




Share of food group expenditure in Mexican households according to the gender of the head of household and size of the locality

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Abstract

Objective: To evaluate differences in the percentage of expenditure on food groups in Mexican households according to the gender of the household head and the size of the locality.

Design: Analysis of secondary data from the National Household Income and Expenditure Survey (ENIGH) 2018. We estimated the percentage of expenditure on fifteen food groups according to the gender of the head of household and locality size and evaluated the differences using a two-part model approach.

Setting: Mexico, 2018.

Participants: A nationally representative sample of 74 647 Mexican households.

Results: Female-headed households allocated a lower share of expenditure to the purchase of *sweetened beverages and alcoholic beverages* and higher percentages to *milk and dairy, fruits and water*. In comparison with metropolitan households, households in rural and urban localities spent more on *cereals and tubers, sugar and honey, oil and fat* and less on *food away from home*.

Conclusions: Households allocate different percentages of expenditure to diverse food groups according to the gender of the head of the household and the size of the locality where they are located. Future research should focus on understanding the economic and social disparities related to differences in food expenditure, including the gender perspective.

Keywords

Diet
Food expenditure
Social determinants of health
Locality size
Gender

Until a few years ago, the head of the household, understood as the main decision-maker within this unit, was automatically assigned to the oldest man. It is now recognised that decision making in households can be shared. However, decision-making power is distributed heterogeneously among household members⁽¹⁾.

Traditionally, women fulfill multiple roles in the household, including food preparers, resource managers and caregivers⁽²⁾. However, households in which women are the main income providers are becoming increasingly common, and this contribution allows them to have a greater say in decision making related to household spending, particularly regarding the use of resources and food choices⁽³⁾.

Mexico has experienced demographic and economic changes such as migration to cities and changes in household

composition. An increasing number of households are in urban areas⁽⁴⁾ and, as a result of the incorporation of women into the labour market, fertility control and cultural changes, the proportion of female-headed households increased from 1% in 1940 to 33% in 2020⁽⁵⁾.

Worldwide, female-headed households have been identified as more likely to be economically vulnerable⁽¹⁾; in Mexico, female-headed households⁽⁶⁾ and those in rural locations⁽⁷⁾ tend to have lower incomes. On the other hand, insufficient economic resources in the household for the purchase of food implies limited access to adequate food, thus deteriorating food security. Households with lower incomes usually spend a greater proportion of their expenditure on food, although the quality of their diets is lower⁽⁸⁾. In addition to the economic resources, other

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factors involved in the purchase have also been identified, such as health knowledge, consumption habits and the taste of food^(9–11). Additionally, examining the size of localities is highly relevant in the Mexican context, as it is a Latin American country with significant social inequality; this includes the marginalisation of smaller localities, which are insufficiently served by social policy^(12,13).

To know the differences in the distribution of food expenditure would allow us to determine the potential disparities in access to those groups that are compatible with an adequate nutritional status, and so far in Mexico, there is limited information on these disparities. The aim of the present study was to evaluate the differences in the proportion of expenditure used to purchase fifteen food groups according to the gender of the household head and the size of the locality.

Materials and methods

Sources of information

We used information from the National Household Income and Expenditure Survey (ENIGH) 2018⁽¹⁴⁾. This biannual survey was conducted between August and December 2018. The ENIGH has a probabilistic, two-stage, stratified, clustered design that is representative of the national level and urban and rural strata.

Household expenditure information was obtained from the Daily Expense Notebook, in which the household informant recorded the expenditures on food and beverages made over seven consecutive days with the support of a trained enumerator⁽¹⁴⁾. For this analysis, we employed *expenditure and concentrated household* modules and combined them according to *file descriptor*⁽¹⁴⁾.

Dependent variable: percentage of expenditure

We classified food groups according to their nutritional value from the food groups analysed in the ENIGH 2018 summary of findings⁽¹⁵⁾, some of which we modified to make them more interpretable from a nutritional standpoint while keeping the number of groups constant to avoid the increase of multiple comparisons due to high dimensionality. We disaggregated the *beverage* group into *alcoholic beverages, sweetened beverages and water*; we also separated the *cereal* group into *sweet and fatty cereals and cereals and tubers*; and finally, we disaggregated *other foods* into *foods prepared away from home* for consumption at home (to be included to *food away from home*), *sweet and salty snacks* and *other miscellaneous foods (hereafter, other foods) in which we also included spices and dressings, coffee, tea and chocolate*.

In this analysis, we included fifteen food groups: (1) *cereals and tubers*, (2) *sweet and fatty cereals*, (3) *meat*, (4) *milk and dairy*, (5) *eggs*, (6) *oil and fat*, (7) *vegetables and legumes*, (8) *fruits*, (9) *sugar and honey*, (10) *food away from home*, (11) *sweet and salty*

snacks, (12) *alcoholic beverages*, (13) *sweetened beverages*, (14) *water* and (15) *other foods*. Of the 242 items available in the survey, we classified only 239 because we did not include tobacco products (see online supplementary material, Supplemental Table S1).

To identify the amount of money a household spent on food, we employed the monetary quarterly expenditure variable. We summed the quarterly expenditures for the fifteen food groups to form the *total quarterly food expenditure*. Then, we calculated the share of expenditure for each food group through the division of quarterly group expenditure over total quarterly food expenditure, subsequently multiplying the result by 100.

Independent variables

We adhere to the definition of gender as '*socially constructed roles, behaviors, expressions and identities of girls, women, boys, men and gender diverse people, including how people perceive themselves and each other, how they act and interact and the distribution of power and resources in society*'⁽¹⁶⁾. At the time of the survey, the gender of the household head was determined by the interviewer based on the name of the head of the household or, when the name was not clear for identification, the person being interviewed reported the gender of the household head as either female or male⁽¹⁴⁾. On the other hand, we classified locality size into three categories according to the number of inhabitants reported by the ENIGH: metropolitan ($\geq 100\,000$), urban (2500–99 999) and rural (< 2500 inhabitants).

Covariates

We included those directly related to household expenditure: current income (quintiles), total number of household members, household composition in four types (just adolescents and adults < 65 years; just children < 12 years, adolescents and adults < 65 years; just adolescents, adults < 65 years and older adults; all-age groups) and education of the household head in three categories (primary or less; secondary or high school and undergraduate or postgraduate).

Statistical analysis

To describe the sample, we employed measures of central tendency, specifically means and proportions. To evaluate the differences in the share of expenditure, we used a two-part model estimation⁽¹⁷⁾, as this approach is designed to account for the high percentage of non-purchaser households that some of the food groups had during the week in which the expenditure information was collected, and because it has been shown that this type of model is suitable for a variety of applications⁽¹⁸⁾. For the first part, to estimate the probability of spending any percentage on a specific food group, we used a probit model because of the dichotomous nature of our variable (purchase/not purchase). When there is no strong imbalance between binary responses, the use of the probit model is interchangeable to

the alternative logit model⁽¹⁹⁾. We included household income, schooling of the head of household, total number of household members and household composition as covariates. For the second part, we used generalised linear models⁽²⁰⁾ with gamma family and logarithmic link function due to the skewed distribution of the dependent variable in the sample and we adjusted for the same variables as in the first part. Then, we use both parts of the model to estimate the average marginal effects on the percentage of expenditure in each food group. Subsequently, we computed the absolute differences between comparison groups (household-head gender and locality size). When the gender of the household head and locality size were not tested as independent variables, they were included in the model as covariates. Statistical analysis was performed using Stata V13.0. All estimates were made considering the complex sample design of ENIGH by using the expansion factors and the *survey* module in Stata. Details on sampling and estimation of the expansion factors for this survey can be found elsewhere^(14,15).

Results

At the national level, 29% of households were female-headed, 23% belonged to rural localities, had an average of 3.6 members and 38% of household heads had primary education or less. Regarding economic variables, on average, Mexican households in 2018 had a quarterly income of \$49 610 pesos, a quarterly monetary expenditure of \$31 913 pesos and a quarterly food expenditure of \$11 193 pesos, representing an average share of 35.1% (Table 1).

Table 2 shows the percentage of spending as a proportion of total food spending on each food group overall, by the gender of the household head and locality size. Overall, the groups that contributed the highest percentage of quarterly expenditures were *food away from home*, *meat* and *cereals and tubers*. The share of food expenditure on discretionary food and beverages such as *sweetened beverages* and *sweet and fatty cereals* was 5.6% and 3.7%, respectively, while basic foods such as eggs and fruits were under 4% each. The food groups with the smallest share of expenditure were *alcoholic beverages* and *sweet and salty snacks* (0.8% and 0.9%, respectively). In metropolitan localities and households with male heads, the group that contributed the highest percentage of quarterly food expenditure was *food away from home* (24.7% and 20.2%, respectively), while households in both rural and urban localities as well as female-headed households, the food group with the largest share of food expenditure was *meat* (18.2%, 20.3% and 19%, respectively).

Table 3 shows the results of the two-part model for gender as the independent variable. The main differences in the share of expenditure were that, compared with households with male heads, female-headed households spent 0.6 percentage points (pp) less on *sweetened beverages* (95% CI: -0.07, -0.04), 0.6 pp less on *food*

Table 1 Characteristics of Mexican households, ENIGH 2018

	Percentage or average
Household head gender	
Male	71.3%
Female	28.7%
Type of locality	
Metropolitan area	48.2%
Urban	28.7%
Rural	23.1%
Mean household income (quarterly, pesos)	\$49 610
Quintile 1	\$12 023
Quintile 2	\$22 846
Quintile 3	\$33 808
Quintile 4	\$50 208
Quintile 5	\$116 698
Monetary spending (quarterly, pesos)	\$31 913
Food expenditure (quarterly, pesos)	\$11 191
Percentage of food expenditure	35.1%
Education of the head of household	
Primary or less	37.9%
Secondary or high school	45.0%
Professional or postgraduate	17.1%
Total number of members	3.6
Household composition	
Adolescents and adults < 65 years	40.6%
Children < 12 years, adolescents and adults < 65 years	42.3%
Adolescents, adults and older adults	11.8%
All age groups	5.2%

Sample (*n* 74 647) represents 34 744 818 households. Income, monetary spending and food expenditure are estimated in Mexican pesos. Adolescents include children between 12 and 17 years.

away from home (95% CI: -1.11, -0.05), 0.3 pp less on *alcoholic beverages* (95% CI: -0.41, -0.25). While they spent 1 pp more on *milk and dairy* (95% CI: 0.85, 1.22), 0.4 pp more on *fruit* (95% CI: 0.22, 0.48) and 0.2 pp more on *water* (95% CI: 0.13, 0.28). The predicted share of expenditure for every group by gender of the head of the household is presented in online supplementary material, Supplemental Fig. 1.

Concerning locality size, compared with metropolitan localities, the share of expenditure in rural localities was different for most food groups. Notably, households in rural localities spent a higher share (1.7 pp more) on *cereals and tubers* (95% CI: 1.4, 2.1), 2.7 pp more on *vegetables and legumes* (95% CI: 2.4, 3.0), 1 pp more on *sugar and honey* (95% CI: 0.9, 1.07), 1 pp more on *oil and fat* (95% CI: 0.88, 1.03) and 0.6 pp more on *sweet and fatty cereals* (95% CI: 0.45, 0.79). On the other hand, they spent 4.7 pp less on *food away from home* (95% CI: -5.4, -4.0), 1 pp less on *meat* (95% CI: -1.5, -0.6) and 0.7 pp less on *milk and dairy* (95% CI: -0.92, -0.45) (Table 4).

Urban localities also presented differences in the share of expenditure. Particularly, compared with households from metropolitan localities, households in urban localities spent 1.5 pp more on *cereals and tubers* (95% CI: 1.2, 1.8), 1.5 pp more on *vegetables and legumes* (95% CI: 1.21, 1.69), 0.8 pp more on *meat* (95% CI: 0.28, 1.22), 0.2 pp more on *oil and fat* and *sugar and honey* (95% CI: 0.17, 0.30; 0.17, 0.29,

Table 2 Percentage of expenditure on food groups by gender of the household head and locality size. ENIGH 2018

Group	Gender		Locality size			Overall
	Men	Women	Metropolitan	Urban	Rural	
	%	%	%	%	%	%
Food away from home	20.2	18.7	24.7	18.4	11.3	19.8
Meat	19.4	19.0	19.2	20.3	18.2	19.3
Cereals and tubers	14.2	14.6	11.9	15.5	18	14.3
Vegetables and legumes	10.4	10.9	8.5	11.1	14.1	10.5
Milk and dairy	7.9	8.9	8.4	8.0	7.8	8.1
Other foods	6.4	6.6	6.8	6.5	5.6	6.4
Sweetened beverages	5.6	5.0	5.5	5.0	5.8	5.4
Sweet and fatty cereals	3.7	3.6	3.3	3.6	4.5	3.7
Eggs	3.7	3.7	3.2	3.7	4.6	3.7
Fruits	3.2	3.9	3.8	3.2	2.8	3.4
Water	1.1	1.7	1.6	1.4	1.1	1.4
Oil and fat	1.3	1.2	0.8	1.2	2.4	1.2
Sugar and honey	1.3	1.0	0.6	1.0	2.4	1.1
Sweet and salty snacks	0.9	0.9	1.0	0.7	0.8	0.9
Alcoholic beverages	0.8	0.4	0.8	0.5	0.5	0.6

Sample represents 34 744 818 households.

Table 3 Average differences in the percentage of expenditure on food groups in households with female household heads v. Male. ENIGH, 2018

	Average difference	95 % CI	P value
Food away from home	-0.6	-1.11, -0.05	0.03
Meat	0.09	-0.27, 0.44	0.67
Cereals and tubers	0.12	-0.13, 0.37	0.37
Vegetables and legumes	0.15	-0.05, 0.35	0.15
Milk and dairy	1.0	0.85, 1.22	< 0.001
Other foods	0.11	-0.12, 0.33	0.38
Sweetened beverages	-0.6	-0.71, -0.39	< 0.001
Sweet and fatty cereals	-0.06	-0.19, 0.06	0.33
Eggs	0.02	-0.08, 0.12	0.69
Fruits	0.4	0.22, 0.48	< 0.001
Water	0.2	0.13, 0.28	< 0.001
Oil and fat	-0.06	-0.12, 0.0	0.04
Sugar and honey	-0.12	-0.17, -0.06	< 0.001
Sweet and salty snacks	0.08	0.01, 0.15	0.02
Alcoholic beverages	-0.3	-0.41, -0.25	< 0.001

Results estimated following a two-part estimation approach, adjusting models by quarterly income, household head education, total number of members, household composition and locality size. Results are presented in percentage points. The complex sample design was considered to calculate the estimates.

respectively). While they spend 1.6 pp less on *food away from home* (95 % CI: -2.3, -0.89), 0.9 pp less on sweetened beverages (95 % CI: -1.13, -0.72) and 0.5 pp less on *milk and dairy* (95 % CI: -0.74, -0.32) (Table 4). The predicted share of expenditure for every group by locality size is presented in online supplementary material, Fig. 2.

Discussion

We identified differences in the share of expenditure on food groups by locality size and gender of the head of the household; female-headed households devoted a lower share to the purchase of *sweetened beverages*, *food away from home* and *alcoholic beverages*, while they also allocated a higher share to the groups of *milk and dairy*, fruits and *water*. Households in rural and urban areas spent a higher share on *cereals and tubers*, *vegetables and*

legumes, *sugar and honey*, *oil and fat* and lower share on *food away from home* and *milk and dairy* than households in metropolitan areas.

Households in countries such as the United States and Canada allocate < 10 % of their household expenditure on food, while those in the Philippines and Guatemala usually spend more than 40 %⁽²¹⁾; expenditure in Mexico is closer to that of the latter (38–45 %), which may be due to historical, economic, geographic, political and socio-cultural similarities among these countries, and indicating a large proportion of the expenses of the average Mexican family is destined to food purchases.

In Mexico, the ENIGH survey has been used to gain a better understanding of the expenditure on food by Mexican households and their changes through time. Using information from the 1984 and 2014 surveys, Garza-Montoya et al. reported an increase in the percentage of prepared and processed food groups accompanied by a

**Table 4** Average differences in percentage of expenditure on food groups in households from rural and urban localities v. Metropolitan households. ENIGH, 2018

	Urban			Rural		
	Average difference	95 % CI	P value	Average difference	95 % CI	P value
Food away from home	-1.6	-2.3, -0.89	< 0.001	-4.7	-5.4, -4.0	< 0.001
Meat	0.8	0.28, 1.22	0.002	-1.0	-1.5, -0.6	< 0.001
Cereals and tubers	1.5	1.2, 1.8	< 0.001	1.7	1.4, 2.1	< 0.001
Vegetables and legumes	1.5	1.21, 1.69	< 0.001	2.7	2.4, 3.0	< 0.001
Milk and dairy	-0.5	-0.74, -0.32	< 0.001	-0.7	-0.92, -0.45	< 0.001
Other foods	0.06	-0.22, 0.33	0.70	-0.5	-0.8, -0.27	< 0.001
Sweetened beverages	-0.9	-1.13, -0.72	< 0.001	-0.5	-0.68, -0.23	< 0.001
Sweet and fatty cereals	0.05	-0.13, 0.22	0.60	0.6	0.45, 0.79	< 0.001
Eggs	-0.1	-0.25, -0.01	0.04	0.03	-0.1, 0.17	0.64
Fruits	-0.1	-0.29, 0.02	0.08	-0.03	-0.2, 0.14	0.70
Water	-0.08	-0.16, 0.01	0.09	-0.4	-0.45, -0.26	< 0.001
Oil and fat	0.2	0.17, 0.3	< 0.001	1.0	0.88, 1.03	< 0.001
Sugar and honey	0.2	0.17, 0.29	< 0.001	1.0	0.9, 1.07	< 0.001
Sweet and salty snacks	-0.2	-0.3, -0.16	< 0.001	0	-0.08, 0.08	0.95
Alcoholic beverages	-0.1	-0.22, -0.03	0.01	-0.09	-0.19, 0.02	0.12

Results were estimated following a two-part estimation approach, adjusting models by quarterly income, household head education, total number of members, household composition and household head gender. Results are presented in percentage points. The complex sample design was considered to calculate the estimates.

decrease in that of unprocessed food groups⁽²²⁾, which could be due in part to the advance of urbanisation and food and nutrition transition⁽²³⁾. Our results are consistent with those reported by Garza-Montoya, particularly our finding that overall, the highest share of expenditure we found across most household strata was in the group of *food away from home*.

Our results have implications in various areas. First, in terms of affordability, food groups with higher costs (i.e. meat) could be disadvantaged and the priority given to those that are less expensive and potentially less nutritious in households with lower incomes, usually female-headed households and those in rural localities. In addition to that, nationally, there are more households without adult men than without adult women⁽²⁴⁾; therefore, differences in expenditures may reflect different needs related to household composition and size.

Second, we observed differences in spending that transcend affordability. Even when we adjust for household head education; household size, composition and income, the differences in the share of expenditure allocated to given food groups remained, suggesting that other factors affect the exercise of food purchases according to the gender of the head of the household and the size of the locality.

A noteworthy finding is that the percentage of quarterly expenditure allocated to sweetened beverages surpasses the expenditure for more nutritious food groups such as eggs and fruits, and this higher share remains despite of the gender of household head or the size of the locality, although it is the highest among rural households. According to a recent report, Chiapas, a state in the south of Mexico⁽²⁵⁾, which is characterised by greater rurality, has the highest intake of cola-flavor soda worldwide⁽²⁶⁾. Our results suggest that the intake of sweetened beverages,

such as sodas, might not be exclusive to Chiapas but relatively common in households from rural localities. More research is needed to understand the drivers for this consumption.

Previous studies have reported differences in food expenditure and purchase preferences according to gender^(9,27,28). Addai, Ng'ombe and Tomoso found gaps in the per-capita expenditure on food between male- and female-headed households⁽²⁷⁾. Kroshus et al. found that households headed by females spent less on commercially prepared foods⁽²⁸⁾, and Crane et al. found differences in the number of food items purchased per receipt by gender in the USA population, which was greater in women (5.6 ± 7.8) than in men (4.1 ± 5.3 ; RR = 1.3, 95 % CI: 1.1, 1.4). Men were more likely to purchase items from fast-food establishments than women. Also, they reported no effect of gender in the nutritional quality of the foods purchased ($b = 0.08$; $P = 0.98$)⁽⁹⁾.

In our analysis, we found that female-headed households, although modestly, appeared to have a more nutritionally adequate purchasing pattern including a lower share of expenditure allocated to *sweetened beverages*, *food away from home* and *alcoholic beverages* and a higher share on *milk and dairy*, *fruits* and *water*. A potential explanation for these differential purchases could be due to women historically being assigned the responsibility of feeding the family, including the purchase and preparation of food⁽²⁾, and even a high proportion of programmes focused on health and nutrition are directed towards this population group⁽²⁹⁾, which could reflect greater knowledge and skills in nutrition than their male counterparts.

It is worth mentioning that within the Mexican context, the common practice is for the woman in the household to be the one in charge of the food purchases, whether she is



the household head or not. However, traditionally purchases made by women in male-headed households are 'pre-approved' by the male household-head, either directly or by the woman aligning the food purchases to the male-head preferences^(30,31). Thus, female heads of households potentially have greater decision-making power in the exercise of household spending than women in male-headed households⁽³²⁾, so even if the latter possess the same nutritional competencies, some food choices may be beyond their reach.

In the case of locality size, rural and urban localities had a higher percentage of expenditure on *cereals and tubers*, *vegetables and legumes*, *oil and fat* and *sugar and honey*, which could cover caloric requirements, possibly in exchange for less dietary diversity⁽³³⁾, consistent with a lower proportion of expenditure on *fruit* and *dairy*. However, the lower expenditure on *fruit* and *dairy* could be due to the production for self-consumption⁽³⁴⁾, allowing for some of these foods not to be purchased but to be available. It could also be a more traditional dietary pattern, compatible with a lower percentage of expenditure on *food away from home*, or that choices are limited by the lower availability and/or physical accessibility of these groups in marginalised rural locations⁽³⁵⁾.

Our study had some limitations. Because gender only included female or male categories, and it was identified using the name of the household head or reported by the person being interviewed, there is a possibility for misclassification; however, we believe that this might be minor as informants were members of the household. Production for self-consumption or participation in social food programmes may modify the percentage of expenditures allocated to food groups, especially in rural areas. However, even in this context, the average percentage of non-monetary expenditure is relatively low, at 22.7%. Additionally, these results could represent the expenditure of the season in which the information was collected, and since it is a closed questionnaire, some regional foods may not be considered in the survey.

A strength of this study is that the ENIGH is nationally representative and is carried out periodically, providing an opportunity to use it as a formal means of monitoring expenditure for the purchase of different food groups in Mexican households, particularly in the most vulnerable, as has been shown in the literature⁽³⁶⁾. Additionally, separating food groups based on their nutritional characteristics allows us to glimpse the implications for spending on these groups, given that the availability of specific food groups within the household is related to food intake for the household members^(37,38).

To our knowledge, this is the first time that the percentage of spending on food groups in Mexican households has been characterised according to the gender of the household head and locality size. We believe that our findings contribute to the evidence of heterogeneity in food expenditure patterns and affordability in Mexico^(22,39).

These results provide a new opportunity to understand the determinants of food purchases in our country and transfer the evidence to the generation of food policies and programmes.

Conclusions

According to the gender of the head of household and the size of the locality where they are located, households allocate a different percentage of expenditure to different food groups. Future research could consider economic and social disparities, including the gender perspective, to better understand food expenditure and improve the evidence that supports the design of food programmes and policies.

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Conflict of interest

There are no conflicts of interest.

Authorship

J.J.: Study design, data analysis, literature review, writing of the first draft, revision of the manuscript and approval of the final version. S.C-L., B.I.A-G., A.G-O., M.H-F.: Study design, literature review, manuscript review and approval of the final version.

Ethics of human subject participation

This research is based on secondary data published by the Mexican National Institute of Statistics and Geography (<https://www.inegi.org.mx/rnm/index.php/catalog/511>)

**Supplementary material**

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