

Assessing the Community Food Environment: Results from a Food Store Reliability Study

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Background

- Environmental factors like the availability and characteristics of community food outlets play a role in dietary behaviors and obesity.
- Understanding the relationships between diet, weight, and the characteristics of food outlets requires reliable measurement of these characteristics.
- **Objective:** To test the inter-rater reliability of a Food Store Observation Form.

Methods

Instrument: 12-page pen and paper Food Store Observation Form developed, building off of pre-existing instruments and including the following measures:

- Store type
- Presence of store services/amenities
- Availability and price of specified food/beverage products
- Price type (regular, sale, member/loyalty card)
- Quality of select fresh fruits and vegetables
- # of fresh, frozen and canned fruits and vegetables
- # of cash registers and items in the check-out aisle
- # of food/beverage ads on store exterior
- Presence of incivilities outside the store

Store Sample:

- Stores pulled from Dun & Bradstreet commercial business list and from supplemental web searches
- 141 stores sampled from Chicago MSA + 50 mile buffer

Data Collection:

- Data collected by six trained field staff in January 2010

Reliability Measures:

- Categorical variables: Simple Kappa and % Agreement
- Continuous variables: Intraclass Correlation Coefficient (ICC)
- Proportion agreement is given for variables where the Kappa value may be artificially low due to a skewed distribution.
- Reliability results are presented only for those measures with at least 15 completed observations.

Results

Completed Store Sample	N
Supermarkets	26
Grocery stores	34
Gas/convenience stores	54
Discount department stores	6
TOTAL	120

Key Findings:

- 77% of all **product availability** measures had a Kappa ≥ 0.80 (almost perfect agreement); 92% had a Kappa ≥ 0.60 .
- 62% of all **product pricing** measures had an ICC ≥ 0.80 ; 89% had an ICC ≥ 0.60 .
- Average ICC for **fruit and vegetable counts** was 0.90 across six categories (fresh, frozen, and canned).
- Proportion agreement for **quality of fresh fruits and vegetables** was >90% for eight different items.
- Measures with lowest reliability (Kappa/ICC < 0.60 and/or proportion agreement < 75%) were the following:
 - Availability of juice drink, bottled water, cookies and candy
 - Price of oranges, family-size juice drink, juice boxes, least expensive 2-liter soda, and candy
 - Presence of bike parking and sidewalk outside main entrance
 - Presence of at least one candy-free register at checkout
 - Number of beverage ads on the store property

Inter-Rater Reliability for the Number of Advertisements on Store Exterior (ICC)

	Building Exterior	Store Property
# Food ads	0.96	0.91
# Food ads with price promotion	0.90	*
# Beverage ads	0.88	0.51
# Beverage ads with price promotion	0.87	0.86
# Combination (food & beverage) ads	0.62	0.73
# Combination ads with price promotion	*	*

* Sample size too small to calculate result.

Average Inter-Rater Reliability (and Range) for Availability and Price of Various Product Categories

Product Category (# of measures)	Product Availability		Product Price
	Kappa	% Agreement	ICC
Fresh Fruits and Vegetables (8)	0.97 (0.91-1.00)	0.99 (0.96-1.00)	0.86 (0.41-1.00)
Meat and Dairy Products (10)	0.91 (0.80-1.00)	0.96 (0.92-0.97)	0.85 (0.72-0.99)
Bread and Cereal Products (5)	0.87 (0.81-0.93)	0.92 (0.86-0.96)	0.84 (0.71-1.00)
Canned Beans and Vegetables (6)	0.89 (0.80-0.96)	0.91 (0.80-0.98)	0.91 (0.80-0.99)
Family Size Beverages (6)	0.75 (0.67-0.82)	0.97 (0.96-0.99)	0.71 (0.47-0.95)
Individual Size Beverages (9)	0.71 (0.17-0.94)	0.93 (0.83-1.00)	0.82 (0.61-1.00)
Snack Foods (6)	0.65 (0.00-0.91)	0.93 (0.77-0.99)	0.79 (0.32-0.98)
Frozen Vegetables (4)	0.94 (0.91-0.98)	0.97 (0.96-0.99)	*

* Sample size too small to calculate result.

Discussion and Conclusions

- Most measures on the Food Store Observation Form could be captured feasibly and reliably in various store types.
- Measures that were most highly reliable included product availability, presence of store services/amenities, and counts of fruits and vegetables.
- Limited measures were dropped from the Food Store Observation Form.
- Changes were made to the observation form and protocol to address issues discovered during the reliability study:
 - Definitions tightened for some beverage and snack products
 - Definition tightened for main entrance on store exterior measures
 - Training and practice exercises added for capturing price and price type
- Finalized measures were incorporated into a Food Store Observation Form that was fielded in a national sample of 154 communities in the spring/summer of 2010.

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