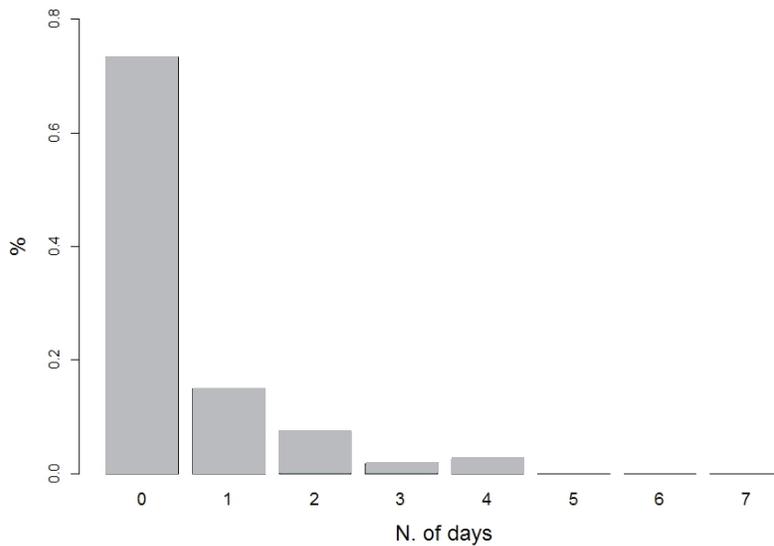


FIGURE 1. Number of days in which children follow NI

groups combination was legumes and animal source food + fruits and vegetables (1.08%, 1.07; 1.12 95% C.I.). When breakfast composition included only one of the recommended food groups, the less represented food group was fruits

and vegetables (1.08%, 1.04; 1.09 95% C.I.).

Regarding the classification of beverages consumption, the most represented were: Level 5 (58.44%, 58.31; 58.53 95% C.I.), this is because children took whole milk more often than skim or low fat (1%) milk (Level 2), and Level 6 (16.07%, 15.99; 16.16 95% C.I.), because of the consumption of soft drinks and atole.

Table 2 and Table 3 show respectively socio-economic characteristics of children and their mother's attitude towards breakfast: there were no significant differences between compliant and noncompliant children.

Table 4 shows the characteristics of breakfast

TABLE 2. Socio-economical characteristics of children and their mothers according to children's compliance with NI. Data are percentages (absolute number).

	Compliant children (n=32)	Noncompliant children (n=88)	p-value
<b>Children</b>			
<b>Age, % (n)</b>			
3-6	44 (14)	31 (27)	0.546
7-9	19 (6)	27 (24)	
10-12	19 (6)	24 (21)	
13-14	19 (6)	18 (16)	
<b>Mother</b>			
<b>Age, % (n)</b>			
>35	59 (19)	51 (45)	0.424
<35	41 (13)	49 (43)	
<b>Education level, % (n)</b>			
medium-high	66 (21)	52 (46)	0.193
low	34 (11)	48 (42)	
<b>Working status, % (n)</b>			
worker	44 (14)	36 (32)	0.462
homemaker	56 (18)	64 (56)	
<b>House old size, % (n)</b>			
≤3	9 (3)	19 (17)	0.196
>3	91 (29)	81 (71)	

TABLE 3. Mother's attitude towards breakfast according to children's compliance with NI

		Compliant children (n=32)	Noncompliant children (n=88)	p-value
Breakfast is the most important meal of the day, especially for children, % (n)	Disagree	28 (9)	22 (19)	0.454
	Agree	72 (23)	78 (69)	
In the morning, children usually don't want to have breakfast because they aren't hungry, % (n)	Disagree	47 (15)	35 (31)	0.246
	Agree	53 (17)	65 (57)	
I would like to talk to my children during breakfast. I really want to see them happy at breakfast, % (n)	Disagree	19 (6)	19 (17)	0.944
	Agree	81 (32)	81 (71)	
My children have hard time getting up in the morning: it's only after breakfast that they really wake up, % (n)	Disagree	41 (13)	44 (39)	0.718
	Agree	59 (19)	56 (49)	
Weekday mornings are busy, so I'm looking for quick solutions for breakfast, % (n)	Disagree	72 (23)	58 (51)	0.165
	Agree	28 (9)	42 (37)	
At breakfast I have trouble with my children: they want to decide what to have for breakfast and I want they have a balanced breakfast, % (n)	Disagree	28 (9)	40 (35)	0.242
	Agree	72 (23)	60 (53)	
For breakfast, I look for food that helps my children to be ready for the day, % (n)	Disagree	59 (19)	56 (49)	0.718
	Agree	41 (13)	44 (39)	
For breakfast, I look for food that is high in energy, % (n)	Disagree	56 (18)	47 (41)	0.349
	Agree	44 (14)	53 (47)	
For breakfast I look for food that is delicious and make my children happy, % (n)	Disagree	56 (18)	44 (39)	0.247
	Agree	44 (14)	56 (49)	
For breakfast I look for food that is both healthy and nutritious, % (n)	Disagree	47 (15)	31 (27)	0.1
	Agree	53 (17)	69 (61)	
For breakfast I look for food that make me sure that my children will eat enough, % (n)	Disagree	66 (21)	57 (50)	0.385
	Agree	34 (11)	43 (38)	
In the morning children need food that is high in energy in order to do all their physical activities: playing, jumping, playing sports, % (n)	Disagree	62 (20)	51 (45)	0.269
	Agree	38 (12)	49 (43)	
In the morning children need food that is high in energy in order to do all their mental activities: learning, studying, % (n)	Disagree	44 (14)	56 (49)	0.247
	Agree	56 (18)	44 (39)	
Breakfast would not be the same every day: I always look for new food types, % (n)	Disagree	56 (18)	45 (40)	0.295
	Agree	44 (14)	55 (48)	
Breakfast affects the mood of the day: I want to be sure that my children leave home happy after a balanced breakfast, % (n)	Disagree	53 (17)	43 (38)	0.334
	Agree	47 (15)	57 (50)	
Giving an healthy breakfast to my children helps to protect them against the flu, % (n)	Disagree	53 (17)	43 (38)	0.334
	Agree	47 (15)	57 (50)	
Breakfast is important because, after spending hours without eating, children should eat enough to be ready for the day, % (n)	Disagree	31 (10)	41 (36)	0.336
	Agree	69 (22)	59 (52)	

records which followed and didn't follow NI: children who had breakfast with family members are more likely to follow NI than children who had breakfast alone or with others (p-value 0.007).

in the recommendation used for the analysis of compliance, these studies, consistently with ours, reveal a low intake of fruits and vegetables compared to other food groups.

TABLE 4. Characteristics of breakfast records according to compliance with NI

	Breakfast records followed NI (n=54)	Breakfast records didn't follow NI (n=680)	p-value
Where, % (n)			
at home	83 (45)	88 (600)	0.288
out of home	17 (9)	12 (80)	
With whom, % (n)			
alone	9 (5)	29 (196)	0.007
with family members	70 (38)	53 (363)	
with others	20 (11)	18 (121)	
Duration, % (n)			
<20 minutes	56 (30)	68 (464)	0.056
>20 minutes	44 (24)	32 (216)	
Distractions, % (n)			
no	30 (16)	30 (175)	0.53
yes	70 (38)	74 (505)	

Another study (20) evaluates the impact of school action program of the "Estrategia contra el sobrepeso en la obesidad" (for the 2011-2012 academic year) on eating pattern of Mexican children, especially on school lunch. Consistently with our results, it demonstrated that the majority of lunch packages of primary schoolchildren do not follow national recommendation. Additionally, the amount of lunch packs not following guidelines further increase when the recommendations include water. Also in our study, the analysis of beverages consumption shows a low intake of water

## DISCUSSION

This analysis of what children had for breakfast was conducted on a sample of 120 male Mexican children and aimed to investigate if children meet the NI for breakfast provided by the "Estrategia contra el sobrepeso en la obesidad". Only 32 children followed NI at least once a week. Similar results were obtained from other studies (16, 17) demonstrating that children and adolescents did not follow the nutritional indication for breakfast. In addition to breakfast, other studies (18, 19) evaluated if children meet daily recommended food groups intake (referring not only to breakfast consumption), showing a poor compliance. Despite the fact that we did not consider the nutrient intake but only the food group consumption and little differences

(Level 1). We found a high intake of whole milk (Level 5, which is recommended for children under 2 years of age or for children who live in geographical area with a high prevalence of malnutrition) and of beverages high in sugar and with low nutritional value, especially soft drinks (Level 6). Our findings are consistent with the results of other studies on Mexican children's beverages consumption (21, 22), showing a high intake of caloric beverages (especially whole milk and soft drinks) and on US children (23) (particularly referring to a higher consumption of whole milk compared to skim ones).

Differently from other studies that evaluate if children meet breakfast guidelines, we found out no significant association with socio-economic characteristics and mother's attitude towards

breakfast. Thus probably because most of compliant children meet NI only once a week and in any case nobody meet NI throughout the week, consequently there is no significant difference between compliant and noncompliant children by both socio-economic characteristics and mother's attitude towards breakfast. Particularly the assessment of beliefs on breakfast showed how mothers' attitude of compliant and noncompliant children were similar to each other and how they both not were fully aware on the importance of breakfast: despite they both thought that breakfast is the most important meal of the day, they did not express complete agreement regard the fact that children should have a balanced breakfast which helps to make them ready for the day and to do all their physical and mental activities.

Regarding breakfast records' characteristics, we showed that children are more likely to meet NI when they have breakfast with family members, consistently with other studies which demonstrated that children who have meals with parents present significant better dietary habits (24).

### CONCLUSIONS

Our study investigated if children meet NI for breakfast provided by the "Estrategia contra el sobrepeso en la obesidad". We found out that only 32 children meet NI at least once a week and most of compliant children follow NI only once a week. Additionally, we showed a low intake of fruit and vegetables and water and a high intake of caloric beverages (whole milk and soft drinks). Further studies are needed to evaluate the long-term impact of the program on Mexican children's eating patterns.

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