Consumption and expenditure on food prepared away from home among Mexican adults in 2006

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Abstract
Objective. To describe food expenditure and consumption of foods prepared away from home among Mexican adults.
Materials and methods. Data were from 45,241 adult participants in the National Health and Nutrition Survey 2006, a nationally-representative, cross-sectional survey of Mexican households. Descriptive statistics and multivariable linear and logistic regression were used to assess the relationship between location of residence, educational attainment, socioeconomic status and the following: 1) expenditure on all food and at restaurants, and 2) frequency of consumption of comida corrida or restaurant food and street food.

Results. Food expenditure and consumption of food prepared away from home were positively associated with socioeconomic status, educational attainment, and urban vs. rural residence (p<0.001 for all relationships in bivariate analyses).

Conclusions. Consumption of food prepared outside home may be an important part of the diet among urban Mexican adults and those with high socioeconomic status and educational attainment.

Key words: food; nutrition, public health; health status disparities; Mexico

Resumen
Objetivo. Describir los gastos en alimentos y el consumo de alimentos preparados fuera de casa en población mexicana.
Material y métodos. Los datos fueron de 45,241 adultos mexicanos en la Encuesta Nacional de Salud y Nutrición de 2006, representativa al nivel nacional. Se utilizaron estadísticas descriptivas y regresión lineal y logística para estimar la relación entre el lugar de residencia, el nivel educativo y el nivel socioeconómico, con el gasto en todos los alimentos y en restaurantes, y con la frecuencia de consumo de comida corrida, en restaurantes y de la calle.

Resultados. El gasto en alimentos y el consumo de alimentos preparados se asociaron positivamente con el nivel socioeconómico, el nivel educativo y la residencia rural (p<0.001 para todas las relaciones).

Conclusiones. El consumo de alimentos preparados puede ser una parte importante de la dieta de los adultos urbanos y de aquellos con altos niveles socioeconómicos y educativos.

Palabras clave: alimentos; nutrición; salud pública; disparidad en el estado de salud; México
Obesity is a global epidemic.1 Developing countries around the world have undergone a ‘nutrition transition’ characterized by overweight and obesity surpassing undernutrition as a leading cause of morbidity and mortality.2,3 In Mexico, where 69% of all adult men and 73% of all adult women are overweight or obese, prevalence has steadily increased and is now among the highest in the world.4 Data from nationally-representative surveys suggest that 35% of Mexican women ages 20 to 49 years old were overweight or obese in 1988, compared to 62% in 1999, 72% in 2006, and 71% in 2012.4 This trend has been attributed to a variety of factors, including urbanization, sedentary lifestyles, and consumption of soda and other energy-dense food and beverage items.5,6

In the United States, where secular increases in overweight and obesity preceded those in Mexico, consumption of foods prepared away from home, including fast food and restaurant food, has played an important role in the obesity epidemic.7-11 Foods prepared away from home tend to come in larger portion sizes, and to be more energy-dense, higher in total fat, saturated fat, sodium, and cholesterol on a per-calorie basis, and lower in dietary fiber, calcium, and iron.12-15 Research has demonstrated that frequent consumption of food away from home is associated with increased caloric intake and body mass index.9,16 Furthermore, several studies have found that consumption of food away from home is associated with social and demographic factors, including income, education, age, gender, and others, and may contribute to disparities in diet-related chronic diseases.17,18

Relatively little is known about food purchasing and consumption behaviors among the Mexican population, particularly those related to food prepared away from home. Rivera and colleagues (2002) used data from the National Income and Expenditure Surveys to conduct one of the only studies of food purchasing among Mexicans, and found that most types of food are purchased in greater quantities in urban than rural areas, suggesting food purchasing may contribute to disparities in obesity and other diet-related chronic diseases.5

There is a dearth of knowledge regarding patterns in purchasing and consumption of foods prepared away from home within the Mexican population. Given the role that these foods have played in the obesity epidemic in the U.S.,7-11 it is important to understand the extent to which Mexicans consume foods prepared away from home. It is also important to identify social and demographic characteristics associated with prepared meal consumption because previous studies have identified disparities in diet quality and the burden of diet-related chronic disease based on gender, area of residence, socioeconomic status, and other factors.5,19,20 This study used data from the National Health and Nutrition Survey 2006 (Ensanut 2006) to accomplish three objectives: First, to describe expenditures on all food (i.e., restaurant and other food away from home, as well as food to be prepared at home) and at restaurants among Mexican households. Second, to describe purchasing of foods prepared away from home, including the following: 1) purchasing of comida corrida or restaurant food for breakfast, lunch, and dinner, and 2) purchasing of meals, snacks, and drinks from street vendors or convenience stores. Third, to describe whether food expenditure and consumption of prepared food are associated with social and demographic factors previously found to be associated with diet quality and the prevalence of diet-related chronic disease, including area of residence (i.e., urban vs. rural), educational attainment, and socioeconomic status.

Materials and methods

Data source

Data were from the public-use data file of the Ensanut 2006, a nationally-representative health survey conducted by the Mexican National Institute of Public Health.4 The goal of the survey was to collect systematic data about the health and nutritional status of Mexican children, adolescents, and adults, as well as to help evaluate the performance of the national health system and other social programs. Ensanut 2006 data were collected via in-person interviews covering topics related to health and health care, nutrition, household expenditure, use of social programs, and sociodemographics.

The Ensanut 2006 sample included 45,241 adult participants ≥20 years old. The sample was constructed using a stratified, multi-stage, clustered sampling plan and was designed to produce generalizable results to both urban and rural areas within each of Mexico’s 31 states and the Distrito Federal, the capital city. Sample weights were included in the Ensanut 2006 public use data that account for the complex survey design and weight the data to be representative of the Mexican population living in households. The Ensanut 2006 research protocol was reviewed and approved by the ethics committee of the National Institute of Public Health. All participants provided informed consent prior to the interview. Further details on the survey’s sampling strategy and study design are available elsewhere.4

Analytic sub-sample

Analyses were restricted to two subsamples: 42,915 participants (95% of the total sample) with complete...
Participants’ educational attainment was reported in Mexican pesos per month. To assess total household expenditures, the responses to these variables were summed. All outcomes were reported in Mexican pesos per month.

Consumption of comida corrida/restaurant food and street food: A randomly-selected subsample of 20 103 Ensanut 2006 participants were asked a series of questions to assess the frequency with which they purchased foods prepared away from home. To assess purchasing of comida corrida and other restaurant food, participants were asked three questions: “How often do you typically eat [breakfast/lunch/dinner] at comida corrida or at a restaurant?” Comida corrida refers to a prepared meal typically served at smaller restaurants and food stalls. Comida corrida meals vary, but generally they are intended to be a full meal prepared in a style resembling a homemade meal, similar to food served in a dining hall or cafeteria. To assess purchasing of street food, participants were asked: “How often do you typically eat breakfasts, lunches, or dinners from street food vendors?” To assess purchasing of snacks and drinks away from home, participants were asked: “How often do you typically buy [snacks/drinks] from a convenience store or street vendor?” Response options for all questions were: more than once per day, once per day, 4-6 times per week, 1-3 times per week, 1-3 times per month, less than once per month, and never. For all questions regarding consumption of food away from home, the definition of the vendor type (e.g., ‘convenience store’) was left open to the interpretation of the participant. In this study, responses were dichotomized as either: 1) ≥once per month, or 2) <once per month. This dichotomization was used for two reasons: First, relatively few participants (generally less than ~15%) reported any consumption of the outcomes assessed (e.g., comida corrida or restaurant food for lunch) and very few (generally less than 2%) reported engaging in these behaviors once per week or more. This relative infrequency required the aggregation of responses into larger categories. Second, participants who reported never engaging in a given behavior were placed in the same category as those who reported engaging in that behavior less than once per month, because it was assumed that eating a specific type of food away from home less than once per month would have little or no health impact.

Residence area: Localities in Mexico were classified as ‘rural’ if they had <2 500 inhabitants, ‘urban’ if they had 2 500 to 99 999 inhabitants, and ‘large urban’ if they had ≥100 000 inhabitants.

Education: Participants’ educational attainment was classified into the following five categories, based on the last level of education completed: 1) <elementary school, 2) elementary school, 3) middle school, 4) high school or vocational school, 5) college or more.

Socioeconomic status: As discussed by Gutiérrez (2008), the Mexican National Institute of Public Health used principal components analyses to calculate a multi-dimensional socioeconomic status index based on the sociodemographic structure of households (e.g., number of occupants, employment status), housing conditions (e.g., water source, floor material, number of occupants), and household goods (e.g., radio, television and refrigerator). This index, which was calculated based on reference data from the 2006 Household Income and Expenditure Survey, was intended as a cross-survey measure that could be used to determine household-level socioeconomic status using multidimensional items commonly included in Mexican health and social surveys. As described by Gutiérrez, the socioeconomic status index was used in the Ensanut 2006 to identify the following groups of households: 1) those with a high probability of being food insecure, 2) those with a high probability of being food secure but suffering from material deprivation, and 3) those who are food secure and not suffering from material deprivation. Based on the index score and cutoff points based on reference data from the 2006 Household Income and Expenditure Survey, the latter category of households were separated into six deciles.
Covariates: Multivariable analyses (described below) were used to adjust for a number of relevant covariates, chosen because previous research has demonstrated that they are associated with food expenditure and consumption of meals prepared away from home. These covariates include the following: 1) age, measured in years, 2) gender, dichotomized as male or female, 3) household size, defined as the number of adults and children living in the household at the time of the interview, 4) literacy, dichotomized as whether or not the participant self-reported knowing how to read or write, 5) employment status, dichotomized as whether or not the participant self-reported having any employment at the time of the interview, 6) indigenous ethnicity, dichotomized based on self-identification, 7) marital status, classified as single, married, or divorced/widowed/separated, and 8) region of the country, classified as North, Central, South, or Mexico City.

Statistical analyses

The distributions of all variables were examined using descriptive statistics, including means and 95% confidence intervals of continuous variables and percentage distributions of categorical variables. Multivariable linear and logistic regression was used to predict consumption of foods prepared away from home based on urban residence, educational attainment, socioeconomic status, and relevant covariates (detailed above). In the models predicting consumption of comida corrida or at restaurants for meals, the outcome is whether participants report consuming comida corrida or at restaurants for breakfasts, lunches, or dinners ≥ once per month. Similarly, for the model predicting consumption of street food, the outcome is whether participants consumed meals from street food vendors or snacks/drinks from street vendors or convenience stores ≥ once per month. All analyses were weighted using weights, strata, and primary sampling units in the Ensanut 2006 data to account for probability of selection into the survey, non-response, and the complex sampling design. To reduce the probability of type I error associated with multiple comparisons and the large sample size, statistical significance is defined conservatively as p<0.01 for all analyses. All analyses were conducted using Stata 12.*

Results

Descriptive statistics for the 45 241 participants who answered questions regarding food expenditure and the

* StataCorp. Stata 12. College Station, TX. 2012.
20103 participantes que respondieron a preguntas sobre el consumo de alimentos preparados fuera de casa en el cuadro I. Approximadamente la mitad de los participantes en cada muestra tuvo una educación primaria o menos. Más del 50% de los participantes vivía en un área urbana, y menos de un tercio de los participantes vivía en una vivienda en el último decil del índice de status socioeconómico del gobierno mexicano.

El cuadro II incluye el gasto mensual de alimentos entre los hogares mexicanos por residencia, nivel de educación y socioeconómico. Comparado con los hogares rurales, las casas en áreas urbanas gastaron más de dos veces, o 270 pesos adicionales por persona por mes, en todos los alimentos (p<0.001). El gasto per cápita por comida corrida en áreas urbanas también dedicó una proporción más baja de su gasto total de alimentos a comida corrida (p<0.001). Este patrón se mantuvo en todo el grupo socioeconómico: las casas con educación más alta y status socioeconómico gastaron más dinero per cápita en alimentos, pero este representaba una menor proporción de su gasto total. Además, el gasto por comida corrida en restaurantes que se utilizó en las casas rurales se mantuvo en el último decil del índice de status socioeconómico del gobierno mexicano.

El cuadro III incluye el porcentaje de participantes en cada estrato social que reportaron comer comida corrida en restaurantes una vez al mes o más. En total, solo el 6% de los participantes reportó comer la comida corrida en restaurantes una vez al mes o más, mientras que el 12% de los respondentes reportó comer la comida corrida en restaurantes una vez al mes o más. En total, 19% de los participantes reportaron comer cualquier comida (es decir, desayuno o almuerzo) una vez al mes o más en restaurantes. Comida corrida y restaurantes consumieron de manera variable a lo largo de los estratos sociales. Por ejemplo, solo el 3% de los participantes en los dos primeros deciles de status socioeconómico reportó comer esta comida una vez al mes, mientras que el 18% de los que están en los tres últimos deciles (p<0.001 para todos los grupos). Similarmente, 1% de los participantes que no terminaron la escuela primaria comieron comida corrida o restaurantes una vez al mes o más, comparado con casi una cuarta parte de aquellos con educación universitaria (p<0.001). Just under 2% of participants in rural areas ate comida corrida or at restaurants for dinner monthly.

<table>
<thead>
<tr>
<th>Table II</th>
<th>Monthly household food expenditure, Mexico, Ensanut 2006 (n=42,915)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Household food expenditure per capita (pesos)</td>
</tr>
<tr>
<td></td>
<td>Mean [95%CI] p</td>
</tr>
<tr>
<td>Total</td>
<td>478 [457-499]</td>
</tr>
<tr>
<td>Rural</td>
<td>284 [275-293]</td>
</tr>
<tr>
<td>Urban</td>
<td>428 [414-441]</td>
</tr>
<tr>
<td>Large urban</td>
<td>554 [531-576]</td>
</tr>
<tr>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>&lt; Elementary</td>
<td>321 [308-334]</td>
</tr>
<tr>
<td>Elementary</td>
<td>389 [379-398]</td>
</tr>
<tr>
<td>Middle school</td>
<td>461 [447-475]</td>
</tr>
<tr>
<td>HS or vocational</td>
<td>553 [535-572]</td>
</tr>
<tr>
<td>≥ College</td>
<td>816 [751-882]</td>
</tr>
<tr>
<td>SES Decile</td>
<td></td>
</tr>
<tr>
<td>1-2</td>
<td>293 [287-299]</td>
</tr>
<tr>
<td>3-4</td>
<td>335 [327-343]</td>
</tr>
<tr>
<td>5-7</td>
<td>580 [569-591]</td>
</tr>
<tr>
<td>8-10</td>
<td>1020 [968-1073]</td>
</tr>
</tbody>
</table>

Nota: p-values are based on a t-test of the difference with the reference group. Reference groups are rural residence, < elementary school education, and 1st-2nd deciles of the socioeconomic status index. Food expenditure is measured in pesos spent per person in one month. Household food expenditure refers to the sum of both restaurant and non-restaurant expenditure.
Table III

**Consumption of comida corrida or at restaurants for breakfasts, lunches, dinners, or any meal ≥ once per month. Mexico, ENSA Nut 2006 (n=20103)**

<table>
<thead>
<tr>
<th></th>
<th>Breakfast</th>
<th>Lunch</th>
<th>Dinner</th>
<th>Any meal</th>
</tr>
</thead>
<tbody>
<tr>
<td>SES decile</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3rd &amp; 4th</td>
<td>10.6 [9.1-12.4]</td>
<td>&lt;0.001</td>
<td>10.5 [9.1-12.2]</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>5th-7th</td>
<td>19.4 [17.4-21.6]</td>
<td>&lt;0.001</td>
<td>19.9 [18.0-22.0]</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>8th-10th</td>
<td>28.4 [24.3-32.9]</td>
<td>&lt;0.001</td>
<td>32.4 [28.2-37.0]</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥ Elementary</td>
<td>3.8 [2.9-5.1]</td>
<td>3.4 [2.6-4.4]</td>
<td>1.1 [0.7-1.6]</td>
<td>5.5 [4.4-6.9]</td>
</tr>
<tr>
<td>Elementary</td>
<td>6.9 [6.1-7.7]</td>
<td>&lt;0.001</td>
<td>6.6 [5.9-7.4]</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Middle school</td>
<td>15.0 [13.3-16.8]</td>
<td>&lt;0.001</td>
<td>16.4 [14.6-18.3]</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>HS or vocational</td>
<td>26.9 [23.5-30.7]</td>
<td>&lt;0.001</td>
<td>28.0 [24.7-31.5]</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>≥ College</td>
<td>35.4 [30.1-41.1]</td>
<td>&lt;0.001</td>
<td>39.4 [34.8-44.1]</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Urban/Rural</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>4.8 [4.2-5.6]</td>
<td>5.1 [4.4-5.9]</td>
<td>1.8 [1.5-2.3]</td>
<td>8.2 [7.3-9.2]</td>
</tr>
<tr>
<td>Urban</td>
<td>9.4 [8.3-10.6]</td>
<td>&lt;0.001</td>
<td>9.7 [8.5-11.1]</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Large urban</td>
<td>19.2 [17.5-21.0]</td>
<td>&lt;0.001</td>
<td>19.9 [18.2-21.7]</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Note: p-values are based on logistic regression models predicting the relationship between food purchasing outcomes and each of the independent variables. One logistic regression is performed for each of the independent variables. Statistical significance is based on a t-test of beta coefficients predicting the difference between each category of the independent variable and the reference category (i.e., 1st and 2nd decile, < elementary education, and rural residence). 'Any meal' refers to consumption of breakfast or lunch or dinner from comida corrida or restaurants ≥ once per month.

Compared to 5% in urban areas (p<0.001) and over 10% in large urban areas (p<0.001). These associations were similar for both breakfasts and lunches.

Table IV includes the percentage of participants within each social stratum who purchased meals from street food vendors or snacks and drinks from street food vendors or convenience stores. The results suggest that street food vendors were a more frequent source of prepared meals among the Mexican adult population than comida corrida or restaurants. One-third of participants reported eating a meal at a street food vendor ≥ once per month, well above the corresponding frequency for comida corrida or restaurant meals. When aggregated 40% of participants ate comida corrida, restaurant meals, or a meal from a street vendor ≥ once per month. Street vendors were also a frequent source of snacks and drinks. 37% and 54% of participants reported consuming snacks and drinks, respectively, from street vendors ≥ once per month. In total, 60% of participants consumed a snack or drink from a street vendor ≥ once per month. Frequency of street food consumption increased with SES, educational attainment, and among those living in large urban vs. rural areas, patterns similar to those observed for meals consumed at comida corrida or restaurants.

The results of two logistic regression models predicting consumption of comida corrida/restaurant meals as well as at street food vendors are shown in table V. The outcome in Model 1 is the log-odds that participants eat comida corrida or at restaurants for breakfasts, lunches, or dinners ≥ once per month. In Model 2 the outcome is the log-odds that participants purchase drinks at street vendors or snacks/meals from street vendors or convenience stores ≥ once per month. After adjustment for other factors, purchasing of all of the mentioned types of prepared food varied across strata defined by rural vs. urban residence, educational attainment, and socioeconomic status. Participants with a college degree or more had nearly four times the odds of eating comida corrida or at restaurants for a meal ≥ once per month (p<0.001).
Compared to those in the lowest two socioeconomic status deciles, those in the highest three deciles had 2.6 times the odds of eating comida corrida or at restaurants ≥ once per month (p<0.001). Similarly, participants in large urban areas had twice the odds of eating these types of meals compared to their rural counterparts (p<0.001).

After adjustment for other factors, purchasing of meals at street vendors and drinks or snacks from street food vendors and convenience stores also increased with education and was higher among residents of urban (p<0.001) and large urban (p<0.001) localities than among residents of rural localities. The relationship between socioeconomic status and street food purchasing was less clear, however, with no clear pattern.

### Discussion

Few previous studies have examined food expenditure and consumption of food prepared away from home among the Mexican population.\(^5\) It is important to document the extent to which populations rely on prepared foods because foods prepared away from home tend to come in larger portion sizes than homemade meals and to be higher in total energy and energy density but lower in micronutrient density.\(^9,10,22\) Furthermore, frequency of consumption of food prepared away from home is associated with increases in body mass index and some diet-related chronic diseases.\(^10,11\) Identifying social characteristics associated with consumption of foods prepared away from home may help explain the distribution of obesity and other diet-related chronic diseases within the Mexican population.\(^23\)

The data presented in this study suggest that the frequency with which Mexican adults consume comida corrida, restaurant food, and street food is significantly and substantially greater among those in urban and large urban areas compared to rural areas, and increases dramatically with SES and educational attainment. Furthermore, total food expenditure and restaurant expenditure each follow a very similar pat-
In a study of 357 Latina

1.102

In contrast, this study revealed that 94% of Mexican adults reported eating comida corrida or at restaurants for dinner less than once per month, and 88% reported eating breakfasts and lunches at these places less than once monthly. Similarly, under one third of Mexican adults reported eating meals from street vendors once per month or more.

An important finding of this study is that overall consumption of food prepared away from home is relatively uncommon among Mexican adults, particularly if compared to U.S. adults.\textsuperscript{9,11,24,25} For example, data from the Coronary Artery Risk Development in Young Adults study, which followed young adults in the U.S. over a fifteen year period, found that both black and white people reported eating fast food an average of 1.3 to 2.4 times per week.\textsuperscript{11} The 1994 to 1996 Continuing Survey of Food Intakes by Individuals, which assessed fast food consumption among U.S. adults based on two 24-hour dietary recalls, suggests that one-quarter of participants consumed fast food at least once during the two days being assessed.\textsuperscript{9} In a study of 357 Latina women in San Diego, California, Ayala and colleagues found that six in ten participants reported eating at fast food restaurants at least once per week, and that 45% ate lunch outside home one or more times per week.\textsuperscript{25}

This study has limitations and strengths that should be considered when interpreting its findings. Perhaps the most serious limitation of this study is the potential for measurement error in the food expenditure and prepared foods variables. Adults within each household were asked to retrospectively recall expenditure on foods and at restaurants during the previous month, which is clearly challenging. Similarly, the data may be subject to reporting bias since participants may have systematically under-reported consumption of food prepared away from home due to social desirability or other reasons. Reporting bias in the module assessing consumption of foods away from home may be of particular concern since, to the author’s knowledge, the module has not been validated. The items included in Ensanut 2006 may also not have covered all types of foods away from home that are purchased and consumed by the Mexican population. For example, participants were

\begin{table}
\centering
\caption{Logistic regression predicting consumption of comida corrida or restaurant food and meals, snacks, or drinks from street vendors \( \geq \) once per month. Mexico, Ensanut 2006 (n=20,103)}
\begin{tabueto}{cccccc}
\hline
 & \multicolumn{2}{c}{Monthly Comida corri/Rest} & \multicolumn{2}{c}{Monthly Street vendors} \\
 & OR & SE & OR & SE \\
\hline
Age & 0.979\textsuperscript{*} (0.00285) & 0.970\textsuperscript{**} (0.00176) & \\
Sex & \\
Male & 1.377\textsuperscript{*} (0.0988) & 1.281\textsuperscript{**} (0.0782) & \\
Household size & 0.959 (0.0168) & 0.986 (0.0135) & \\
Indigenous & 0.948 (0.0894) & 0.948 (0.0589) & \\
Literate & 1.834\textsuperscript{*} (0.321) & 1.064 (0.0924) & \\
Marital status & \\
Single & \\
Married & 1.008 (0.103) & 1.166 (0.0930) & \\
Div/Wid/Sep & 0.988 (0.132) & 1.159 (0.118) & \\
Region & \\
North & \\
Central & 0.799\textsuperscript{*} (0.0637) & 1.008 (0.0741) & \\
Mexico City & 1.102 (0.150) & 1.129 (0.169) & \\
South & 0.700\textsuperscript{*} (0.0583) & 0.831\textsuperscript{*} (0.0588) & \\
Employed & 1.526\textsuperscript{*} (0.118) & 1.389\textsuperscript{**} (0.0873) & \\
Education & \\
\leq Elementary & \\
Elementary & 1.062 (0.177) & 1.147 (0.109) & \\
Middle school & 1.511 (0.278) & 1.338\textsuperscript{*} (0.145) & \\
HS or vocational & 2.517\textsuperscript{**} (0.474) & 1.775\textsuperscript{**} (0.266) & \\
\geq College & 3.759\textsuperscript{**} (0.732) & 1.735\textsuperscript{**} (0.263) & \\
SES decile & \\
1st & 2nd & \\
3rd & 4th & 1.359\textsuperscript{*} (0.133) & 1.084 (0.0770) & \\
5th-7th & 1.853\textsuperscript{**} (0.178) & 1.283\textsuperscript{**} (0.0941) & \\
8th-10th & 2.587\textsuperscript{**} (0.353) & 1.145 (0.138) & \\
Rural/Urban & \\
Rural & \\
Urban & 1.426\textsuperscript{*} (0.127) & 1.320\textsuperscript{**} (0.0986) & \\
Large urban & 2.030\textsuperscript{**} (0.186) & 1.557\textsuperscript{**} (0.130) & \\
\hline
\end{tabueto}
\end{table}

Note: Outcome represents whether participants report consuming comida corrida or at restaurants for breakfasts, lunches, or dinners \( \geq \) once per month and whether participants consumed meals from street food vendors or snacks/drinks from street vendors or convenience stores \( \geq \) once per month.
asked about consumption of meals at comida corrida, restaurants or street food vendors, but there are a wide range of establishments in-between these categories (i.e., that are not vendors on the street but less formal than restaurants) about which data were not collected. These types of establishments are very common in Mexico and include cafes, supermarkets, markets, malls, work cafeterias, private houses or garages, and tacos, tortas or other Mexican food establishments. Unreported consumption at these types of establishments may at least partially explain the very low reported frequency of consumption of food away from home. A further potential weakness of the study is that measurement error in the expenditure and consumption data may be systematically associated with the independent variables of interest (i.e., socioeconomic status, educational attainment, and residence area). For example, participants with low education may systematically under- or over-report food or restaurant expenditure, introducing bias into the results of this study. Thus, the results presented in this study should be considered preliminary and to be confirmed in future studies. These weaknesses notwithstanding, the study also has important strengths. Ensanut 2006 data were collected from a very large, nationally-representative sample of Mexican adults. Furthermore, the study includes a wealth of data regarding health and nutrition. To my knowledge, this is the first and only study to examine consumption of meals prepared outside home among a representative sample of Mexican adults and, as such, its findings may have novel and important findings for understanding Mexico’s obesity epidemic. While the potential for measurement error is real and potentially serious, at the very least this study underscores the need for validation of instruments and collection of further data regarding consumption of meals away from home among the Mexican population.

In conclusion, this study has presented preliminary evidence that food expenditure and consumption of food prepared away from home is generally low among the Mexican population, but varies widely by location of residence, educational attainment, and socioeconomic status. The relationship between these social characteristics, food expenditure, and consumption of food prepared away from home may be important for understanding Mexican health, particularly why some populations may be at increased risk of obesity and other diet-related chronic diseases.23

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References