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RESEARCH

Consumption of ultra-processed and indigenous foods in Mayan families of overweight or obese schoolchildren

Consumo de alimentos ultraprocesados y autóctonos en familias mayas de escolares con sobrepeso u obesidad

Consumo de alimentos ultraprocessados e indígenas em famílias maias de crianças em idade escolar com sobrepeso ou obesidade

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Abstract

Introduction. Overweight and obesity caused by the consumption of ultra-processed foods is a public health problem. Since this type of food has a high energy density, unlike indigenous, which provides healthy nutrients such as fiber, vitamins and minerals. **Objective**. Describe the consumption of ultra-processed and indigenous foods in Mayan families with schoolchildren who are overweight or obese. **Methodology.** Quantitative, descriptive, observational and cross-sectional study. 58 families with at least one overweight or obese student participated. The habitual diet and frequency of food consumption instrument was applied, and the foods were classified into ultra-processed and indigenous. All data were analyzed with descriptive statistics with frequencies and percentages. **Results.** 67.2 % of the participants had secondary education, 89.7 % were Mayan speakers and 15.5 % produced food in the cornfields. Of the native foods included in the usual diet, tomatoes predominated 63.8 %, habanero chili 46.6 %, black beans 44.8 %, and raw milk 41.4 %. In the ultra-processed foods, those with the highest consumption were tortillas 96.6%, sugar 77.7 %, edible oil 75.9 % and dough 60.3 %. **Conclusions.** Since ultra-processed foods with high calorie content and little nutritional value have reached rural areas, it is essential to promote and educate for health, as well as implement interventions to create family gardens in order to obtain local foods that improve eating habits in overweight or obese schoolchildren.

Key words: Eating; overweight; obesity; parents; child nutrition (DeCS).

Resumen

Introducción: El sobrepeso y la obesidad a causa del consumo de alimentos ultraprocesados es una problemática de salud pública, este tipo de alimentos tiene una alta densidad energética a diferencia de los alimentos autóctonos que brinda nutrimentos saludables como fibra, vitaminas y minerales. **Objetivo:** Describir el consumo de alimentos ultraprocesados y autóctonos en familias mayas con escolares que presentan sobrepeso u obesidad. **Metodología:** Estudio cuantitativo, descriptivo, observacional y transversal. Participaron 58 familias con al menos un escolar con sobrepeso u obesidad. Se aplicó el instrumento dieta habitual y frecuenciade consumo de alimentos y se clasificaron los alimentos en ultraprocesados y autóctonos. Todos los datos fueron analizados con estadística descriptiva con frecuencias y porcentajes. **Resultados:** 67.2 % contaba con educación secundaria, 89.7 % eran maya hablante y 15.5 % producía alimentos en la milpa. De los alimentos autóctonos incluidos en la dieta habitual predominó el tomate 63.8 %, chile habanero 46.6 %, frijol negro 44.8 %, y leche bronca 41.4 %. En los ultraprocesados los de mayor consumo fueron la tortilla 96.6 %, azúcar 77.7 %, aceite comestible 75.9 % y la masa 60.3 %. **Conclusiones:** Los alimentos ultraprocesados con alto contenido calórico y poco contenido nutricional han llegado incluso a zonas rurales, es fundamental promover y educar para la salud, así como ejecutar intervenciones para crear huertos familiares con el fin de obtener alimentos autóctonos que mejoren los hábitos alimentarios en escolares con sobrepeso u obesidad.

Palabras clave: Consumo de alimentos; Sobrepeso; Obesidad; Padres; Nutrición del niño (DeCS).

Abstrato

Introdução. O sobrepeso e a obesidade causados pelo consumo de alimentos ultraprocessados são um problema de saúde pública. Esse tipo de alimento tem alta densidade energética, ao contrário dos indígenas, que fornecem nutrientes saudáveis, como fibras, vitaminas e minerais. **Metodologia.** Estudo quantitativo, descritivo, observacional e transversal. Participaram 58 famílias com pelo menos um aluno com sobrepeso ou obesidade. Foi aplicado o instrumento de dieta habitual e frequência de consumo alimentar e os alimentos foram classificados em ultraprocessados e indígenas. Todos os dados foram analisados com estatística descritiva com frequências e porcentagens. **Resultados.** 67,2 % dos participantes tinham ensino médio, 89,7 % eram falantes de maia e 15,5 % produziam alimentos nos milharais. Dos alimentos nativos incluídos na dieta habitual, predominaram o tomate 63,8 %, a pimenta habanero 46,6 %, o feijão preto 44,8 % o leite cru 41,4 %. Nos alimentos ultraprocessados, os de maior consumo foram tortilhas 96,6 %, açúcar 77,7 %, óleo comestível 75,9 % e massa 60,3 %. **Conclusões.** Como os alimentos ultraprocessados com alto teor calórico e pouco valor nutricional chegaram às áreas rurais, é essencial promover e educar para a saúde, bem como implementar intervenções para criar hortas familiares a fim de obter alimentos locais que melhorem os hábitos alimentares de crianças em idade escolar com sobrepeso ou obesidade.

Palavras-chave: Comer; excesso de peso; obesidade; país; nutrição da criança (DeCS).

Introduction

The therapeutic approach to non-communicable diseases such as overweight and obesity continues to be a major public health concern; the high consumption of ultra-processed foods represents a new battle line because their consumption is one of the causes of overweight and obesity related to environmental factors that influence their dietary choice [1,2].

Food processing includes transforming raw or harvested foods into new products, ensuring their safety, palatability and shelf life. However, food systems are undergoing marked changes due to advances in food technology that have resulted in greater availability, affordability and commercialization of these types of foods and, consequently, their consumption in the diet of families has increased. However, the problem with processed foods is that they tend to be of low nutritional quality, but they look attractive and sometimes they are cheaper than the indigenous food, thus, this situation ends up affecting the health of all family members, including schoolchildren [3-5].

The consumption of ultra-processed foods leads to the consumption of food with high energy density, which go in saturated and trans fats, sugar and sodium [6]. Providing calories without other essential nutrients can contribute to poor health outcomes, and can also displace nutrient-rich foods such as those that are indigenous to the geographic area where they are consumed and produced, using vegetables or preparing them in a traditional way, without preservatives or chemicals, which is of particular concern at the school stage, since excessive consumption of sugars has been linked to several metabolic abnormalities and adverse health conditions, and childhood is a critical period for growth, biological development and the establishment of healthy eating behaviors [7,8].

It might be thought that, since there are greater quantities of food available to the population, everyone would have access to what is necessary to eat adequately; however, there is evidence that shows an increase in obesity rates worldwide, due to the fact that most foods undergo production processes that have the capacity to remove their nutritional properties, while chemical ingredients added can be harmful to health [9].

In Mexico, according to the National Health and Nutrition Survey (ENSANUT) 2021, 92.9 % of children between 5 and 11 years of age ate sweetened beverages in terms of non-recommended food groups. In addition, it was noted that more than 50 % of school children ate snacks, sweets, desserts and sweet cereals. It was also identified that male schoolchildren tend to have a higher percentage of consumption in all the non-recommended food groups [10].

In the Mayan community of Cuncunul, Yucatan, Mexico, the influence of inadequate lifestyle related to high-calorie food, easy access to digital entertainment, the exaggerated multiplication of junk food and its wide availability, are some of the examples that must be intervened in a timely manner as society has to face them more and more every day. This has resulted in accelerated changes in food and nutritional demand, its transformation is ruled by the fact that international supply has no market restrictions; in rural areas such as the Mayan communities, the predominance

of monoculture agriculture toward industrial supply has negatively affected the strategies of self-consumption and regional food supply that were previously in place, making them dependent on the global food industry [11,12]. Based on this reasoning, the research question was posed: What is the consumption of ultra-processed and indigenous foods in Mayan families of overweight or obese schoolchildren in the community of Cuncunul, Yucatan?

The study supports the basis for studying food and nutritional health due to the vulnerability of Mayan communities, where the nursing professional can transcend in their health promotion activities by identifying factors associated with overweight and obesity in schoolchildren in Mayan communities, to guide them to better prevention practices contextualized to the culture, practices and access to indigenous foods. The purpose of the study was to describe the consumption of ultra-processed and indigenous foods in Mayan families with overweight or obese schoolchildren.

Methodology

Quantitative, descriptive, observational and cross-sectional study [13]. In a Mayan population of Cuncunul, Yucatan, Mexico with 166 schoolchildren, where at first the weight status data were classified by taking anthropometric measurements, SECA Model Robusta 813 digital scales and ADE Germany Stadiometers were used; the measurements were taken before the schoolchildren ate their breakfast. Descriptive analysis of the measurements showed that 25.9 % (43 schoolchildren) were overweight and 22.9 % (38 schoolchildren) were obese. In a second stage, the Mayan families were identified based on the inclusion criteria, that is, being a parent, caregiver or guardian living with at least one overweight or obese schoolchild, residing in the community, signing informed consent, and deciding to participate voluntarily in the study, obtaining a sample of 64 families, but only 58 decided to participate in the research. The data were collected from July to September 2021, and since there were Mayan-speaking participants, a translator fluent in that language was available.

The main variable was consumption of ultra-processed and indigenous foods, using the Habitual Diet and Frequency of Food Consumption instrument created in 2010, which is divided into three sections. The first section, consisting of 9 items, collects sociodemographic information about the family; the second, consisting of 27 items, determines the frequency of consumption of indigenous foods; and the third, consisting of 23 items, measures the frequency of consumption of ultra-processed foods. The instrument has been applied in 51 families in two Mayan communities in Yucatan, the original language is Spanish, it was validated in two Mayan communities (Mucuyché and Xanláh), it proved to be valid and reliable, with a Cronbach's alpha reliability level of 0.83 [(14)]. The results were classified into ultra-processed and indigenous foods, the frequency of consumption of each food was categorized into three subgroups: 1) daily, 2) one to four times a week and 3) less than once a week. Foods eaten more than once a week (daily or one to four times a week) were considered within the regular diet [(14)]. The procedures were: training course for 6 interviewers for the handling, interpretation and application of the instrument; data collection of 10 to 15 minutes in the homes of the families through 10 visits to the community lasting 4 hours each; in all the interviews with the families, the recommendations to prevent COVID-19 were observed.

For data analysis, a database was created in Statistical Package for Social Sciences (SPSS) version 22 for Windows; all data were analyzed using descriptive statistics with frequencies and percentages because the variable was nominal.

This research was approved by the Ethics and Research Committee with registration 03/20 and complied with the provisions set forth in the Regulations of the General Health Law on Research for Health, identity was safeguarded by using pseudonyms and folios in the instruments, and data collection was carried out at all times by trained personnel [(15)].

Results

Table 1 shows that 32.8 % of the participants were 11 years old, while the minority (3.4 %) were 6 years old.

Table 1. Ages of schoolchildren in families in Cuncunul, Yucatan, Mexico, 2021 (n=58)

Schoolchildren's age	f	%
6	2	3.4
7	8	13.8
8	11	19.0
9	11	19.0
10	7	12.1
11	19	32.8
Total	58	100

Source: Self-development.
Note: f=Frequency; %= Percentage.

Table 2 shows that 89.7 % of the parents were Mayan-speaking and only 1.7 % spoke only Mayan.

Table 2. Languages spoken by parents of families in Cuncunul, Yucatan, Mexico, 2021 (n=58)

Languages	f	%
Only Mayan	1	1.7
Only Spanish	5	8.6
Mayan and Spanish	52	89.7
Total	58	100

Source: Self-development.
Note: f=Frequency; %= Percentage

Table 3 shows that 67.2 % of the parents had secondary schooling, 84.5 % were married, and 84.5 % were engaged in housework. A relevant fact was that in 48.2 % of the families there was at least one member of the household who migrated outside the locality, city or state. With respect to food production, 39.7 % did not produce food and only 15.5 % cultivated cornfields.

Table 3. Sociodemographic data of participating guardians from Cuncunul, Yucatán, Mexico, 2021 (n=58)

Demographics	f	%
Schooling		
Incomplete elementary school	5	8.6
Complete elementary school	8	13.8
Junior high	39	67.2
High School	5	8.6
Technical school	1	1.7
Marital status		
Married	49	84.5
Divorced	1	1.7
Common-law marriage	5	8.6
Widow/Widower	3	5.2
Occupation		
Housewife	49	84.5
Student	1	1.7
Employee	7	12.1
Self-employed	1	1.7
Head of household migrates		
Yes	28	48.2
No	30	51.7
Migrating household members		
0	26	44.8
1	30	51.7
2	1	1.7
3	1	1.7
Food production		
It does not produce food	23	39.7
It has a plot of land	4	6.9
Cultivates cornfield	9	15.5
Raises animals on his/her plot	2	3.4
Raises animals on his/her site	12	20.7
Produces fruit on his/her site	8	13.8

Source: Self-development.
Note: f=Frequency; %= Percentage

Table 4 shows that, of the indigenous foods present in the diet, 69 % of the families consumed local squash, 50 % chaya leaf, 62.1 % pepita seeds, 46.6 % natural soft drinks, and 79.3 % preferred chicken meat to beef or pork.

Table 4. Indigenous foods eaten by participating families in Cuncunul, Yucatán, Mexico, 2021 (n=58)

Food	Daily f (%)	1-4 per week f (%)	Less than 1 per week f (%)	Included in the regular diet f (%)
French toast (naturally prepared)	13 (22.4)	39 (67.2)	4 (6.9)	2 (3.4)
Sweet bread (naturally prepared)	9 (15.5)	36 (62.1)	12 (20.7)	1 (1.7)
Beef	15 (25.9)	42 (72.4)	--	1 (1.7)
Pork	2 (3.4)	44 (75.9)	12 (20.7)	--
Chicken	5 (8.6)	46 (79.3)	--	7 (12.1)
Eggs	15 (25.9)	33 (56.9)	9 (15.5)	1 (1.7)
Raw milk	24 (41.4)	16 (27.6)	16 (27.6)	2 (3.4)
Cheese	6 (10.5)	25 (43.1)	25 (43.1)	2 (3.4)
Black beans	26 (44.8)	30 (51.7)	2 (3.4)	--
Potato	3 (5.2)	36 (62.1)	18 (31)	1 (1.7)
Pork rinds (naturally Prepared)	--	23 (39.7)	35 (60.3)	--
Longaniza sausage	1 (1.7)	22 (37.9)	35 (60.3)	--
Local squash	7 (12.1)	40 (69)	11 (19)	--
Tomato	37 (63.8)	19 (32.8)	1 (1.7)	1 (1.7)
coriander	18 (31)	28 (48.3)	12 (20.7)	--
Horseradish	8 (13.8)	35 (60.3)	15 (25.9)	--
Chaya leaf	4 (6.9)	29 (50)	25 (43.1)	--
Habanero chili	27 (46.6)	19 (32.8)	11 (19)	1 (1.7)
Carrot	11 (19)	39 (67.2)	7 (12.1)	1 (1.7)
Local cucumber	3 (5.2)	20 (34.5)	35 (60.3)	--
Romaine lettuce	3 (5.2)	29 (50)	24 (41.4)	2 (3.4)
Cabbage	4 (6.9)	40 (69)	14 (24.1)	--
Apple	12 (20.7)	28 (48.3)	16 (27.6)	2 (3.4)
Banana	12 (20.7)	34 (58.6)	11 (19)	1 (1.7)
Pepita seeds	2 (3.4)	18 (31)	36 (62.1)	2 (3.4)
Natural refreshments	18 (31)	27 (46.6)	13 (22.4)	--
Coffee	22 (37.9)	20 (34.5)	15 (25.9)	1 (1.7)

Source: Own-development.
Note: f=Frequency; %= Percentage

With respect to the consumption of ultra-processed foods, 100 % of the families consumed it, 96.6 % were predominantly processed flour tortillas, 75.9 % processed dough, 77.7 % sugar, 56.8 % mayonnaise, 56.9 % canned chili peppers and 43.1 % sausages (Table 5).

Table 5. Ultra-processed foods eaten by participating families in Cuncunul, Yucatan, Mexico, 2021 (n=58)

Food	Daily f (%)	1-4 per week f (%)	Less than 1 per week f (%)	Included in the regular diet f (%)
Tortilla (flour processed)	56 (96.6)	1 (1.7)	--	1 (1.7)
Dough (flour processed)	35 (60.3)	14 (24.1)	8 (13.8)	1 (1.7)
Edible oil	44 (75.9)	10 (17.2)	3 (5.2)	1 (1.7)
Sugar	45 (77.69	10 (17.2)	2 (3.4)	1 (1.7)
Oats	17 (29.3)	20 (34.5)	21 (36.2)	--
Barley	1 (1.7)	11 (19)	46 (79.3)	--
Tomato puree	4 (6.9)	22 (39.6)	31 (53.4)	--
Mayonnaise	6 (10.3)	33 (56.8)	18 (31)	1 (1.7)
Ketchup	6 (10.3)	22 (37.9)	29 (50)	1 (1.7)
Pudding	3 (5.2)	24 (41.4)	31 (53.4)	--
Jello	3 (5.2)	25 (44.8)	29 (50)	--
Pancake mix	3 (5.2)	23 (39.7)	31 (53.4)	1 (1.7)
Microwave popcorn	6 (10.3)	9 (15.5)	41 (70.7)	2 (3.4)
Cereal box	13 (22.4)	23 (39.7)	22 (37.9)	--
Fried foods	6 (10.3)	21 (36.2)	30 (51.7)	1 (1.7)
Canned chiles	4 (6.9)	20 (34.5)	33 (56.9)	1 (1.7)
Pasta	7 (12)	40 (69)	11 (19)	--
Powder for preparation of refreshments	5 (8.6)	30 (51.7)	23 (39.7)	--
Crackers	14 (24.1)	31 (53.4)	12 (20.7)	1 (1.7)
Chocolate powder	23 (39.7)	17 (29.3)	17 (29.3)	1 (1.7)
Sausages	5 (8.6)	28 (48.3)	25 (43.1)	--
Pork ham	6 (10.3)	32 (55.2)	20 (34.5)	--
Bottled soft drinks	19 (32.8)	24 (41.4)	15 (25.9)	--

Source: Own-development.
Note: f=Frequency; %= Percentage

Discussion

Overweight and obesity in Cuncunul schoolchildren was present in the 6 to 11 year-old group, with a predominance in one third of 11 year-old schoolchildren. Parents were predominantly Mayan-speaking, with secondary school education, and most of them do not produce backyard food despite they eat such food. An alarming fact is that all Mayan families eat ultra-processed foods in their regular diet. Therefore, and in accordance with the United Nations 2030 Agenda for Sustainable Development Goals, which talks about food Safety, it is important to determine in ethnic minorities the types of food consumed and how it is acquired, in order to implement strategies to improve nutrition and food conditions [16]. Inadequate dietary lifestyle, as mentioned in two studies [17,18], indicate that it generates changes in eating behaviors due to the consumption of hypercaloric foods,

more free sugars, more salt and more saturated and trans fats, which leads to non-communicable health problems such as overweight and obesity. This is consistent with the consumption of ultra-processed foods in the Mayan families of Cuncunul, where, on a daily basis, they eat processed tortillas, sugar, canned chili peppers and commercial sausages with greater frequency.

In a study [19] carried out in two rural localities of Yucatan, it was described that the increase in overweight and obesity at school age was related to the lifestyle established in the family environment; therefore, it is important to study in a multidisciplinary way the nutritional habits of the families of the schoolchildren who have this health problem, where the nursing professional implements interventions to improve nutritional conditions and reduce obesity in Mayan towns. For this purpose, it is recommended to take into account sociocultural factors such as the use of the dish of the Mayan good eating [20], designed for the consumption of indigenous foods, which, although the families in this study ate squash, chaya, and pepita seed for example with greater frequency, this food is not included in the regular diet of schoolchildren.

One study [21] reported that unhealthy dietary intake was characterized by excessive caloric density and high in free sugars, unhealthy fats and salt, as well as low in dietary fiber, which accounted for the increased risk of obesity and other diet-related chronic non-communicable diseases. Such consumption is consistent with the preferences of the families that participated in this study, where at least one schoolchild was overweight and obese. The food preferences of overweight and obese children in the current study differed from the results obtained by other researchers [22], who showed that the favorite foods were fruits, pizzas, flavored milk and French fries, while the least popular foods were vegetables, whole grains, fish, meats and *panela* cheese. The differences were due to the fact that the products consumed in urban areas are not the same as those consumed in rural areas.

Another factor that influenced this result was the culture adopted in the Mayan community. In this regard, a researcher pointed out that the new eating habits acquired had an impact on the population with the selection of modern food products that take a toll on their health. This research shows a high consumption of ultra-processed foods by Mayan schoolchildren living in a rural area, since they also face barriers such as poverty and limited resources, which undoubtedly influence the frequent consumption of this type of food, leading to a sedentary lifestyle and habits that are harmful to health [23,24].

The current dietary pattern is characterized by a progressive decrease in the consumption of fruits, vegetables and greens, together with a generally low consumption of fresh, local and seasonal foods. This is consistent with the type of food consumption of the families of Cuncunul, where ultra-processed foods predominated in their regular diet. This is important because parental food preferences have been shown to be a modulator in the habits of schoolchildren, and determine eating behaviors from the earliest ages, such as type, portions, schedule and eating habits [22].

In this study, it was determined that high frequency indigenous foods were the pillar for the nursing professional to carry out nutritional education, together with the prevention of overweight and obesity in order to contribute to food safety, especially in their influence on consumption habits, food purchase, preparation, safety and environmental conditions [25].

In this respect, the lesson of establishing a link with Mayan schoolchildren is to identify their awareness of the rising cost of imported products and the need to eat local products, not only because they are within their reach but also because, in nutritional terms, their consumption is advisable. Encouraging interventions with children is important because it is at this age that habits are learned in addition that those habits learned at this stage will be practiced in adulthood [26].

The main limitation of the study was the unwillingness of some families to participate in the research, for fear of being infected with COVID-19, even though they were told, and shown, that they would be wearing personal protective equipment.

Conclusions

Ultra-processed foods are on the rise by families in rural and indigenous communities, a factor that causes and increases malnutrition in people from an early age and, at the same time, the loss of interest in the production of their own food. Among the main ultra-processed foods consumed in the families were those with a higher content of preservatives and synthetic antioxidants, fats and sugars, which gives an idea of the schooling of the head of household or the person responsible for food preparation, and may be a key factor for a greater acquisition of such foods, since they are more in contact with technology and whose advertising of ultra-processed foods is more accessible to them. Additionally, the migration of a member of the household to other more globalized places, where the acquisition and preparation of food is increasingly carried out with ultra-processed foods, a behavior that can be transmitted and adopted by the other members of the household.

In the context of the Mayan community it is convenient to have a program with nutritional education from the nursing approach in the promotion of health in order to improve eating habits. Therefore, it is recommended to continue studying nutritional varieties from the cultural context to identify which stimuli are related to overweight and obesity. Moreover, although in this study the consumption of ultra-processed foods was identified in families with overweight or obese schoolchildren, it would be very enriching if future research could compare it in families with schoolchildren with a normal nutritional status.

Conflicts of interest

The authors stated that there is no conflict of interest.

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