Purchase behavior reported by Mexican adults after implementing the front-of-pack warning labels

Janine Sagaceta-Mejía, MSc,[1] Regina Durán, MPH,[1] Ana Munguía, MPH,[1]
Carlos Cruz-Casarrubias, MPH,[1] Lizbeth Tolentino-Mayo, MSc,[1] Simón Barquera, PhD.[1]

Sagaceta-Mejía J, Durán R, Munguía A, Cruz-Casarrubias C, Tolentino-Mayo L, Barquera S. Purchase behavior reported by Mexican adults after implementing the front-of-pack warning labels. Salud Publica Mex. 2025;67:447-454.
https://doi.org/10.21149/16253

Abstract

Objective. Describe the purchasing behavior reported by Mexican adults regarding the Mexican front-of-pack warning labeling system (FoPWL). **Materials and methods.** Data from the Mexican National Health and Nutrition Survey 2021 labeling questionnaire were analyzed, and logistical modeling was performed. Frequencies, proportions, odds ratio, and 95% confidence intervals were reported. **Results.** 38.2% [95%CI 36.5,40.0] of the respondents modified their purchase behavior, representing 25 953 736 Mexicans, with females and participants ≥60 years making the greatest proportion of changes. Among those who modified their purchases, 30.5% [95%CI 28.1,32.9] chose a product with fewer "excess" labels, while 38.7% [95%CI 36.1,41.4] decided not to buy the product. Sweetened carbonated beverages and bakery items were the most modified purchases. The odds of making purchase changes are 1.6 [95%CI 1.35,1.91] times when looking at FoPWL. **Conclusion.** The study identifies changes in purchase behavior in products with FoPWL, highlighting a positive impact on women and older people. These findings suggest that FoPWL, alongside other public policies, could contribute to improving food environments and the health of the Mexican population.

Keywords: food labeling; consumer behavior; ultra-processed; health policy

Sagaceta-Mejía J, Durán R, Munguía A, Cruz-Casarrubias C, Tolentino-Mayo L, Barquera S. Comportamiento de compra reportado por adultos mexicanos tras la implementación del sistema de etiquetado frontal de advertencia. Salud Publica Mex. 2025;67:447-454.
https://doi.org/10.21149/16253

Resumen

Objetivo. Describir el comportamiento de compra reportado por adultos mexicanos con respecto al sistema de etiquetado frontal de advertencia mexicano (EFA). **Material y métodos.** Se analizó la información del cuestionario de etiquetado de la Encuesta Nacional de Salud y Nutrición de México 2021. Se realizaron modelos logísticos. Se reportaron frecuencias, proporciones, razón de momios e intervalos de confianza del 95%. **Resultados.** 38.2% [IC95% 36.5,40.0] de los entrevistados realizó modificaciones en sus compras, representando a 25 953 736 de mexicanos, siendo las mujeres y personas de ≥60 años quienes realizaron cambios en mayor proporción. De quienes modificaron sus compras, 30.5% [IC95% 28.1,32.9] eligieron un producto con menos sellos de "exceso" y 38.7% [IC95% 36.1,41.4] reportaron no comprar el producto. Las bebidas gasificadas endulzadas y panadería fueron las categorías con más cambios en compras. La posibilidad de realizar cambios en las compras es de 1.6 [IC95% 1.35,1.91] veces al observar el EFA. **Conclusión.** Este estudio describe los cambios en la compra de productos con EFA, principalmente entre mujeres y personas mayores, sugiriendo que el EFA, aunado a otras políticas públicas, puede mejorar los entornos alimentarios en México.

Palabras clave: etiquetado de alimentos; comportamiento del consumidor; ultraprocesados; política de salud

(1) Centro de Investigación en Nutrición y Salud, Instituto Nacional de Salud Pública. Cuernavaca, Morelos, México.

Received on: August 8, 2024 • **Accepted on:** May 13, 2025 • **Published online:** September 25, 2025
Corresponding author: Lizbeth Tolentino-Mayo. Centro de Investigación en Nutrición y Salud, Instituto Nacional de Salud Pública. Av. Universidad 655, col. Santa María Ahuacatitlán. 62100, Cuernavaca, Morelos, México.
email: mltolentino@insp.mx

The transformation of food systems has impacted the health and well-being of the Mexican population.[1] In the current context, poor quality diets in México, where ultra-processed products (UPPs), which are formulations of ingredients mostly of exclusive industrial use, typically created by a series of industrial techniques and processes, high in sugar, trans fat, saturated fat, and sodium, represent 30% of total energy intake.[2] During the last decade, the sale of UPPs increased by 29.2%, occupying the first place in the sale of UPPs in Latin America.[3] This situation has led to calls for action for implementing public health policies based on scientific evidence.[4]

The World Health Organization (WHO) recommends governments adopt scientifically based public policies to address the problem of obesity and noncommunicable diseases (NCDs).[5] One key policy is the front-of-pack food and beverage labeling that populations accept and understand.[6] The front-of-pack warning labeling system (FoPWL) indicates when a product contains excessive calories and critical nutrients (free sugars, saturated fats, trans fats, and sodium) associated with NCDs.[7] FoPWL is expected to impact purchase behavior and encourage the food industry to reformulate products,[6,8] promoting healthier food choices and health outcomes in the long term.[7,9] This labeling has been implemented in several Latin American countries, demonstrating its usefulness for consumers.[10-12]

Chile was the first country to implement FoPWL in July 2016. Post-implementation studies show that the Chilean population uses FoPWL to modify purchase behavior. Uruguay followed in 2018, with similar findings showing that the population had seen the warning labels (WLs) on a product they intended to buy and modified their purchase decision.[12]

Since 2020, Mexico has implemented the FoPWL and the evidence shows that it was the best understood and accepted by the Mexican population,[6,13,14] could prevent exposure to misleading advertising on packaging,[15] and improve health outcomes.[9,16] Recently, a study conducted post-FoPWL implementation in Mexico demonstrated positive responses from parents in using it,[17] although the changes in the entire population are still unknown. Therefore, this study aims to describe the purchasing behavior reported by Mexican adults after implementing the Mexican FoPWL.

Materials and methods

Data from the Mexican National Health and Nutrition Survey (Ensanut, for its Spanish acronym) 2021 were utilized. The Ensanut has a cross-sectional, probabilistic, multistage, and stratified design to ensure national representativeness; details of its methodology were published previously.[18] The Ensanut 2021 included a labeling questionnaire designed to monitor food labeling use, understanding, and awareness among Mexican adults (aged ≥20 years). The Ensanut 2021 protocol was reviewed and approved (No. CI-450-2021) by the Ethics, Research, and Biosafety Commission of the Mexican National Institute of Public Health.

Sociodemographic data

Sociodemographic data, such as sex, age, education level, well-being index, Indigenous ethnicity, and households with children, were obtained for all participants.

Age was categorized by decades (20-29, 30-39, 40-49, 50-59, 60 or more), and *education level* by lower than elementary school, middle school, high school, and college or more. The *well-being index* was estimated using principal component analysis based on housing characteristics, goods, and services available; it was classified into three ordinal categories using tertiles according to the final distribution as cut-off points: low, medium, and high.[18] *Indigenous ethnicity* was considered positive for those who reported speaking an indigenous dialect. Households were classified as having children according to the presence of children 12 years or less.

Purchase behavior

Purchase behavior was assessed using the question, "Think about the last time you went shopping and one of the products you normally consume had some warning label on it; what did you do with that product?". The response options included 1) *Purchased it anyway*; 2) *Purchased a similar product with fewer 'excess' labels*; 3) *Purchased a similar product without 'excess' labels*; 4) *Purchased less amount than would have bought if it had no labels;* 5) *Didn't buy it*; 6) *Other (specify);* 7) *Don't know/ Don´t respond,* 8) *It's not making purchases*. The first response option was categorized as "Did not modify their purchases," while the second through fifth options were classified as "Modified their purchases." Responses listed under the *Other* option were reviewed, and those similar to the predefined options were reclassified. The response options *Don't know/no response, Other,* and *It´s not making purchases* were excluded.

Reasons for purchase behavior

It was obtained from the question *"Why?"* whose response options were: 1) *Does not consume it much/almost*

does not consume it; 2) *Habit/like/dislike*; 3) *Because of the number of labels*; 4) *Concern for their health/the health of their family*; 5) *Cost*; 6) *Other (specify)*; 7) *Don't know/ Don't answer.* Responses under the *Other* option were reviewed, and those similar to the predefined options were reclassified. The response options *Don't know/Don't answer* are not reported.

Product identification in purchase behavior

This information was collected through an open-ended question, *"Which product was it?"* The responses were classified into sweetened carbonated beverages (SwCB), breakfast cereals, non-carbonated sweetened beverages, salty snacks, salty cereals, sweetened dairy products, dairy products and derivatives, sweet snacks and desserts, other cereals, seasonings, canned products, processed meats, and others. Details of the classification can be found in table I. Products not subject to FoPWL, like alcoholic beverages, supplements or unidentifiable items, were excluded from the sample.

Self-report of having seen the FoPWL

Self-report of having seen the FoPWL was obtained from the question, "When making your last purchases, did you see the 'excess' labels on any product you were going to buy?" was used. The response options were: 1) *Yes*; 2) *No*; 3) *Don't remember*; 4) *Don't know/Don't respond*; 5) *It's not making purchases*. Only participants who answered *Yes* or *No* were included.

Statistical analysis

The data included were categorical, so frequencies, proportions, and 95% confidence intervals were reported. A chi-square test was performed to examine differences in the distribution of sociodemographic characteristics and categories among participants according to purchase behavior. Three logistic regression models were performed to determine whether viewing the FoPWL would influence purchase behavior; the first was a crude model, the second adjusted for socio-demographic variables, and the third only for sex and age. All analyses were performed using the complex survey design (SVY) in STATA 14,* considering a *p*-value of <0.05 to establish statistical significance.

* Stata Corp. Release 14, vol. 1-4. College Station (TX): Stata Press. United States.

Table I
TYPE OF PRODUCTS THAT PARTICIPANTS REPORTED MODIFYING THEIR PURCHASE BEHAVIOR AFTER FoPWL IMPLEMENTATION. MEXICO, ENSANUT 2021

	Modified their purchases	
	n= 2 693; N= 25 953 736	
	%	*95%CI*
Sweetened carbonated beverages	25.7	23.5,27.9
Bakery	13.0	11.2,15.1
Breakfast cereals	11.2	9.5,13.1
Non-carbonated sweetened beverages	8.7	7.3,10.5
Salty snacks	7.2	5.9,8.7
Salt cereals	6.4	5.2,8.0
Sweetened dairy products	4.1	3.2,5.2
Dairy products and derivatives	4.0	3.1,5.2
Sweet snacks and toppings	3.6	2.7,4.7
Other cereals	3.7	2.6,5.2
Seasonings	3.0	2.2,4.0
Canned products	2.8	2.1,3.6
Processed meats	2.7	1.9,3.8
Others	2.2	1.6,3.0

FoPWL: Front-of-pack warning labeling
Participants were asked: "Which product was it?"
Note: Product classification includes sweetened carbonated beverages (soft drinks, bakery (cookies, pastries, sweet bread), breakfast cereals, non-carbonated sweetened beverages (juices, nectars, flavored waters, energy drinks, sweetened teas, powder for preparing flavored waters, sweetened coffee, rehydration drinks), salty snacks (chips, peanuts, *tortilla* chips, *nachos*, popcorn, fries), salty cereals (boxed bread, flour *tortillas*, pasta, instant soups, breadcrumbs), sweetened dairy products (yoghurt, flavored milks or milk-shakes, ice cream, condensed milk), dairy products and derivatives (milk, cream, cheese, cream substitute), sweet snacks (sorbets, *cajeta*, jam, peanut or hazelnut butter, chocolates, chocolate powder, lollipops, candies, marzipan, dried fruit), other cereals (oatmeal, bars, granola), seasonings (hot sauce, soy sauce, mayonnaise, ketchup, chicken broth cubes or powder, dressings), canned products, (tuna, beans, chilies, corn, olives, fruits and vegetables), processed meats (sausages, ready-to-eat meats) and others (rice, lentils, oil, water, sugar, coffee, flour, salt, sugar substitute, unprocessed meats).
Estimations based on data from the National Health and Nutrition Survey (Ensanut) 2021. The complex survey design was considered in all analyses.

Results

A total of 8 811 participants were interviewed. Following the review and recategorization of the *Other* response option, 1 198 participants reported not making any purchases, 575 selected *Don't know/No answer*, 37 selected *Other*; 4 specified not making purchases as their reason for purchase behavior, and 103 mentioned either a product not regulated by the FoPWL or no product at all were excluded. This resulted in an analytical

sample of 6 894 participants[19] representing 67 914 475 Mexican adults.

The sociodemographic characteristics of participants are reported in table II. The highest proportion of participants were female (53.4%, [95%CI 51.8,55.1]), aged 20-29 years (26.8%, [95%CI 25.3,28.3]), with a middle school education (29.6%, [95%CI 27.8,31.4]), and a high well-being index (39.8%, [95%CI 37.4,42.3]). Most participants identified as non-indigenous (96.8%, [95%CI 95.5,97.8]) and lived in households without children (70.7%, [95%CI 68.4,72.9]).

Table III shows the purchase behavior reported by Mexican adults when they were going to buy a pro-

Table II
Sociodemographic characteristics of participants. Mexico, Ensanut 2021

n= 6 894; N= 67 914 475

	%	95%CI
Sex		
Males	46.6	45.0,48.2
Females	53.4	51.8,55.1
Age (years)		
20-29	26.8	25.3,28.3
30-39	24.4	23.0,26.0
40-49	21.2	20.0,22.4
50-59	14.1	12.9,15.4
60 or more	13.5	12.4,14.6
Education level		
Lower than elementary school	21.7	20.2,23.3
Middle school	29.6	27.8,31.4
High school	21.5	20.0,23.0
College or more	27.3	25.2,29.5
Well-being index		
Low	27.5	25.5,29.7
Medium	32.6	30.6,34.8
High	39.8	37.4,42.3
Indigenous ethnicity		
No	96.8	95.5,97.8
Yes	3.2	2.2,4.6
Households with children*		
No	70.7	68.4,72.9
Yes	29.3	27.1,31.6

Participants were asked: "When making your last purchases, did you see the "Excess" labels on any product you were going to buy?"
* *n*= 5 306 *N*: 52 055 535
Note: Estimations based on data from the National Health and Nutrition Survey (Ensanut) 2021. The complex survey design was considered in all analyses.

Table III
Sociodemographic characteristics according to the purchase behavior reported by Mexican adults after FoPWL implementation. Mexico, Ensanut 2021

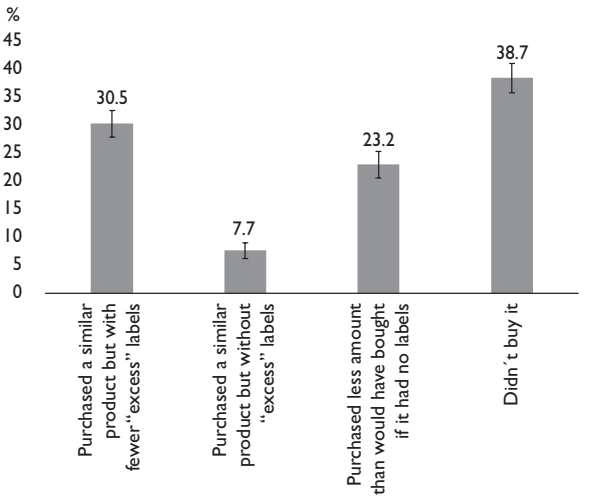
	Modified their purchases n= 2 693; N= 25 953 736		*Did not modify their purchases n= 4 201; N= 41 960 739*		*p value*
	%	95%CI	%	95%CI	
Total	38.2	36.5,40.0	61.8	60.0,63.5	
Sex					<0.001
Males	33.1	30.5,35.9	66.9	64.1,69.5	
Females	42.7	40.2,45.2	57.3	54.8,59.8	
Age (years)					<0.001
20-29	30.1	27.0,33.5	69.9	66.5,73.0	
30-39	36.3	32.7,40.0	63.7	60.0,67.3	
40-49	42.9	39.2,46.6	57.1	53.4,60.8	
50-59	42.8	38.5,47.3	57.2	52.7,61.5	
60 or more	46.0	42.1,49.9	54.0	50.1,57.9	
Education level					0.077
Lower than elementary school	38.7	35.0,42.5	61.4	57.5,65.0	
Middle school	36.8	34.1,39.7	63.2	60.3,66.0	
High school	35.5	31.8,39.4	64.5	60.6,68.2	
College or more	41.5	38.1,44.9	58.5	55.1,61.9	
Well-being index					0.960
Low	38.3	35.3,41.4	61.7	58.6,64.7	
Medium	37.9	35.0,40.9	62.1	59.2,65.0	
High	38.4	35.7,41.2	61.6	58.8,64.3	
Indigenous ethnicity					0.502
No	40.9	33.1,49.1	59.2	50.9,66.9	
Yes	38.1	36.4,39.9	61.9	60.1,63.6	
Households with children*					0.094
No	39.0	36.8,41.2	61.0	58.8,63.2	
Yes	35.4	31.6,39.3	64.6	60.7,68.4	

* *n*= 5 221 *N*: 51 274 318
FoPWL: Front-of-pack warning labeling
Note: The difference in the distribution of the proportion of people who reported seeing the FoPWL on any product they were going to buy was analyzed using the Chi-square statistic; $p< 0.05$ indicates differences in the distribution.
Participants were asked: "Think about the last time you went shopping and one of the products you normally consume had some warning label on it; what did you do with that product?" Those participants who reported seeing a product with the FoPWL were considered.
Estimations based on data from the National Health and Nutrition Survey (Ensanut) 2021. The complex survey design was considered in all analyses.

duct with FoPWL on it. It was found that 38.2% [95%CI 36.5,40.0] of them modified their purchase behavior, representing 25 953 736 Mexicans. By sociodemographic characteristics, the higher proportion of participants who reported modifying their purchases were females (42.7%, [95%CI 40.2,45.2]) and participants aged 60 years or more (46.0%, [95%CI 42.1,49.9]). In contrast, those who did not change their purchasing behavior were primarily males (66.9%, [95%CI 64.1,69.5]) aged 20-29 years (69.9%, [95%CI 66.5,73.0]). Statistically significant differences were only found by sex and age.

When inquiring about the types of changes among those who reported modifying their purchases, it was found that 38.7% [95%CI 36.1,41.4] reported not buying the product, 30.5% [95%CI 28.1,32.9] purchased a similar product, with fewer "excess" labels, 7.7% [95%CI 6.3,9.2] without "excess" labels, and 23.2% [95%CI 20.9,25.7] bought a smaller amount than they would have if it had no labels (figure 1). People reported modifying their purchases mainly due to health concerns (37.5%, [95%CI 35.1,40.1]). In contrast, 67.5% [95%CI 65.2,69.7] of the people who reported not modifying their purchases did so because they liked the product, out of habit, or out of craving.[19]

Products with FoPWL where consumers reported purchase changes (table I) were SwCB, representing 25.7% [95%CI 23.5,27.9], followed by bakery (13.0%, [95%CI 11.2,15.1]).



n= 2 693; *N*= 25 953 736
Note: Estimations based on data from the National Health and Nutrition Survey (Ensanut) 2021. The complex survey design was considered in all analyses.

FIGURE 1. TYPE OF CHANGE REPORTED BY PARTICIPANTS WHO MODIFIED THEIR PURCHASE BEHAVIOR. MEXICO, ENSANUT 2021

Finally, among the participants who viewed the FoPWL when making their latest purchases, there were 1.6 times the odds of modifying their purchases ([95%CI 1.4,1.9]; $p< 0.001$) compared to those who did not modify their purchases (table IV).

Discussion

This study investigated Mexican adults' purchase behavior reported after implementing the FoPWL, providing valuable insights into its impact. The results indicate that the FoPWL has influenced Mexican adults' purchasing behavior. Overall, 38% of participants reported modifying their purchasing behavior, primarily by selecting products with fewer or no 'excess' labels, or by ceasing to purchase them. Furthermore, 23% of Mexicans reported modifying their purchases when it came to SwCB. Health concerns emerged as the primary motivation behind these modifications. Additionally, the odds of modifying the purchase were higher among participants who noticed FoPWL during their most recent purchase.

Our findings align with experiences in Latin American countries such as Chile and Uruguay. In Chile, a population-based survey found that 43.8% of participants reported using WLs for purchase decisions,[10] a proportion slightly higher than our findings. Notably, the age group that most uses the WLs varies by country, with adults in

Table IV
ODDS RATIO FOR MODIFYING PURCHASES FOLLOWING FoPWL IMPLEMENTATION BASED ON VIEWING THE LABEL. MEXICO, ENSANUT 2021

	OR	*95%CI*	*p value*
Model 1		Ref	
Did not see the FoPWL			
Saw the FoPWL	1.52	1.28,1.81	<0.001
Model 2			
Did not see the FoPWL		Ref	
Saw the FoPWL	1.50	1.21,1.85	<0.001
Model 3			
Did not see the FoPWL		Ref	
Saw the FoPWL	1.61	1.35,1.91	<0.001

FoPWL: Front-of-pack warning labeling

OR: odds ratio obtained from the logistic model of the report of having seen labelling or not and modification of purchases
Model 1: crude
Model 2: adjusted by sex, age, education level, well-being index, indigenous ethnicity, households with children
Model 3: adjusted by sex and age
Note: Estimations based on data from the National Health and Nutrition Survey (Ensanut) 2021. The complex survey design was considered in all analyses.

Chile (over 46 years old), while in Mexico, is prominent among those over 60.[10] A possible explanation for this pattern is that older adults, more affected by NCDs,[20] are more health-aware and thus responsive to WLs. It was previously found that this group understood WLs, using them to guide healthier food choices.[21]

Regarding the type of purchasing behavior, the most frequently reported in Chile and Uruguay was product substitution.[10,22] This aligns with our findings, as we also observed that substitution was the most common behavior. Specifically, participants reported purchasing a similar product with fewer or no "excess" labels. Consistently, another study conducted in Chile found that 26% of participants self-reported having stopped buying products with WLs. These findings support previous studies conducted before implementing the FoPWL, which suggested that WLs foster healthier food choices in the Mexican population.[6,14,23] Recent research in Mexico found that 44.8% of adults and 38.7% of youth reported reducing purchases of unhealthy food categories due to the WL implementation.[24]

On the other hand, a study conducted in Mexico involving parents of school-aged children found that the perceived impact of the FoPWL on parents was greater when they purchased products for their children than for themselves.[17] Another study in Mexico, which included adults and young people, found 42% higher odds of buying less unhealthy foods due to the WLs. This finding reinforces the effectiveness of the labels in influencing purchasing decisions, highlighting their impact on reducing the purchase of unhealthy products.[24] In our study, we didn't observe significant differences, suggesting that purchasing behavior is similar regar-dless of the presence of children. Notably, our study was not restricted to parents of school-aged children, and the question didn't allow us to make this distinction.

Furthermore, when participants were asked which specific products, they stopped consuming due to the FoPWL, cookies and beverages were the most frequently mentioned in Chile. In Mexico, the most mentioned products were SwCB and bakery.[11] In Mexican adolescents and adults, the greatest purchase reduction was observed for cola beverages, regular and diet soda. Additionally, the study found that adults with higher water intake and lower sugar-sweetened beverages (SSBs) consumption reduced sugary drink purchases due to the WLs.[24] SSBs significantly contribute to Mexico's disease and mortality burden. In 2010, it was estimated that SSBs accounted for 12% of all deaths related to diabetes, cardiovascular disease, and obesity-related cancers. Furthermore, SSBs consumption was attributed to 6.9% of all-cause mortality.[25]

In Uruguay, participants who reported changes in their purchasing behavior mentioned health concerns as the main reason, a finding consistent with our study. Those who did not report changes attributed this to infrequent or 'moderate' consumption, habit, preference, or craving.[12] Similar results were found in Mexico where the main reason was habit or liking, followed by not or rarely consume it.[12] These findings highlight the importance of communication campaigns to raise awareness about health risks of excessive intake of critical nutrients.[26] In Mexico, the design of specific communication strategies has shown potential to strengthen the impact of FoPWL.[27]

For the FoPWL to effectively influence population purchasing behavior and health outcomes in the long term, the population must first be aware of it, accept it, understand it, and use it.[28] According to Ensanut reports, 67% of the Mexican population was aware of the FoPWL,[20] and nearly 4 out of 10 Mexicans used it to modify their purchasing behavior. In line with this, 74% of the Mexican population considers the FoPWL a good or very good measure.[20] Despite participants' awareness and perception of the FoPWL, efforts to promote its use and understanding have been limited within the context of Mexican labeling.[29]

This study utilized data from the Ensanut, ensuring representativeness and enhancing generalizability to Mexican adult population. However, there are limitations. First, the survey design included preliminary questions before addressing the perception of purchase changes, which may have felt repetitive or contradictory, potentially introducing bias and affecting their answers. Second, the use of self-reported purchase data may be influenced by social desirability bias, leading to inconsistencies in responses. Nonetheless, despite this limitation, the findings were consistent with previously published studies. Finally, the data was collected during the Covid-19 pandemic, and the associated circumstances, such as changes in food security and household dynamics (e.g., households with reduced food expenditures and severe food insecurity), were observed to have a higher likelihood of causing negative dietary changes.[30] This could potentially diminish the impact of WLs and affect how participants made their purchase decisions.

These findings support the importance of implementing public health strategies to improve purchasing beha-viors. These preliminary findings suggest that changes in purchasing behavior may contribute to improving the dietary quality of the Mexican population.

Acknowledgments

To the Ensanut 2021 field workers for their dedication during the survey period.

Funding

Bloomberg Philanthropies provided funding for this research. The founders had no role in this article's design, analysis, or writing.

Declaration of conflict of interests. The authors declare that they have no conflict of interests.

References

1. Barquera S, Rivera JA. Obesity in Mexico: rapid epidemiological transition and food industry interference in health policies. Lancet Diabetes Endocrinol. 2020;8(9):746-7. https://doi.org/10.1016/S2213-8587(20)30269-2
2. Marrón-Ponce JA, Sánchez-Pimienta TG, Da Costa-Louzada ML, Batis C. Energy contribution of NOVA food groups and sociodemographic determinants of ultra-processed food consumption in the Mexican population. Public Health Nutr. 2018;21(1):87-93. https://doi.org/10.1017/S1368980017002129
3. Pan American Health Organization. Ultra-processed food and drink products in Latin America: Trends, impact on obesity, policy implications. Washington DC: Pan American Health Organization, 2015 [cited May 7, 2024]. Available in: https://iris.paho.org/bitstream/handle/10665.2/7699/9789275118641_eng.pdf
4. Kaufer-Horwitz M, Tolentino-Mayo L, Jáuregui A, Sánchez-Bazán K, Bourges H, Martínez S, *et al*. Sistema de etiquetado frontal de alimentos y bebidas para México: una estrategia para la toma de decisiones saludables. Salud Publica Mex. 2018;60(4):479-86. https://doi.org/10.21149/9615
5. World Health Organization. Best buys' and other recommended interventions for the prevention and control of noncommunicable diseases TACKLING NCDs. Geneva: World Health Organization, 2022 [cited Jun 13, 2024]. Available in: https://apps.who.int/iris/bitstream/handle/10665/259232/WHO-NMH-NVI-17.9-eng.pdf
6. Vargas-Meza J, Jáuregui A, Contreras-Manzano A, Nieto C, Barquera S. Acceptability and understanding of front-of-pack nutritional labels: an experimental study in Mexican consumers. BMC Public Health. 2019;19(1):1751. https://doi.org/10.1186/s12889-019-8108-z
7. Organización Panamericana de la Salud. El etiquetado frontal como instrumento de política para prevenir enfermedades no transmisibles en la Región de las Américas. Washington DC: Organización Panamericana de la Salud, 2020 [cited Sep 26, 2023]. Available in: https://iris.paho.org/handle/10665.2/53013
8. Roberto CA, Ng SW, Ganderats-Fuentes M, Hammond D, Barquera S, Jauregui A, *et al*. The influence of front-of-package nutrition labeling on consumer behavior and product reformulation. 2021;41:529-50. https://doi.org/10.1146/annurev-nutr-111120-094932
9. Basto-Abreu A, Torres-Alvarez R, Reyes-Sánchez F, González-Morales R, Canto-Osorio F, Colchero MA, *et al*. Predicting obesity reduction after implementing warning labels in Mexico: A modeling study. PLoS Med. 2020;17(7):e1003221. https://doi.org/10.1371/journal.pmed.1003221
10. Valdebenito-Verdugo M, Labrín-Elgueta JM, León-Porath V, Fierro-Kalbhenn S. Informe de resultados: Descripción de las percepciones y actitudes de los/as consumidores respecto a las medidas estatales en el marco de la implementación del Decreto 13/15. Chile: Ministerio de salud, 2027:63-97 [cited Nov 20, 2023]. Available in: https://www.incap.int/index.php/es/listado-de-documentos/repositorio-efan/evidencia-efan/580-informe-de-evaluacion-de-la-implementacion-de-la-ley-sobre-composicion-nutricional-de-los-alimentos-y-su-publicidad/file
11. Gobierno de Chile. Informe de Evaluación de la Implementación de la Ley Sobre Composición Nutricional de los Alimentos y su Publicidad. Chile: Ministerio de Salud, 2017 [cited Nov 9, 2024]. Available in: https://www.incap.int/index.php/es/listado-de-documentos/repositorio-efan/evidencia-efan/580-informe-de-evaluacion-de-la-implementacion-de-la-ley-sobre-composicion-nutricional-de-los-alimentos-y-su-publicidad/file
12. Ares G, Antúnez L, Curutchet MR, Galicia L, Moratorio X, Giménez A, *et al*. Immediate effects of the implementation of nutritional warnings in Uruguay: awareness, self-reported use and increased understanding. Public Health Nutr. 2021;24(2):364-75. https://doi.org/10.1017/S1368980020002517
13. Nieto C, Jáuregui A, Contreras-Manzano A, Arillo-Santillan E, Barquera S, White CM, *et al*. Understanding and use of food labeling systems among Whites and Latinos in the United States and among Mexicans: Results from the International Food Policy Study, 2017. Int J Behav Nutr Phys Act. 2019;16(1):87. https://doi.org/10.1186/s12966-019-0842-1
14. Contreras-Manzano A, Jáuregui A, Vargas-Meza J, Nieto C, Granich-Armenta A, Alemán-Escobar M de L, *et al*. Objective understanding of front of pack warning labels among Mexican children of public elementary schools. A randomized experiment. Nutr J. 2022;21(1):47. https://doi.org/10.1186/S12937-022-00791-Z
15. Cruz-Casarrubias C, Tolentino-Mayo L, Vandevijvere S, Barquera S. Estimated effects of the implementation of the Mexican warning labels regulation on the use of health and nutrition claims on packaged foods. Int J Behav Nutr Phys Act. 2021;18(1):76. https://doi.org/10.1186/s12966-021-01148-1
16. Mendoza R, Tolentino-Mayo L, Hernández-Barrera L, Nieto C, Monterrubio-Flores E, Barquera S. Modifications in the consumption of energy, sugar, and saturated fat among the Mexican adult population: simulation of the effect when replacing processed foods that comply with a front of package labeling system. Nutrients. 2018;10(1):101. https://doi.org/10.3390/nu10010101
17. Batis C, Aburto TC, Pedraza LS, Angulo E, Hernández Z, Jáuregui A, *et al*. Self-reported reactions to the front-of-package warning labelling in Mexico among parents of school-aged children. medRxiv. 2023. https://doi.org/10.1101/2023.07.26.23293213
18. Romero-Martínez M, Barrientos-Gutiérrez T, Cuevas-Nasu L, Bautista-Arredondo S, Colchero MA, Gaona-Pineda EB, *et al*. Metodología de la Encuesta Nacional de Salud y Nutrición 2021. Salud Publica Mex. 2021;63(6):813-8. https://doi.org/10.21149/13348
19. Sagaceta-Mejia J, Durán R, Munguía A, Cruz-Casarrubias C, Tolentino-Mayo L, Barquera S. Supplementary Materials. Figshare, 2025 [cited Apr 24, 2025]. https://doi.org/10.6084/m9.figshare.28028891.v2
20. Shamah-Levy T, Romero-Martínez M, Barrientos-Gutiérrez T, Cuevas-Nasu L, Bautista-Arredondo S, Colchero MA, *et al*. Encuesta Nacional de Salud y Nutrición 2021 Sobre Covid-19. Resultados Nacionales. Mexico: Instituto Nacional de Salud Pública, 2022 [cited Sep 9, 2022]. Available in: https://ensanut.insp.mx/encuestas/ensanutcontinua2021/doctos/informes/220804_Ensa21_digital_4ago.pdf
21. Sagaceta-Mejía J, Tolentino-Mayo L, Cruz-Casarrubias C, Nieto C, Barquera S. Understanding of front of package nutrition labels: Guideline daily amount and warning labels in Mexicans with non-communicable diseases. PLoS One. 2022;17(6):e0269892. https://doi.org/10.1371/journal.pone.0269892
22. Ares G, Aschemann-Witzel J, Curutchet MR, Antúnez L, Moratorio X, Bove I. A citizen perspective on nutritional warnings as front-of-pack labels: insights for the design of accompanying policy measures. Public Health Nutr. 2018;21(18):3450-61. https://doi.org/10.1017/S1368980018002045
23. Jáuregui A, Vargas-Meza J, Nieto C, Contreras-Manzano A, Alejandro-Torres NZ, Tolentino-Mayo L, *et al*. Impact of front-of-pack nutrition labels

on consumer purchasing intentions: a randomized experiment in low- and middle-income Mexican adults. BMC Public Health. 2020;20(1):463. https://doi.org/10.1186/s12889-020-08549-0

24. Contreras-Manzano A, White CM, Nieto C, Quevedo KL, Vargas-Meza J, Hammond D, *et al*. Self-reported decreases in the purchases of selected unhealthy foods resulting from the implementation of warning labels in Mexican youth and adult population. medRxiv. 2023. https://doi.org/10.1101/2023.11.22.23298843

25. Braverman-Bronstein A, Camacho-García-Formentí D, Zepeda-Tello R, Cudhea F, Singh GM, Mozaffarian D, *et al*. Mortality attributable to sugar sweetened beverages consumption in Mexico: an update. Int J Obes. 2020;44(6):1341-9. https://doi.org/10.1038/s41366-019-0506-x

26. Taillie LS, Hall MG, Popkin BM, Ng SW, Murukutla N. Experimental studies of front-of-package nutrient warning labels on sugar-sweetened beverages and ultra-processed foods: a scoping review. Nutrients. 2020;12(2):569. https://doi.org/10.3390/nu12020569

27. Jáuregui A, Pacheco-Miranda S, Ayvar-Gama Y, Alejandro-Torres NZ, Cuno A, Espinosa-de Candido AF, *et al*. Diseño de una estrategia de comunicación para la promoción del uso del etiquetado de advertencia en niños, niñas y adolescentes mexicanos. Salud Publica Mex. 2023;65(1):70-81. https://doi.org/10.21149/14120

28. Crockett RA, King SE, Marteau TM, Prevost AT, Bignardi G, Roberts NW, *et al*. Nutritional labelling for healthier food or non-alcoholic drink purchasing and consumption. Cochrane Database Syst Rev. 2018;2021(6):CD009315. https://doi.org/10.1002/14651858.CD009315.pub2

29. Secretaría de Salud. Conoce el nuevo #EtiquetadoParaLaSalud y elige saludablemente. Facebook, 2020 [cited Nov 20, 2023]. Available in: https://www.facebook.com/SecretariadeSaludMX/photos/conoce-el-nuevo-etiquetadoparalasalud-y-elige-saludablementem%C3%A1s-informaci%C3%B3n-en-%EF%B8%8F/3346319462083390/?paipv=0&eav=AfZ5b2aKGcEdqm402dsV9Cvmyq2qMIy34BXW5UQWPHbu36iBmtdl-K_v_cwDIzMdptw&_rdr

30. Rodríguez-Ramírez S, Gaona-Pineda EB, Martínez-Tapia B, Romero-Martínez M, Mundo-Rosas V, Shamah-Levy T. Inseguridad alimentaria y percepción de cambios en la alimentación en hogares mexicanos durante el confinamiento por la pandemia de Covid-19. Salud Publica Mex. 2021;63(6):763-72. https://doi.org/10.21149/12790