

# Predicting Impulse Purchases in Mexican Nanostores

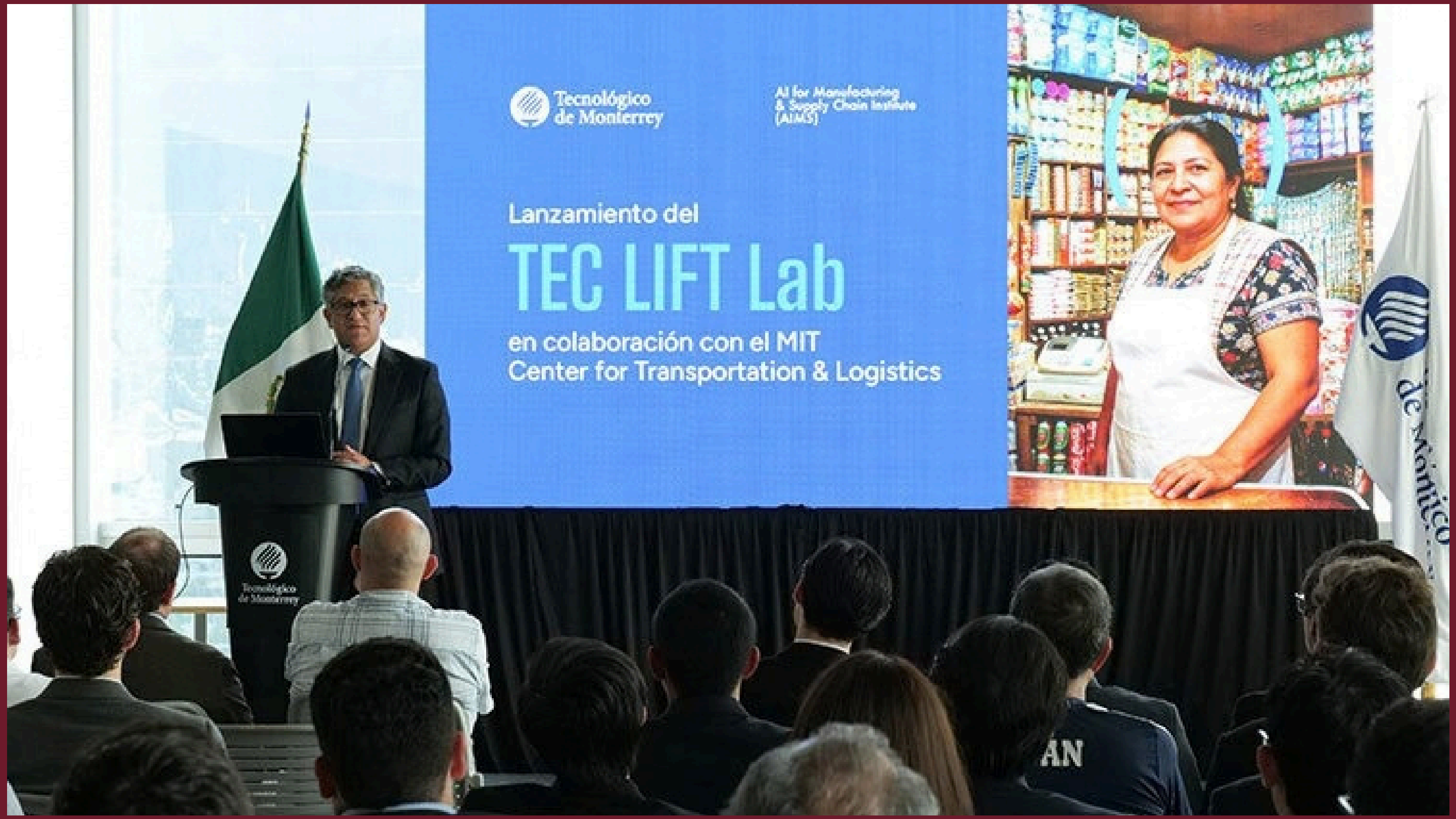
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Integrating Consumer Behavior and Last-Mile Supply Chain Characteristics

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Tecnológico  
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AI for Manufacturing  
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(AIMS)

Lanzamiento del

# TEC LIFT Lab

en colaboración con el MIT  
Center for Transportation & Logistics

# Nanostores in Mexico

**+1 million**

nanostores in Mexico

INEGI, DENUE (2025)

**37%**

of total spend in  
nanostores

Bank of Mexico (2023)

**6 million**

people depend on  
nanostores

DataMexico (2025-Q1)

**20%**

of SMEs in Mexico

INEGI, DENUE (2025)



# Suppliers and the product mix



Illustrative nanostore image

≈40

suppliers visit nanostore weekly

(Meza Rodríguez, 2024)

+72,000

different products and presentations distributed

(ANAM, n.d.)

69.9%

of supply comes from manufacturers

(Frogtex Analytics, 2025)

≈80%

of processed products are snacks, cookies or candies

(Marrón-Ponce et al., 2021)



# Research objectives

## **01** MIT LIFT Lab partnership

Generate evidence on Mexican nanostores and their customers to support research on small retailers.

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## **02** Impulse purchase behavior

Estimate the probability of impulse purchases using shopper characteristics and buying habits.

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## **03** Supplier-focused study

Identify associations between supplier operations and customer behavior, including impulse purchases.

# Sampling plan

12

participating campuses

## Third-semester engineering students

Teams of approximately 3 students

2 Two students surveyed  $\approx 5$  customers entering the nanostore and  $\approx 10$  suppliers outside the store.

## MIT LIFT Lab provided the questionnaires

Fieldwork targets are separate from the final national sample

## Target per nanostore

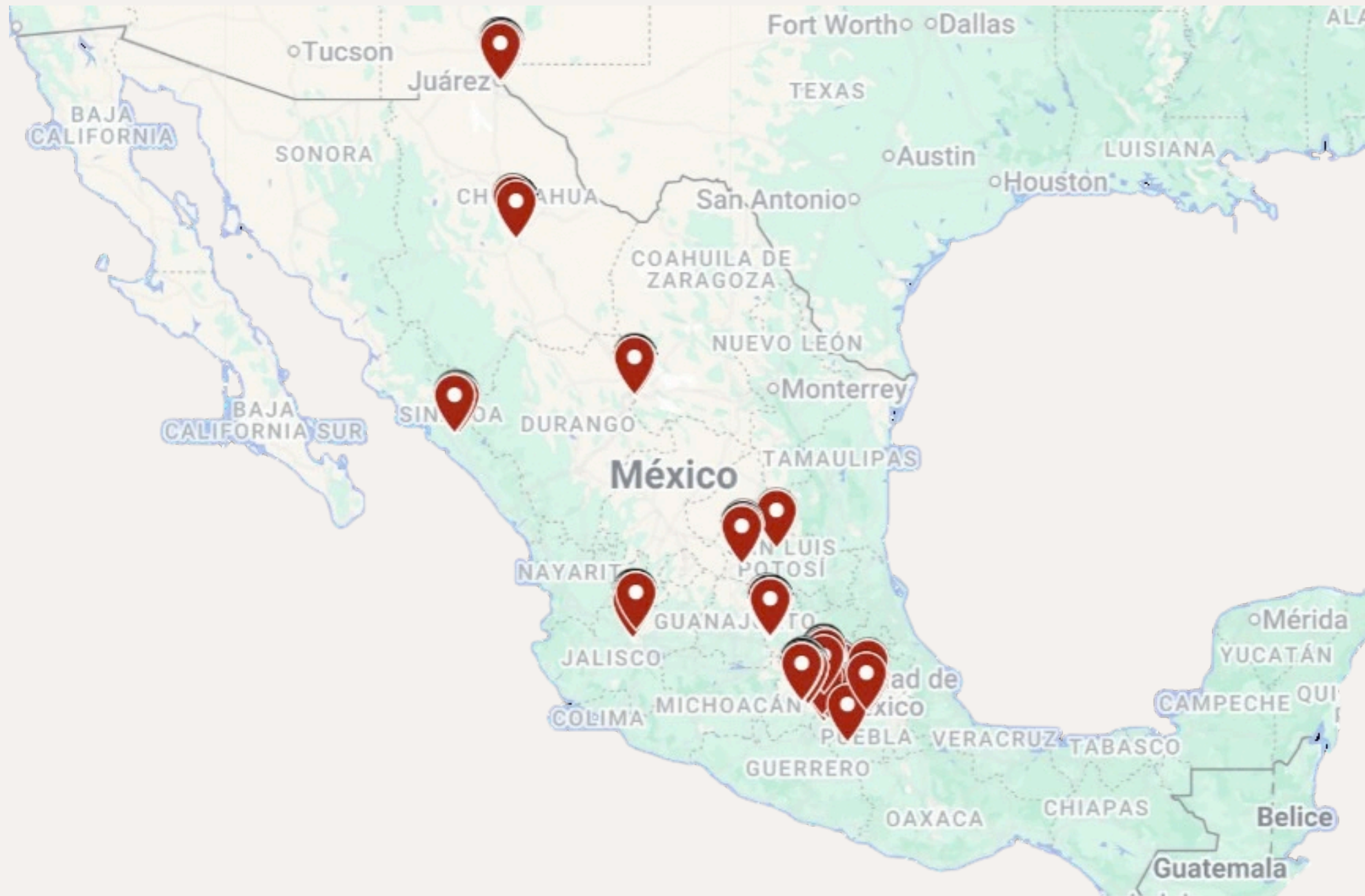
1 shopkeeper

5 customers

10 suppliers

# Study area

## National participation



12 participating campuses

## Local fieldwork



## Culiacán, Sinaloa

Survey locations shown in the supplied map

# Customer and shopkeeper surveys



Illustrative fieldwork photograph

## Customers

Random selection of customers to reduce selection bias

In-person questions on buying habits and perceived product healthiness

## Shopkeepers

One interview per nanostore on store characteristics



# Supplier data collection

## 01

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### **Observe activities**

Record the activities performed during the store visit, in the order they occur.

## 02

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### **Measure time**

Time the activities performed during the visit.

## 03

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### **Interview the supplier**

Ask about visit frequency and whether the supplier considers the delivered products healthy.

**Observation and timing preceded the questionnaire**



# National database

12 campuses contributed to the national database

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**477**

**Shopkeepers**

Shopkeeper records

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**1,317**

**Customers**

Shopper survey records

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**1,734**

**Suppliers**

Last-mile records

National totals before cleaning

# National database: cleaning and validation

## Shopkeepers

Initial records

**477**

Retained after cleaning

**101**

Response integrity

## Customers

Initial records

**1,317**

Retained after cleaning

**557**

Geographic validation

## Suppliers

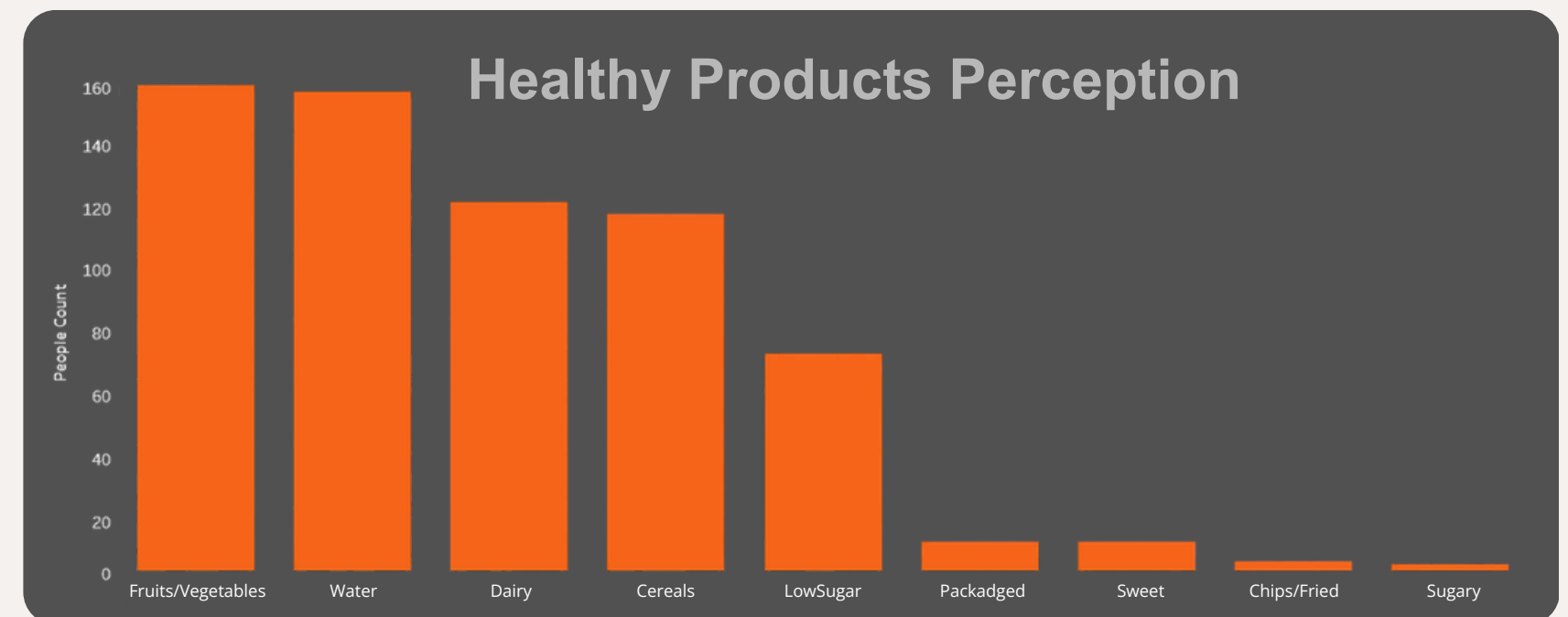
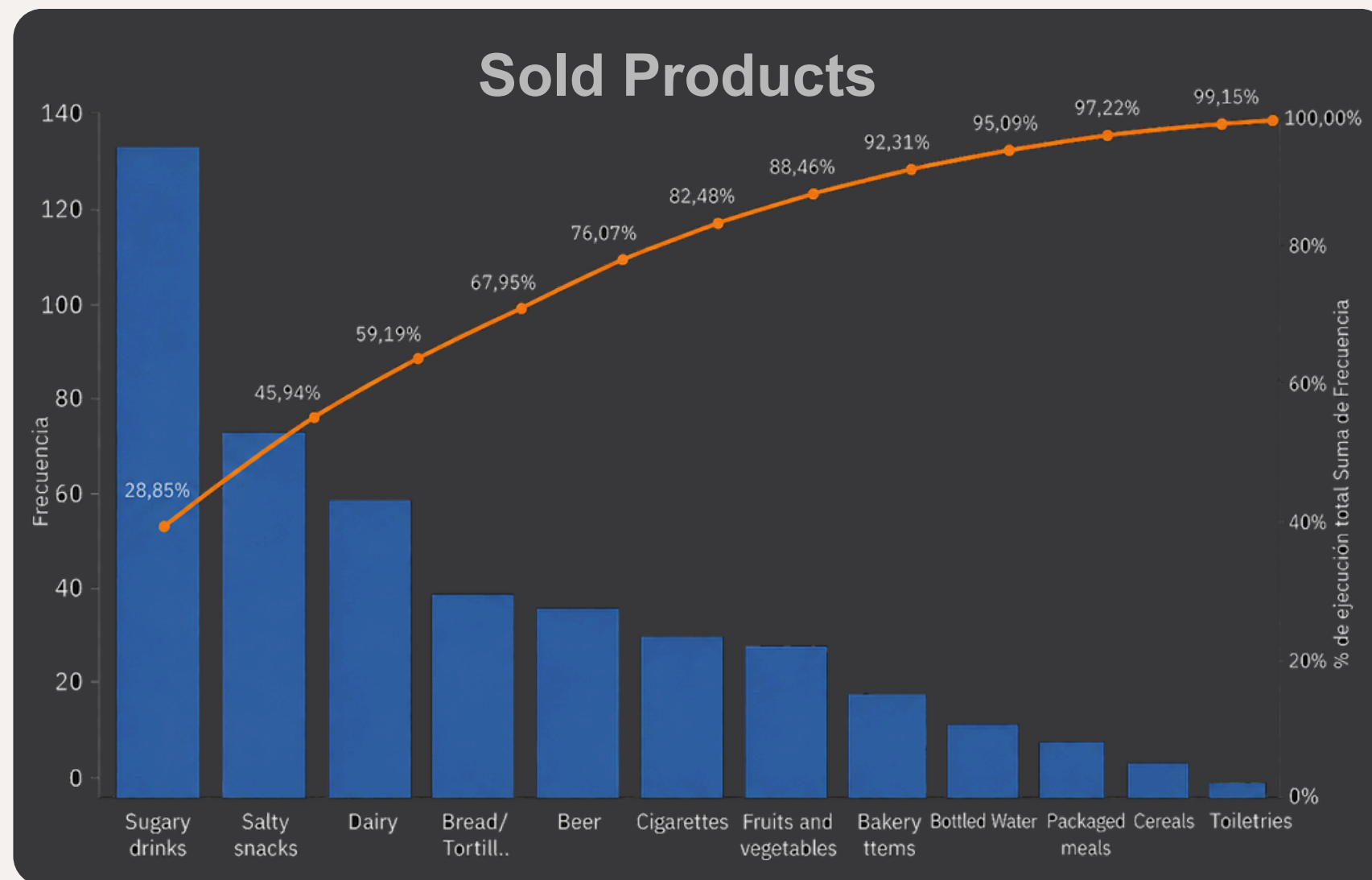
Initial records

**1,734**

Retained after cleaning

**794**

# Product sales and health perceptions



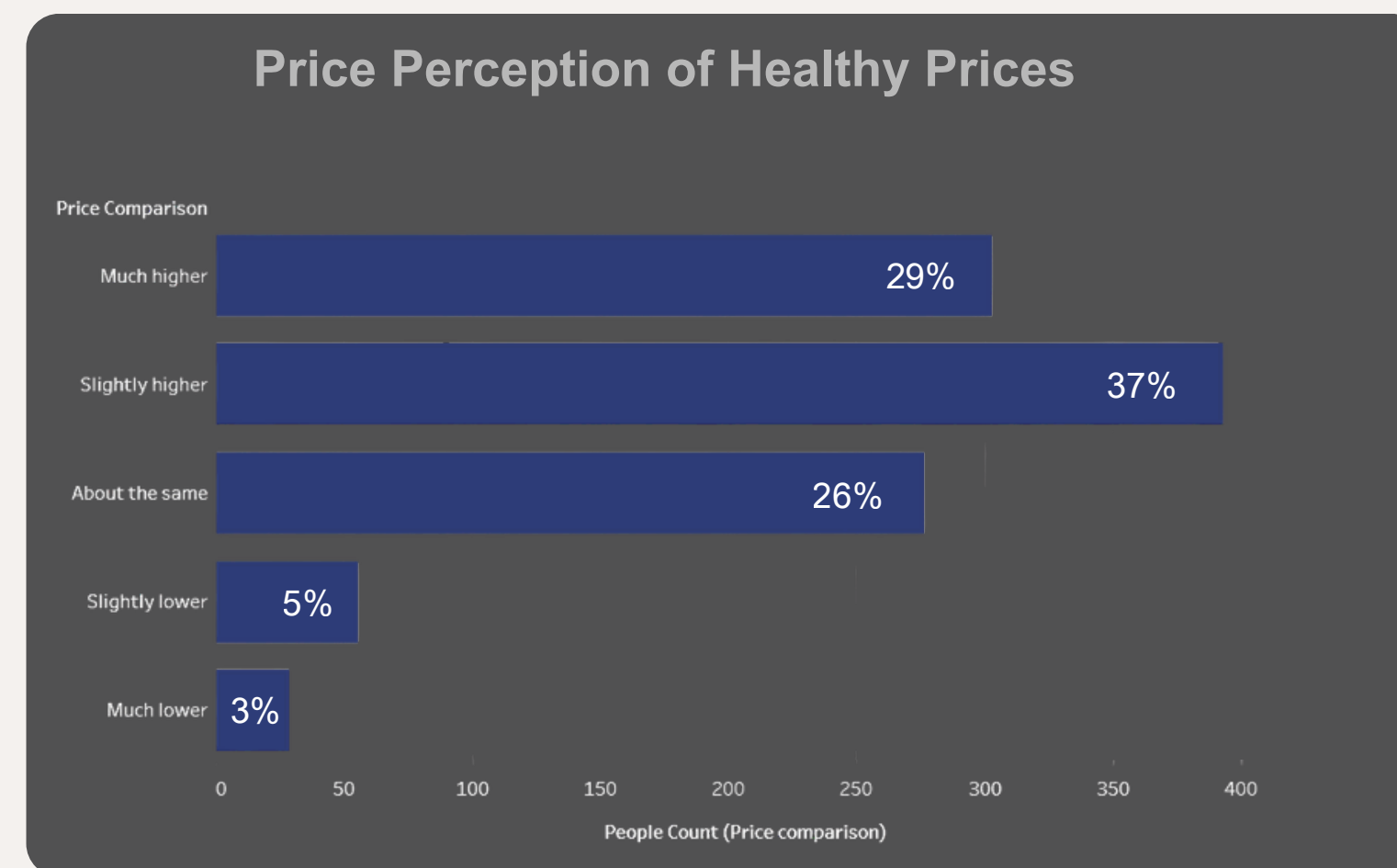
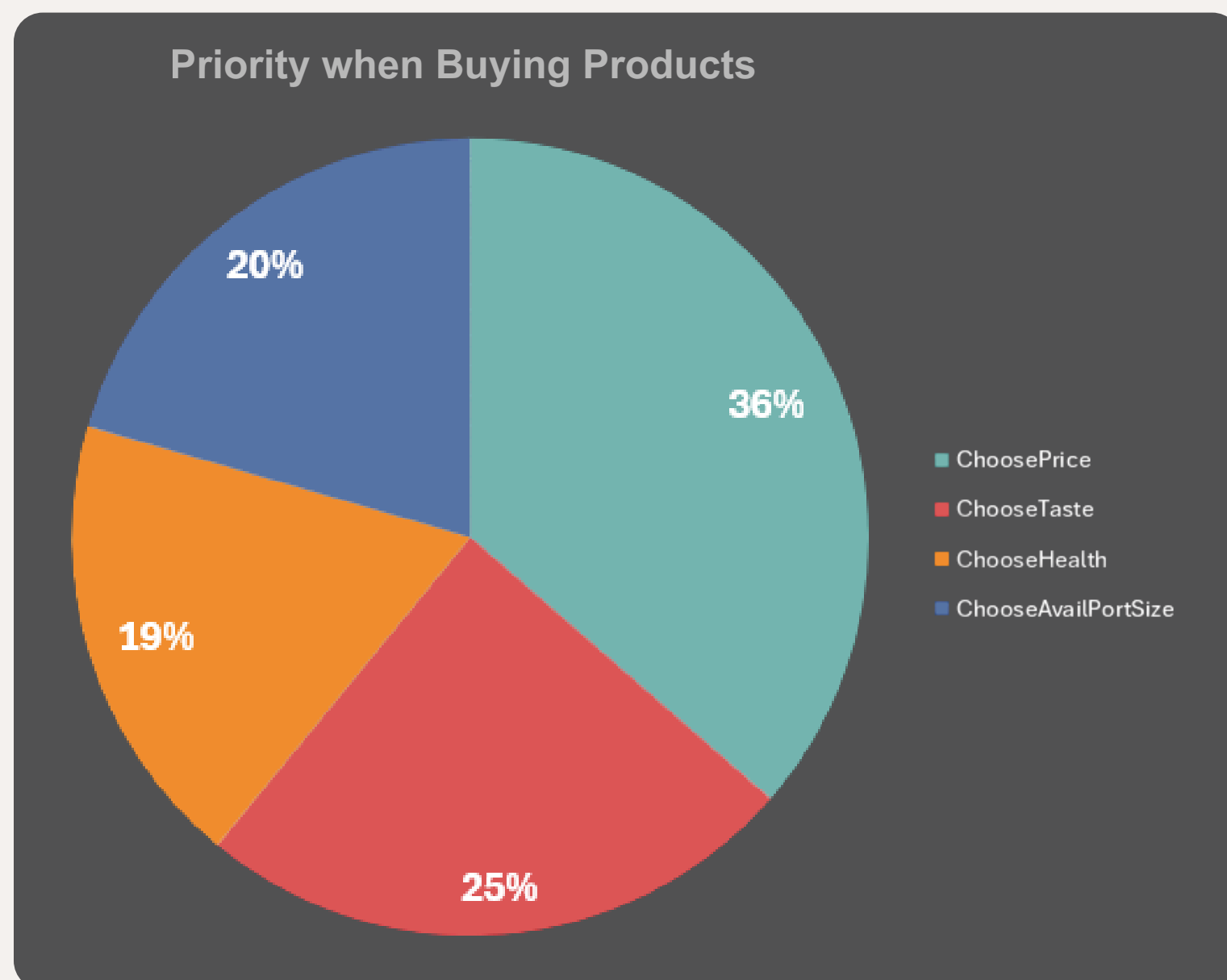
Top 3 most sold products:

- **Sugary drinks (28.85%)**
- **Salty snacks (17.09%)**
- **Dairy (13.25%)**

The top 4 **least healthy items** represent more than **50% of the sales** in nanostores.

Clients most common purchases are items they perceive as unhealthy.

# Purchase priorities and healthy product prices

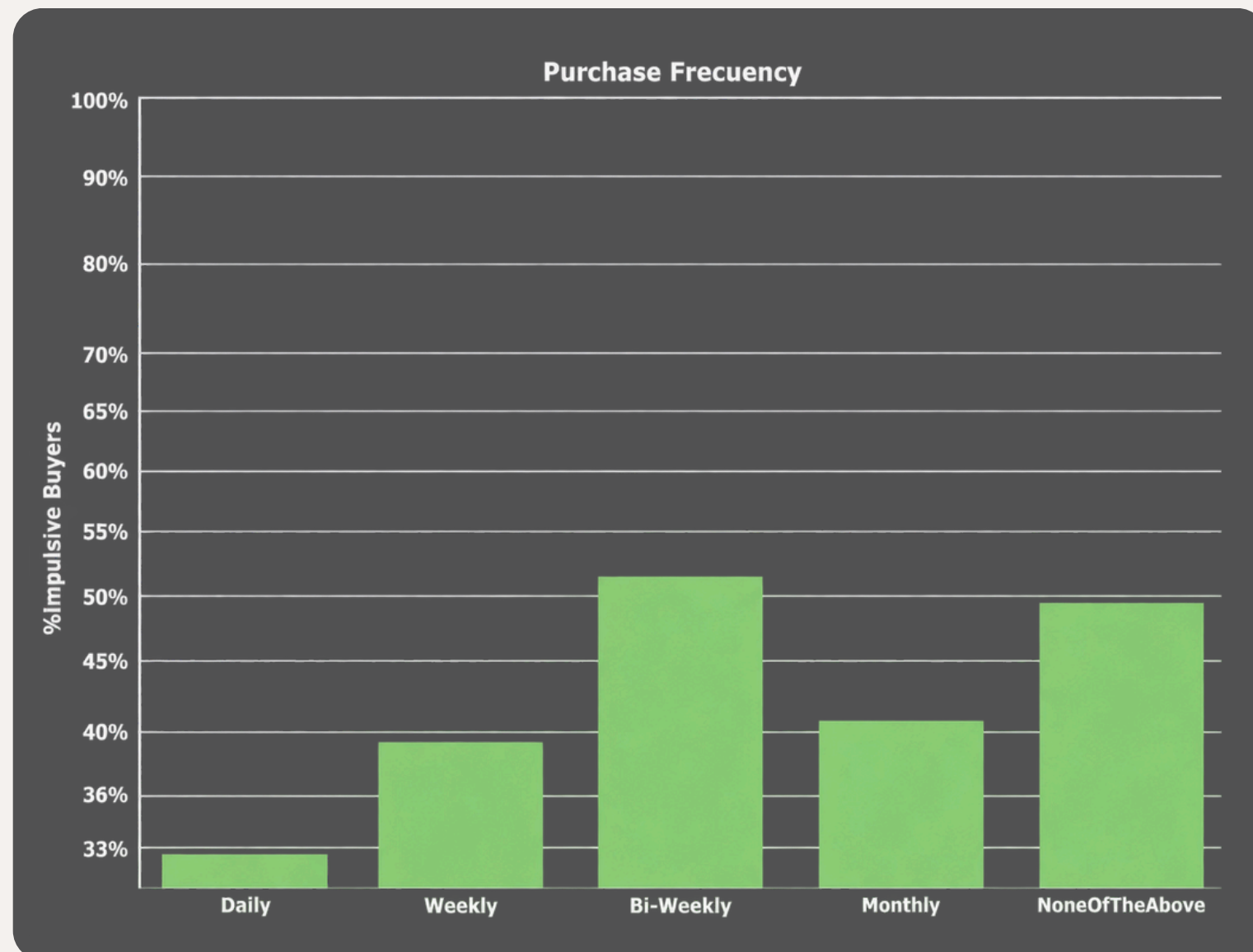


**36%** of the clients **choose** their products **by price**.

**Health** is the **lowest factor** clients consider when choosing products with only **19%**.

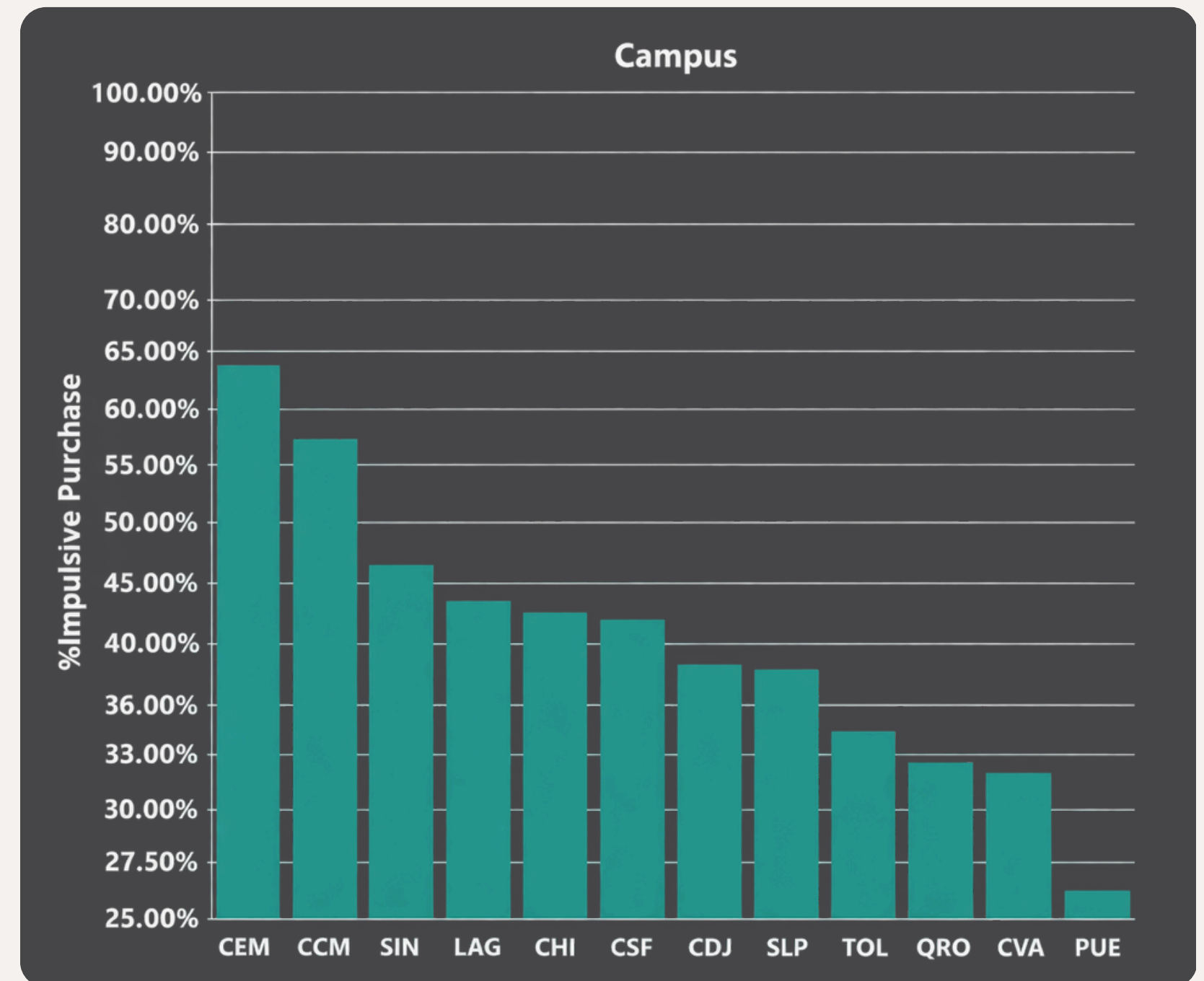
**66%** of clients perceive **healthy products** as slightly or much more expensive.

# Impulse purchases by frequency and campus



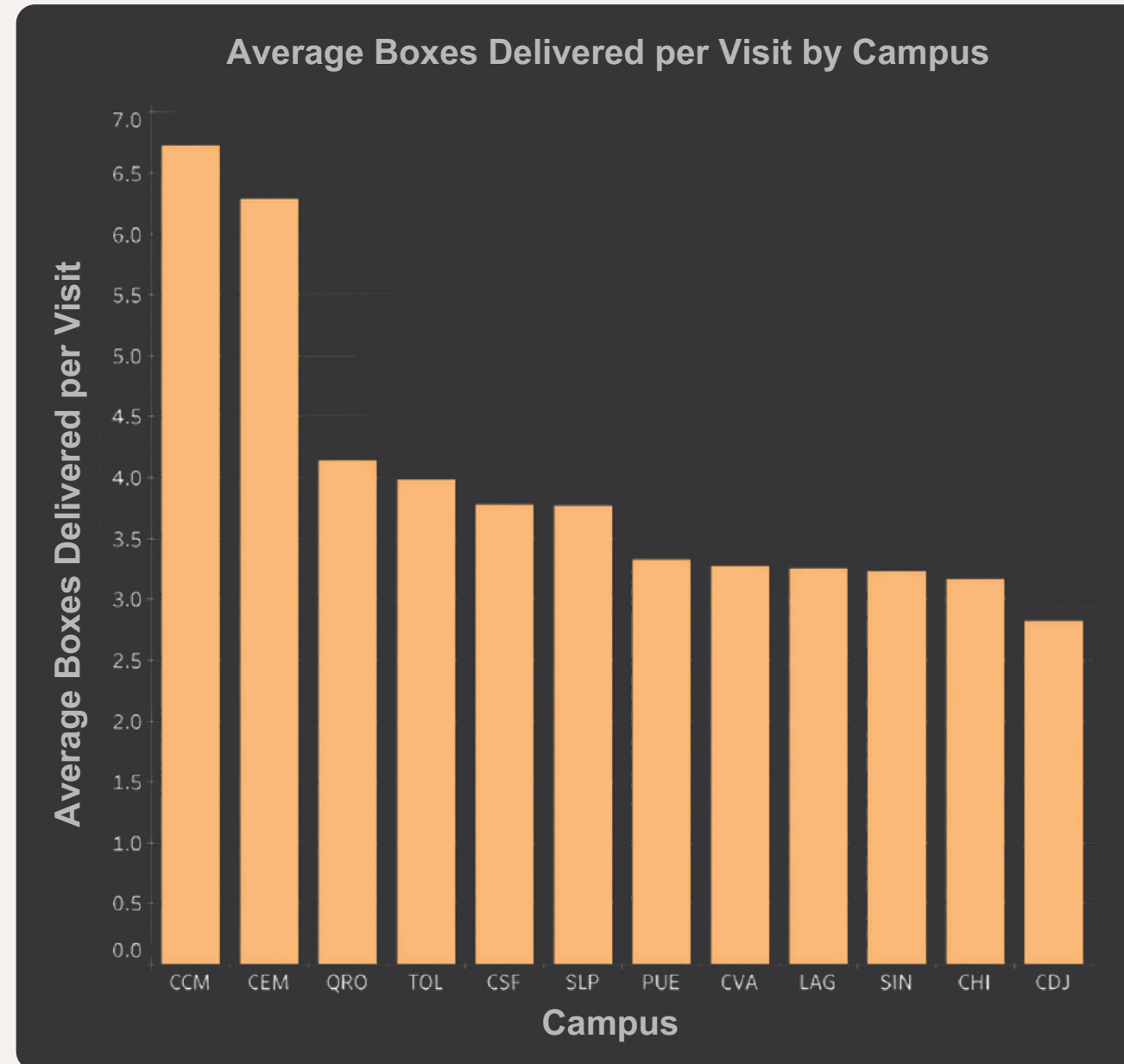
A higher proportion of impulse purchases is observed among consumers who shop less frequently.

The highest percentage corresponds to those who **shop every two weeks (51%)**, followed by those who do **not identify with the established frequencies (49%)**.



The proportion of impulse purchases varies between campuses, with **CEM** showing the highest percentage (**63%**) and **PUE** the lowest (**26%**), highlighting differences between the locations analyzed.

# Supplier deliveries by campus



It is observed that **CCM** and **CEM** have the **highest average** number of boxes delivered, with **6.7** and **6.3** boxes respectively.

In contrast, the **rest of the campuses** have more similar values, staying in an approximate range of **2.8** to **4.1** boxes per visit.



Productivity is relatively similar across the different unloading spots, although unloading **On the sidewalk** shows a slightly higher average level, followed by unloading **On the street** and **Next to the store**. Also, all four types of locations show considerable variation in their productivity values.

# Impulse purchase model: shoppers

$$P(\text{ImpulsePurchase} = 1) = \exp(\text{ImpulsePurchase}') / (1 + \exp(\text{ImpulsePurchase}'))$$

$$\begin{aligned} \text{ImpulsePurchase}' = & -1.733 + 0.1565 \text{MonthlyBudgetLog} + 1.314 \text{Bakery items}_1 + 0.717 \text{Salty snacks}_1 \\ & + 0.130 \text{Bread/Tortillas}_1 + 0.411 \text{Other}_1 + 0.513 \text{Sugary drinks}_1 + 0.537 \text{Cigarettes}_1 + 0.098 \\ & \text{TotalSpend}_2 + 0.250 \text{TotalSpend}_3 + 0.602 \text{TotalSpend}_4 + 0.868 \text{Bi-Weekly}_1 + 0.483 \text{None of the} \\ & \text{above}_1 - 0.363 \text{BuyLowerPrice}_2 - 0.537 \text{BuyLowerPrice}_3 - 0.039 \text{BuyLowerPrice}_4 - 1.088 \\ & \text{BuyLowerPrice}_5 - 0.444 \text{Age}_{25} - 1.208 \text{Age}_{35} - 0.919 \text{Age}_{45} - 1.310 \text{Age}_{55} - 1.179 \text{Age}_{65} - \\ & 1.620 \text{Age}_{75} + 1.058 \text{Salty snacks} * \text{Bread/Tortillas}_1 \end{aligned}$$

AUC ROC = 0.7425

VIF < 10

P-Value < 0.05

# Impulse purchase model: integrated data

$$P(\text{ImpulsePurchase} = 1) = \exp(\text{ImpulsePurchase}') / (1 + \exp(\text{ImpulsePurchase}'))$$

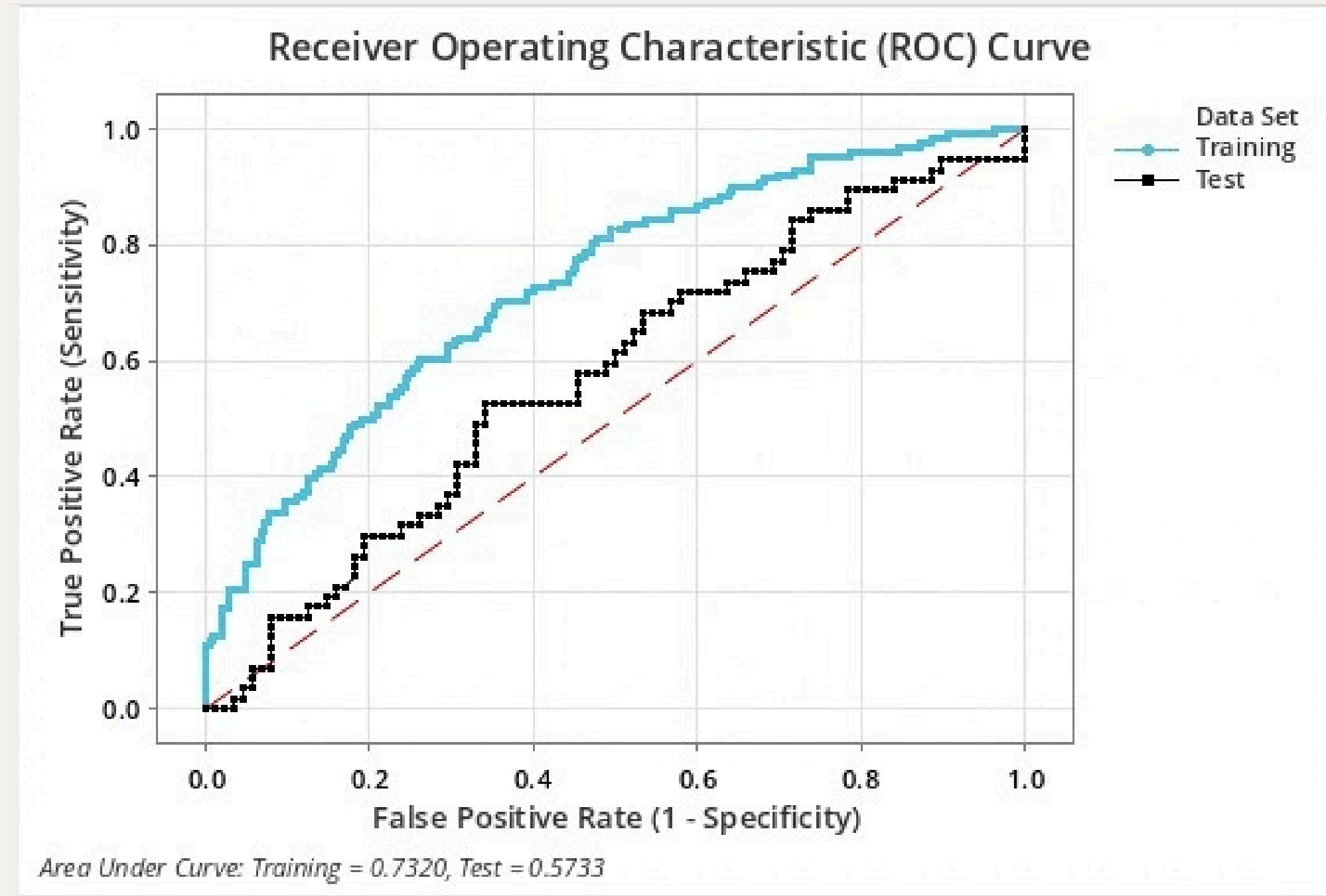
$$\begin{aligned} \text{ImpulsePurchase}' = & -1.385 + 0.1923 \text{HouseholdSize\_num} + 0.0000590 \text{MonthlyBudget\_num} + \\ & 0.388 \text{avg\_boxes} - 0.784 \text{HealthierVersion\_Neutral} + 1.79 \text{HealthierVersion\_Unlikely} + 0.440 \\ & \text{HealthierVersion\_Very likely} + 1.148 \text{HealthierVersion\_Very unlikely} - 0.654 \text{BuyLowerPrice\_2} - \\ & 1.325 \text{BuyLowerPrice\_3} - 0.433 \text{BuyLowerPrice\_4} - 0.484 \text{BuyLowerPrice\_5} + 0.057 \\ & \text{StreetType\_Secondary (side street)} - 1.083 \text{NanostoreSize\_51–100 m}^2 - 0.224 \text{NanostoreSize\_Less} \\ & \text{than 20 m}^2 - 0.900 \text{NanostoreSize\_Over 100 m}^2 + 0.057 \text{avg\_boxes} * \text{HealthierVersion\_Neutral} - \\ & 0.445 \text{avg\_boxes} * \text{HealthierVersion\_Unlikely} - 0.299 \text{avg\_boxes} * \text{HealthierVersion\_Very likely} - 0.276 \\ & \text{avg\_boxes} * \text{HealthierVersion\_Very unlikely} - 0.267 \text{avg\_boxes} * \text{StreetType\_Secondary (side street)} \end{aligned}$$

Shopper variables

Supplier variables

Nanostore variables

# Integrated model performance



Training AUC

**0.7320**

Test AUC

**0.5733**

VIF < 10

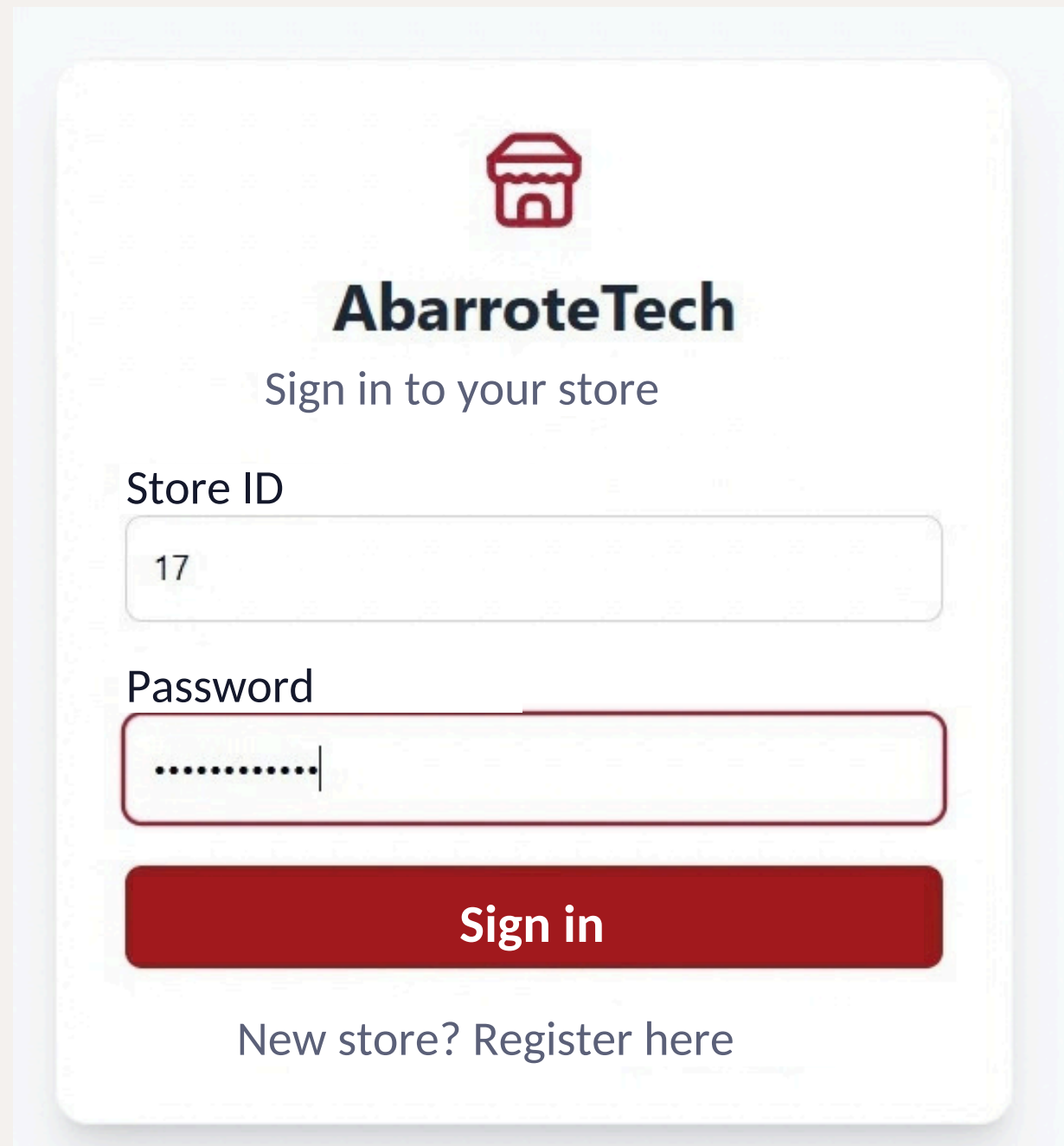
p-value < 0.05

The test AUC is lower than the training AUC

# AbarroteTech prototype

## Digital tool for nanostores

A prototype supporting the broader nanostore project



The image shows a login form for AbarroteTech. At the top is a red icon of a storefront. Below it is the text "AbarroteTech" in bold, followed by "Sign in to your store". There are two input fields: "Store ID" with the value "17" and "Password" with masked characters. A red "Sign in" button is below the fields. At the bottom, it says "New store? Register here".



**AbarroteTech**

Sign in to your store

Store ID

17

Password

.....

**Sign in**

New store? Register here



# AbarroteTech

Salesmanagement and  
impulse purchase analysis

## Access

Login and register  
Home screen

## Sales

Point of sale  
Smart purchase analysis

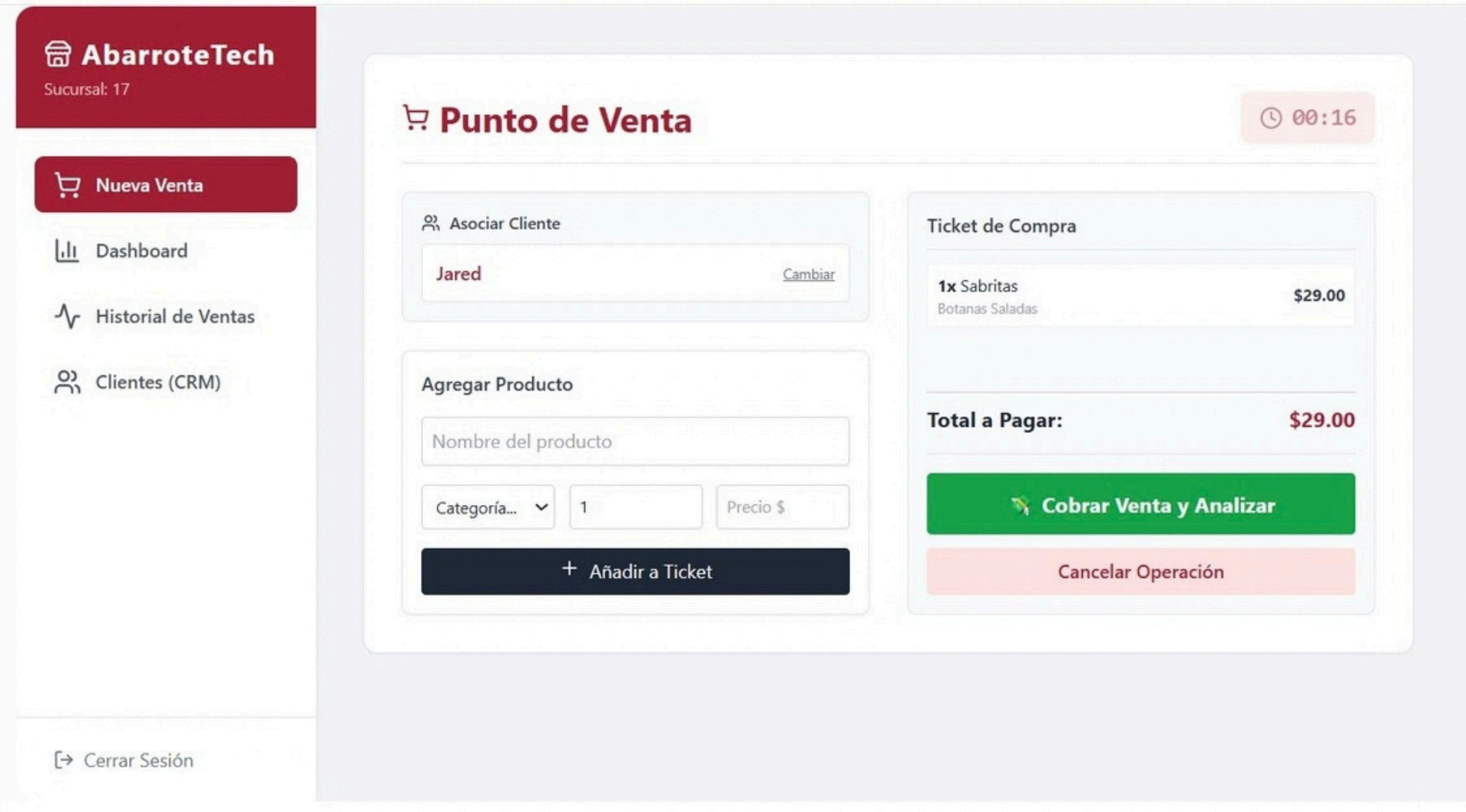
## Insights

AI sales insights  
Saleshistory and AI analysis

## Data

Customer dashboard  
Database records

## Point of sale



## AI sales insights



# Next steps

- 1** Test the prototype with nanostore users

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- 2** Validate performance on new store data

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- 3** Examine and include shopkeeper associations

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Image credits: El Heraldo de Mexico (2020), El Sol de la Laguna (undated), BBVA (2021). Additional fieldwork photograph from the supplied earlier presentation.