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Research Informing Policies & Practices  
for Healthy Youth

# **Classification Bias in Commercial Business Lists for Retail Food Outlets in the U.S**

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Euna Han, PhD  
University of Illinois at Chicago

# Presenter Disclosure

**Euna Han**

The following personal financial relationships with commercial interests relevant to this presentation existed during the past 12 months:

**“No relationships to disclose”**

# Research Team

Euna Han

Lisa Powell

Shannon Zenk

Leah Rimkus

Punam Ohri-Vachaspati

+

5 staffs

18 field workers

6 data entry workers

# Presentation Outline

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- Motivation
- Objectives

## 2. Methods

- Study Design
- Sample
- Classification
- Statistical Analyses

## 3. Results

## 4. Implications

# Introduction

Motivation and Objectives

# Motivation

- Numerous empirical studies have relied on commercial data sources to measure the availability of different type of food stores and/or restaurants in specific geographic areas.
- These secondary data are primarily created for business purposes and may not require the same level of precision in classification as needed for research.
- Only a few studies have validated secondary data sources and the extent of classification match in the commercial lists have not investigated.
- It is important to understand the extent to which those secondary data correctly classify food outlets, given that the relationship of food outlets with individual weight outcomes has been reported to vary by outlet type and geographic characteristics.

# Objectives

- Investigate the extent of classification bias of food stores and restaurants in two secondary commercial data sources that are widely available in the U.S.
- Analyze whether retailer characteristics differed by classification match status (between ground-survey and business lists) for different store types
- Identify any specific patterns of mis-classification in the two business lists
- Assess the extent to which the accuracy in outlet classification was associated with neighborhood characteristics.

# Methods

Study Design, Sample, Classification and Statistical Analyses



# Study Design

- Direct field observations including in-store instruments by trained field staff (May-July 2009)
- Commercial outlet data (May 2009)
  - Dun & Bradstreet
  - InfoUSA
- Census tracts drawn from the Chicago MSA; sample of 274 tracts, stratified by:
  - Income tertiles
  - Low income:
    - Race (>70 white, >70 black, mixed)
    - Ethnicity (>70 Hispanic, Non-Hispanic)

## Sample

- Analysis sample: retailers that were found on the ground and listed in each of the business lists
- Excluded retailer that were found on the ground but were not found in either of the business lists from the analysis
- A total of 612 and 729 food stores in D&B and InfoUSA
- A total of 1717 and 2046 restaurants in D&B and InfoUSA

# Classification of Food Stores on the Ground

**Specialty Food Stores:** Bakeries, meat or fish stores, fruit or vegetable stores, candy or nut stores and coffee and tea stores.

**Convenience Stores:** Non-specialty food stores with no fresh meat, at most a selection of ten fruits and vegetables and two or fewer cash registers.

**Supermarkets:**  $\geq 4$  cash registers; a selection of 20+ fruits and vegetables; sold fresh meat; and had  $\geq 2$  features of a butcher, deli or bakery.

**Grocery Stores:** Not a specialty food store, a supermarket or a convenience store.

# Classification of Restaurants on the Ground

**Specialty restaurants:** Coffee shops, donut shops, ice cream parlors, pretzel shops, banquet halls.

**Fast food restaurants:** Patrons order food at the counter and pay at the counter.

**Full-service restaurants:** Patrons offered patrons table service (patrons did not order and pay at the counter) and those restaurants that were not specialty restaurants.

## SIC Classification of Food Stores from the Commercial Lists

Store classification	D&B list	InfoUSA list
Convenience store	<ul style="list-style-type: none"> <li>• 541102 (convenience stores)</li> </ul>	<ul style="list-style-type: none"> <li>• 541103 (convenience stores)</li> </ul>
Supermarket	<ul style="list-style-type: none"> <li>• 541101 (supermarkets)</li> </ul>	<ul style="list-style-type: none"> <li>• 541101 (food markets)</li> <li>• 541102 (snack products)</li> <li>• 541104 (food products-retail)</li> <li>• 541105 (grocers-retail)</li> <li>• 541106 (markets-kosher)</li> <li>• 541107 (grocers-ethnic foods)</li> <li>• 541108 (grocers-health foods)</li> <li>• 541108 (grocers-take-out foods)</li> </ul>
Grocery stores	<ul style="list-style-type: none"> <li>• 541100 (grocery Stores)</li> <li>• 541199 (grocery stores, nec)</li> </ul>	<ul style="list-style-type: none"> <li>• Same as supermarket</li> </ul>
Specialty food stores	<ul style="list-style-type: none"> <li>• 5421 (meat and fish markets)</li> <li>• 5431 (fruit and vegetable market)</li> <li>• 5441 (candy, nut, and confectionary stores)</li> <li>• 5451 (dairy products stores)</li> <li>• 5461 (retail bakeries)</li> <li>• 5499 (miscellaneous food stores)</li> </ul>	<ul style="list-style-type: none"> <li>• 5421 (meat and fish markets)</li> <li>• 5431 (fruit and vegetable market)</li> <li>• 5441 (candy, nut, and confectionary stores)</li> <li>• 5451 (dairy products stores)</li> <li>• 5461 (retail bakeries)</li> <li>• 5499 (miscellaneous food stores)</li> </ul>

# SIC Classification of Restaurants from the Commercial Lists

Store classification	D&B list	InfoUSA list
Fast-food restaurants	<ul style="list-style-type: none"> <li>• 581203 (fast food restaurants and stand) except for 58120304 (coffee shop),</li> </ul>	<ul style="list-style-type: none"> <li>• 581206 (food-carry out)</li> <li>• 581219 (sandwiches)</li> <li>• 581208 (delicatessens)</li> <li>• 581229 (deli-bakery)</li> </ul>
Full service restaurants	<ul style="list-style-type: none"> <li>• 581200 (eating places)</li> <li>• 581201 (ethnic food restaurants)</li> <li>• 581204 (lunchroom and cafeterias)</li> <li>• 581205 (family restaurants)</li> <li>• 581206 (pizza restaurants)</li> <li>• 581207 (seafood restaurants)</li> <li>• 581208 (steak and barbecue restaurants)</li> <li>• 581209 (eating places, nec) except for 58129903 (caterers), and 58129906 (contract food services)</li> </ul>	<ul style="list-style-type: none"> <li>• 581201 (Luau's)</li> <li>• 581208 (Restaurants)</li> <li>• 581215 (Box lunches)</li> <li>• 581224 (Barbecue)</li> <li>• 581232 (Chow mein &amp; Chop suey)</li> <li>• 581233 (Jewish foods)</li> <li>• 581240 (Chuck wagon dinners)</li> <li>• 581245 (Escargots)</li> <li>• 581247 (Restaurants with liquor)</li> <li>• 581250 (Wedding rehearsal restaurants)</li> <li>• 581251 (Restaurants-family dining)</li> <li>• 581202 (Greek food products)</li> <li>• 581211 (Chicken dinners)</li> <li>• 581222 (Pizza)</li> <li>• 581227 (Italian food products)</li> <li>• 581235 (Fine dining)</li> <li>• 581244 (Oyster bars)</li> <li>• 581246 (Chili parlors)</li> <li>• 581249 (Restaurants-reservations)</li> <li>• 581252 (Cajun products)</li> </ul>
Specialty restaurants	<ul style="list-style-type: none"> <li>• 581202 (ice cream, soft drink, and soda fountain stand)</li> <li>• 58120304 (coffee shop)</li> <li>• 58129903 (caterers)</li> <li>• 58129906 (contract food services)</li> </ul>	<ul style="list-style-type: none"> <li>• 581203 Ice cream parlors</li> <li>• 581205 Hamburgers &amp; hot dog stands</li> <li>• 581210 Commissary contractors</li> <li>• 581213 Cafeterias</li> <li>• 581220 Restaurant management</li> <li>• 581221 Refreshment stands</li> <li>• 581225 Beverages-Non alcoholic-retail</li> <li>• 581226 Theaters-dinner</li> <li>• 581231 Food service -Industrial</li> <li>• 581234 Reception Centers</li> <li>• 581236 Tea Rooms</li> <li>• 581237 Dessert Preparations</li> <li>• 581238 Cafeterias-Industrial-Operators</li> <li>• 581239 Catering-Kosher</li> <li>• 581241 Milk Bars</li> <li>• 581242 Mobile Concessions</li> <li>• 581243 Luncheonette Food Supply</li> <li>• 581248 Juice Bars</li> <li>• 581253 Meal Preparation Services</li> <li>• 581204 Wedding cakes</li> <li>• 581207 Foods-Institutional</li> <li>• 581212 Caterers</li> <li>• 581214 Cafes</li> <li>• 5581223 Banquet rooms</li> <li>• 581230 Restaurants-foods delivery</li> </ul>

# Statistical Analyses

- Calculated the extent to which categorization of retail outlets based on ground-survey matched the classification in each of the business lists by retailer type
- Analyzed whether retailer characteristics differed based on the match status of the outlets (between the on-ground survey and the business list classifications) for different outlet types.
- Explored the extent to which the accuracy in the classification of the outlets was associated with neighborhood characteristics in multivariate regression models.

# Results



# Results: Concordance in classification between on-ground survey and business lists for food stores

Classification in business list	Classification in ground survey			
	Super-market	Grocery	Conv	Specialty
D&B	N=67	N=148	N=293	N=104
Supermarket	54%	11%	5%	1%
Grocery stores	37%	64%	26%	14%
Supermarket + Grocery	91%	75%	31%	15%
Convenience stores	0%	6%	24%	1%
Specialty food stores	9%	19%	45%	84%
Total	100%	100%	100%	100%

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Convenience stores	0%	6%	24%	1%
Specialty food stores	9%	19%	45%	84%
Total	100%	100%	100%	100%
InfoUSA	N=73	N=172	N=344	N=140
Supermarket	– †	– †	– †	– †
Grocery stores	– †	– †	– †	– †
Supermarket + Grocery	81%	69%	19%	14%
Convenience stores	1%	13%	49%	1%
Specialty restaurants	18%	18%	32%	85%
Total	100	100	100	100

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# Results: Concordance in classification between on-ground survey and business lists for restaurants

Classification in business list	Classification in ground-survey			
	Chain fast food	Non-chain fast food	Full service	Specialty
D&B	N=340	N=531	N=737	N=109
Fast food restaurants	68%	18%	8%	1%
Full service restaurants	29%	82%	91%	27%
Specialty restaurants	3%	0%	1%	72%
Total	100%	100%	100%	100%

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	Chain fast food	Non-chain fast food	Full service	Specialty
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Fast food restaurants	68%	18%	8%	1%
Full service restaurants	29%	82%	91%	27%
Specialty restaurants	3%	0%	1%	72%
Total	100%	100%	100%	100%
InfoUSA	N=450	N=613	N=840	N=143
Fast food restaurants	42%	22%	15%	4%
Full service restaurants	57%	77%	84%	15%
Specialty restaurants	1%	1%	1%	81%
Total	100	100	100	100

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# Results: Comparison of food store characteristics by match status and food store classification

D&B	Supermarket	
	No Match	Match
Number of cash registers	<b>7.13</b>	<b>10.69</b>
Does the store sell/have Fresh milk	100.0	100.0
Fresh meat	100.0	100.0
Fresh produce section	100.0	100.0
# of different types of fresh fruits : 0	0.0	0.0
# of different types of fresh fruits : 1-9	0.0	0.0
# of different types of fresh fruits : 10-19	0.0	0.0
# of different types of fresh fruits : >=20	100.0	100.0
Have a pharmacy	<b>3.2</b>	<b>80.6</b>
Have a bank	<b>6.5</b>	<b>72.2</b>
Have a deli	<b>58.1</b>	<b>94.4</b>
Have a bakery	100.0	100.0
Have a butcher or unpackaged fresh meat	93.6	94.4
Attached to a gas station	0.0	5.6
Attached to a restaurant	9.7	11.1

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# Results: Comparison of food store characteristics by match status and food store classification

D&B	Supermarket		Grocery	
	No Match	Match	No Match	Match
Number of cash registers	<b>7.13</b>	<b>10.69</b>	1.94	1.89
Does the store sell/have Fresh milk	100.0	100.0	96.3	91.5
Fresh meat	100.0	100.0	67.9	80.9
Fresh produce section	100.0	100.0	<b>59.3</b>	<b>82.8</b>
# of different types of fresh fruits : 0	0.0	0.0	<b>27.8</b>	<b>7.5</b>
# of different types of fresh fruits : 1-9	0.0	0.0	14.8	14.9
# of different types of fresh fruits : 10-19	0.0	0.0	31.5	35.1
# of different types of fresh fruits : >=20	100.0	100.0	25.9	42.6
Have a pharmacy	<b>3.2</b>	<b>80.6</b>	0.0	0.0
Have a bank	<b>6.5</b>	<b>72.2</b>	0.0	1.1
Have a deli	<b>58.1</b>	<b>94.4</b>	3.8	4.3
Have a bakery	100.0	100.0	44.2	36.2
Have a butcher or unpackaged fresh meat	93.6	94.4	<b>58.5</b>	<b>75.5</b>
Attached to a gas station	0.0	5.6	<b>20.4</b>	<b>0.0</b>
Attached to a restaurant	9.7	11.1	20.4	10.8

## bridging the gap

# Results: Comparison of food store characteristics by match status and food store classification

D&B	Supermarket		Grocery		Convenience store	
	No Match	Match	No Match	Match	No Match	Match
Number of cash registers	<b>7.13</b>	<b>10.69</b>	1.94	1.89	<b>1.31</b>	<b>1.49</b>
Does the store sell/have Fresh milk	100.0	100.0	96.3	91.5	98.7	100.0
Fresh meat	100.0	100.0	67.9	80.9	0.0	0.0
Fresh produce section	100.0	100.0	<b>59.3</b>	<b>82.8</b>	4.0	5.7
# of different types of fresh fruits : 0	0.0	0.0	<b>27.8</b>	<b>7.5</b>	<b>85.2</b>	<b>50.0</b>
# of different types of fresh fruits : 1-9	0.0	0.0	14.8	14.9	<b>14.8</b>	<b>50.0</b>
# of different types of fresh fruits : 10-19	0.0	0.0	31.5	35.1	0.0	0.0
# of different types of fresh fruits : >=20	100.0	100.0	25.9	42.6	0.0	0.0
Have a pharmacy	<b>3.2</b>	<b>80.6</b>	0.0	0.0	0.0	0.0
Have a bank	<b>6.5</b>	<b>72.2</b>	0.0	1.1	0.0	0.0
Have a deli	<b>58.1</b>	<b>94.4</b>	3.8	4.3	0.0	0.0
Have a bakery	100.0	100.0	44.2	36.2	3.1	2.9
Have a butcher or unpackaged fresh meat	93.6	94.4	<b>58.5</b>	<b>75.5</b>	0.0	0.0
Attached to a gas station	0.0	5.6	<b>20.4</b>	<b>0.0</b>	<b>61.9</b>	<b>30.0</b>
Attached to a restaurant	9.7	11.1	20.4	10.8	8.6	4.3

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# Results: Comparison of food store characteristics by match status and food store classification

D&B	Supermarket		Grocery		Convenience store		Other store	
	No Match	Match	No Match	Match	No Match	Match	No Match	Match
Number of cash registers	<b>7.13</b>	<b>10.69</b>	1.94	1.89	<b>1.31</b>	<b>1.49</b>	1.18	1.15
Does the store sell/have Fresh milk	100.0	100.0	96.3	91.5	98.7	100.0	23.5	20.7
Fresh meat	100.0	100.0	67.9	80.9	0.0	0.0	<b>52.9</b>	<b>16.1</b>
Fresh produce section	100.0	100.0	<b>59.3</b>	<b>82.8</b>	4.0	5.7	<b>23.5</b>	<b>6.9</b>
# of different types of fresh fruits : 0	0.0	0.0	<b>27.8</b>	<b>7.5</b>	<b>85.2</b>	<b>50.0</b>	<b>52.9</b>	<b>92.0</b>
# of different types of fresh fruits : 1-9	0.0	0.0	14.8	14.9	<b>14.8</b>	<b>50.0</b>	<b>29.4</b>	<b>3.5</b>
# of different types of fresh fruits : 10-19	0.0	0.0	31.5	35.1	0.0	0.0	<b>17.7</b>	<b>1.2</b>
# of different types of fresh fruits : >=20	100.0	100.0	25.9	42.6	0.0	0.0	0.0	3.5
Have a pharmacy	<b>3.2</b>	<b>80.6</b>	0.0	0.0	0.0	0.0	0.0	0.0
Have a bank	<b>6.5</b>	<b>72.2</b>	0.0	1.1	0.0	0.0	0.0	0.0
Have a deli	<b>58.1</b>	<b>94.4</b>	3.8	4.3	0.0	0.0	17.7	49.4
Have a bakery	100.0	100.0	44.2	36.2	3.1	2.9	<b>23.5</b>	<b>6.9</b>
Have a butcher or unpackaged fresh meat	93.6	94.4	<b>58.5</b>	<b>75.5</b>	0.0	0.0	<b>41.2</b>	<b>14.9</b>
Attached to a gas station	0.0	5.6	<b>20.4</b>	<b>0.0</b>	<b>61.9</b>	<b>30.0</b>	0.0	0.0
Attached to a restaurant	9.7	11.1	20.4	10.8	8.6	4.3	23.5	9.2

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# Results: Comparison of food store characteristics by match status and food store classification

InfoUSA	Supermarket	
	No Match	Match
Number of cash registers	<b>3.08</b>	<b>4.90</b>
Does the store sell/have Fresh milk	94.1	95.5
Fresh meat	<b>71.6</b>	<b>88.1</b>
Fresh produce section	<b>64.7</b>	<b>89.2</b>
Number of different types of fresh fruits : 0	<b>19.1</b>	<b>4.5</b>
Number of different types of fresh fruits : 1-9	<b>25.0</b>	<b>7.3</b>
Number of different types of fresh fruits : 10-19	16.2	24.3
Number of different types of fresh fruits : >= 20	39.7	63.3
Have a pharmacy	7.5	13.6
Have a bank	<b>5.9</b>	<b>16.4</b>
Have a deli	20.6	25.9
Have a bakery	51.5	53.7
Have a butcher or unpackaged fresh meat	<b>60.3</b>	<b>76.3</b>

## bridging the gap

# Results: Comparison of food store characteristics by match status and food store classification

InfoUSA	Supermarket		Convenience store	
	No Match	Match	No Match	Match
Number of cash registers	<b>3.08</b>	<b>4.90</b>	<b>1.12</b>	<b>1.38</b>
Does the store sell/have Fresh milk	94.1	95.5	98.6	99.6
Fresh meat	<b>71.6</b>	<b>88.1</b>	0	0
Fresh produce section	<b>64.7</b>	<b>89.2</b>	<b>10.9</b>	<b>3.3</b>
Number of different types of fresh fruits : 0	<b>19.1</b>	<b>4.5</b>	<b>57.5</b>	<b>80.8</b>
Number of different types of fresh fruits : 1-9	<b>25.0</b>	<b>7.3</b>	<b>42.5</b>	<b>19.2</b>
Number of different types of fresh fruits : 10-19	16.2	24.3	0	0
Number of different types of fresh fruits : >= 20	39.7	63.3	0	0
Have a pharmacy	7.5	13.6	0	0
Have a bank	<b>5.9</b>	<b>16.4</b>	0	0
Have a deli	20.6	25.9	0	0
Have a bakery	51.5	53.7	<b>8.2</b>	<b>1.8</b>
Have a butcher or unpackaged fresh meat	<b>60.3</b>	<b>76.3</b>	0	0

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# Results: Comparison of food store characteristics by match status and food store classification

InfoUSA	Supermarket		Convenience store		Other store	
	No Match	Match	No Match	Match	No Match	Match
Number of cash registers	<b>3.08</b>	<b>4.90</b>	<b>1.12</b>	<b>1.38</b>	1.24	1.24
Does the store sell/have Fresh milk	94.1	95.5	98.6	99.6	<b>38.1</b>	<b>17.0</b>
Fresh meat	<b>71.6</b>	<b>88.1</b>	0	0	<b>38.1</b>	<b>9.2</b>
Fresh produce section	<b>64.7</b>	<b>89.2</b>	<b>10.9</b>	<b>3.3</b>	<b>42.9</b>	<b>2.5</b>
Number of different types of fresh fruits : 0	<b>19.1</b>	<b>4.5</b>	<b>57.5</b>	<b>80.8</b>	<b>38.1</b>	<b>97.5</b>
Number of different types of fresh fruits : 1-9	<b>25.0</b>	<b>7.3</b>	<b>42.5</b>	<b>19.2</b>	<b>28.6</b>	<b>0.8</b>
Number of different types of fresh fruits : 10-19	16.2	24.3	0	0	<b>19.1</b>	<b>0</b>
Number of different types of fresh fruits : >= 20	39.7	63.3	0	0	14.3	1.7
Have a pharmacy	7.5	13.6	0	0	0	0
Have a bank	<b>5.9</b>	<b>16.4</b>	0	0	0	0
Have a deli	20.6	25.9	0	0	<b>0</b>	<b>52.9</b>
Have a bakery	51.5	53.7	<b>8.2</b>	<b>1.8</b>	14.3	5.0
Have a butcher or unpackaged fresh meat	<b>60.3</b>	<b>76.3</b>	0	0	0	0

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# Results: Comparison of restaurant characteristics by match status and restaurant classification

D&B	Fast food chain	
	No match	match
Indoor seating available	92.1	91.6
A bar with seating, serving alcohol available	1.3	0.0
Attached to or within a convenience store	1.3	1.1
Attached to or within a grocery	0.0	0.0
Attached to another restaurant	5.3	2.7
Attached to a gas station	0.0	1.5
In a Food court in a mall	<b>13.2</b>	<b>2.7</b>
Within a general merchandise store	0.0	0.8
A drive-through window for ordering available	<b>17.1</b>	<b>48.7</b>

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# Results: Comparison of restaurant characteristics by match status and restaurant classification

D&B	Fast food chain		Fast food non-chain	
	No match	match	No match	match
Indoor seating available	92.1	91.6	82.1	83.2
A bar with seating, serving alcohol available	1.3	0.0	3.2	3.2
Attached to or within a convenience store	1.3	1.1	0.5	2.1
Attached to or within a grocery	0.0	0.0	0.5	1.1
Attached to another restaurant	5.3	2.7	1.6	2.1
Attached to a gas station	0.0	1.5	0.5	2.1
In a Food court in a mall	<b>13.2</b>	<b>2.7</b>	3.2	1.1
Within a general merchandise store	0.0	0.8	0.2	0.0
A drive-through window for ordering available	<b>17.1</b>	<b>48.7</b>	4.8	6.3

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# Results: Comparison of restaurant characteristics by match status and restaurant classification

D&B	Fast food chain		Fast food non-chain		Full service	
	No match	match	No match	match	No match	match
Indoor seating available	92.1	91.6	82.1	83.2	<b>98.4</b>	<b>100.0</b>
A bar with seating, serving alcohol available	1.3	0.0	3.2	3.2	39.7	46.7
Attached to or within a convenience store	1.3	1.1	0.5	2.1	<b>1.6</b>	<b>0.2</b>
Attached to or within a grocery	0.0	0.0	0.5	1.1	0.0	0.3
Attached to another restaurant	5.3	2.7	1.6	2.1	0.0	0.6
Attached to a gas station	0.0	1.5	0.5	2.1	0.0	0.0
In a Food court in a mall	<b>13.2</b>	<b>2.7</b>	3.2	1.1	0.0	0.3
Within a general merchandise store	0.0	0.8	0.2	0.0	0.0	0.0
A drive-through window for ordering available	<b>17.1</b>	<b>48.7</b>	4.8	6.3	<b>6.4</b>	<b>0.8</b>

## bridging the gap

# Results: Comparison of restaurant characteristics by match status and restaurant classification

D&B	Fast food chain		Fast food non-chain		Full service		Specialty	
	No match	match	No match	match	No match	match	No match	match
Indoor seating available	92.1	91.6	82.1	83.2	<b>98.4</b>	<b>100.0</b>	93.1	94.9
A bar with seating, serving alcohol available	1.3	0.0	3.2	3.2	39.7	46.7	<b>6.9</b>	<b>0.0</b>
Attached to or within a convenience store	1.3	1.1	0.5	2.1	<b>1.6</b>	<b>0.2</b>	0.0	1.3
Attached to or within a grocery	0.0	0.0	0.5	1.1	0.0	0.3	0.0	0.0
Attached to another restaurant	5.3	2.7	1.6	2.1	0.0	0.6	<b>0.0</b>	<b>14.1</b>
Attached to a gas station	0.0	1.5	0.5	2.1	0.0	0.0	0.0	1.3
In a Food court in a mall	<b>13.2</b>	<b>2.7</b>	3.2	1.1	0.0	0.3	0.0	3.9
Within a general merchandise store	0.0	0.8	0.2	0.0	0.0	0.0	0.0	0.0
A drive-through window for ordering available	<b>17.1</b>	<b>48.7</b>	4.8	6.3	<b>6.4</b>	<b>0.8</b>	<b>0.0</b>	<b>15.6</b>

## bridging the gap

# Results: Comparison of restaurant characteristics by match status and restaurant classification

InfoUSA	Fast food chain	
	No match	match
Indoor seating available	<b>97.9</b>	<b>74.5</b>
A bar with seating, serving alcohol available	0.3	0.0
Attached to or within a convenience store	1.7	1.4
Attached to or within a grocery	0.0	0.7
Attached to another restaurant	3.8	1.4
Attached to a gas station	2.1	0.7
In a Food court in a mall	5.1	4.8
Within a general merchandise store	<b>2.1</b>	<b>0.0</b>
A drive-through window for ordering available	<b>51.6</b>	<b>16.6</b>

## bridging the gap



# Results: Comparison of restaurant characteristics by match status and restaurant classification

InfoUSA	Fast food chain		Fast food non-chain	
	No match	match	No match	match
Indoor seating available	<b>97.9</b>	<b>74.5</b>	<b>85.2</b>	<b>66.4</b>
A bar with seating, serving alcohol available	0.3	0.0	3.6	0.8
Attached to or within a convenience store	1.7	1.4	0.6	2.2
Attached to or within a grocery	0.0	0.7	0.2	1.5
Attached to another restaurant	3.8	1.4	1.9	0.8
Attached to a gas station	2.1	0.7	0.4	0.8
In a Food court in a mall	5.1	4.8	2.7	1.5
Within a general merchandise store	<b>2.1</b>	<b>0.0</b>	0.2	0.0
A drive-through window for ordering available	<b>51.6</b>	<b>16.6</b>	6.3	2.2

## bridging the gap

# Results: Comparison of restaurant characteristics by match status and restaurant classification

InfoUSA	Fast food chain		Fast food non-chain		Full service	
	No match	match	No match	match	No match	match
Indoor seating available	<b>97.9</b>	<b>74.5</b>	<b>85.2</b>	<b>66.4</b>	100.0	100.0
A bar with seating, serving alcohol available	0.3	0.0	3.6	0.8	<b>32.8</b>	<b>47.0</b>
Attached to or within a convenience store	1.7	1.4	0.6	2.2	<b>1.6</b>	<b>0.1</b>
Attached to or within a grocery	0.0	0.7	0.2	1.5	0.0	0.3
Attached to another restaurant	3.8	1.4	1.9	0.8	1.6	0.7
Attached to a gas station	2.1	0.7	0.4	0.8	0.0	0.1
In a Food court in a mall	5.1	4.8	2.7	1.5	0.0	0.1
Within a general merchandise store	<b>2.1</b>	<b>0.0</b>	0.2	0.0	0.0	0.0
A drive-through window for ordering available	<b>51.6</b>	<b>16.6</b>	6.3	2.2	<b>7.9</b>	<b>0.7</b>

## bridging the gap

# Results: Comparison of restaurant characteristics by match status and restaurant classification

InfoUSA	Fast food chain		Fast food non-chain		Full service		Specialty	
	No match	match	No match	match	No match	match	No match	match
Indoor seating available	<b>97.9</b>	<b>74.5</b>	<b>85.2</b>	<b>66.4</b>	100.0	100.0	96.0	94.8
A bar with seating, serving alcohol available	0.3	0.0	3.6	0.8	<b>32.8</b>	<b>47.0</b>	<b>8.0</b>	<b>0.0</b>
Attached to or within a convenience store	1.7	1.4	0.6	2.2	<b>1.6</b>	<b>0.1</b>	<b>4.0</b>	<b>0.0</b>
Attached to or within a grocery	0.0	0.7	0.2	1.5	0.0	0.3	4.0	4.4
Attached to another restaurant	3.8	1.4	1.9	0.8	1.6	0.7	0.0	9.6
Attached to a gas station	2.1	0.7	0.4	0.8	0.0	0.1	<b>4.0</b>	<b>0.0</b>
In a Food court in a mall	5.1	4.8	2.7	1.5	0.0	0.1	0.0	3.5
Within a general merchandise store	<b>2.1</b>	<b>0.0</b>	0.2	0.0	0.0	0.0	0.0	4.4
A drive-through window for ordering available	<b>51.6</b>	<b>16.6</b>	6.3	2.2	<b>7.9</b>	<b>0.7</b>	0.0	11.4

## bridging the gap

## Results: Associations of census tract characteristics with the likelihood of classification match by retailer type

Food Store: D&B	Super- market
Hispanic	0.4001 (0.2408)
Black	1.0559 (0.6008)
Mixed race	1.4113 (0.6114)
Middle income	1.0653 (0.4812)
High income	1.2031 (0.6431)
N	612

## Results: Associations of census tract characteristics with the likelihood of classification match by retailer type

Food Store: D&B	Super- market	Grocery
Hispanic	0.4001 (0.2408)	1.2639 (0.5151)
Black	1.0559 (0.6008)	0.7499 (0.2940)
Mixed race	1.4113 (0.6114)	0.5684 (0.1852)
Middle income	1.0653 (0.4812)	0.966 (0.2646)
High income	1.2031 (0.6431)	1.3043 (0.5068)
N	612	612

## Results: Associations of census tract characteristics with the likelihood of classification match by retailer type

Food Store: D&B	Super- market	Grocery	Conv.
Hispanic	0.4001 (0.2408)	1.2639 (0.5151)	2.7429*** (0.9268)
Black	1.0559 (0.6008)	0.7499 (0.2940)	0.2932*** (0.1030)
Mixed race	1.4113 (0.6114)	0.5684 (0.1852)	0.8327 (0.2491)
Middle income	1.0653 (0.4812)	0.966 (0.2646)	0.841 (0.2053)
High income	1.2031 (0.6431)	1.3043 (0.5068)	1.0486 (0.3510)
N	612	612	612

## Results: Associations of census tract characteristics with the likelihood of classification match by retailer type

Food Store: D&B	Super- market	Grocery	Conv.	Specialty
Hispanic	0.4001 (0.2408)	1.2639 (0.5151)	2.7429*** (0.9268)	4.4450*** (1.7615)
Black	1.0559 (0.6008)	0.7499 (0.2940)	0.2932*** (0.1030)	0.7735 (0.2724)
Mixed race	1.4113 (0.6114)	0.5684 (0.1852)	0.8327 (0.2491)	1.563 (0.4864)
Middle income	1.0653 (0.4812)	0.966 (0.2646)	0.841 (0.2053)	0.7884 (0.2044)
High income	1.2031 (0.6431)	1.3043 (0.5068)	1.0486 (0.3510)	0.6093 (0.2013)
N	612	612	612	612

# Results: Associations of census tract characteristics with the likelihood of classification match by retailer type

<b>Food store: InfoUSA</b>	<b>Supermarket /Grocery</b>
Hispanic	1.4512 (0.4282)
Black	0.8169 (0.3096)
Mixed race	0.8103 (0.2522)
Middle income	1.5333 (0.4128)
High income	1.4804 (0.5057)
N	729



# Results: Associations of census tract characteristics with the likelihood of classification match by retailer type

<b>Food store: InfoUSA</b>	<b>Supermarket /Grocery</b>	<b>Conv.</b>
Hispanic	1.4512 (0.4282)	1.4859 (0.4627)
Black	0.8169 (0.3096)	0.5092** (0.1632)
Mixed race	0.8103 (0.2522)	1.2273 (0.3545)
Middle income	1.5333 (0.4128)	1.0041 (0.2352)
High income	1.4804 (0.5057)	1.5749 (0.4952)
N	729	729

# Results: Associations of census tract characteristics with the likelihood of classification match by retailer type

Food store: InfoUSA	Supermarket /Grocery	Conv.	Specialty
Hispanic	1.4512 (0.4282)	1.4859 (0.4627)	4.9112*** (1.7188)
Black	0.8169 (0.3096)	0.5092** (0.1632)	1.6063 (0.5585)
Mixed race	0.8103 (0.2522)	1.2273 (0.3545)	1.1900 (0.3436)
Middle income	1.5333 (0.4128)	1.0041 (0.2352)	1.022 (0.2509)
High income	1.4804 (0.5057)	1.5749 (0.4952)	1.1167 (0.3417)
N	729	729	729

# Results: Associations of census tract characteristics with the likelihood of classification match by retailer type

<b>Restaurant: D&amp;B</b>	<b>Fast food chain</b>
Hispanic	0.4683 (0.4228)
Black	1.0247 (0.5537)
Mixed race	0.9495 (0.2955)
Middle income	0.3684** (0.1548)
High income	0.2389*** (0.0986)
N	1717

# Results: Associations of census tract characteristics with the likelihood of classification match by retailer type

<b>Restaurant: D&amp;B</b>	<b>Fast food chain</b>	<b>Fast food non-chain</b>
Hispanic	0.4683 (0.4228)	0.7987 (0.2532)
Black	1.0247 (0.5537)	0.1439*** (0.0368)
Mixed race	0.9495 (0.2955)	0.6075*** (0.0979)
Middle income	0.3684** (0.1548)	0.9655 (0.1665)
High income	0.2389*** (0.0986)	1.0043 (0.1793)
N	1717	1717

# Results: Associations of census tract characteristics with the likelihood of classification match by retailer type

<b>Restaurant: D&amp;B</b>	<b>Fast food chain</b>	<b>Fast food non-chain</b>	<b>Full service</b>
Hispanic	0.4683 (0.4228)	0.7987 (0.2532)	0.7114 (0.2237)
Black	1.0247 (0.5537)	0.1439*** (0.0368)	0.1446*** (0.0374)
Mixed race	0.9495 (0.2955)	0.6075*** (0.0979)	0.6187*** (0.0946)
Middle income	0.3684** (0.1548)	0.9655 (0.1665)	0.888 (0.1487)
High income	0.2389*** (0.0986)	1.0043 (0.1793)	0.7988 (0.1359)
N	1717	1717	1717

# Results: Associations of census tract characteristics with the likelihood of classification match by retailer type

<b>Restaurant: D&amp;B</b>	<b>Fast food chain</b>	<b>Fast food non-chain</b>	<b>Full service</b>	<b>Specialty</b>
Hispanic	0.4683 (0.4228)	0.7987 (0.2532)	0.7114 (0.2237)	2.3774 (1.9212)
Black	1.0247 (0.5537)	0.1439*** (0.0368)	0.1446*** (0.0374)	2.7869 (3.3315)
Mixed race	0.9495 (0.2955)	0.6075*** (0.0979)	0.6187*** (0.0946)	2.2645** (0.9386)
Middle income	0.3684** (0.1548)	0.9655 (0.1665)	0.888 (0.1487)	1.1088 (0.5248)
High income	0.2389*** (0.0986)	1.0043 (0.1793)	0.7988 (0.1359)	1.2768 (0.5676)
N	1717	1717	1717	1717

# Results: Associations of census tract characteristics with the likelihood of classification match by retailer type

<b>Restaurant: InfoUSA</b>	<b>Fast food chain</b>
Hispanic	1.6132 (0.9932)
Black	1.2939 (1.0096)
Mixed race	1.7088 (0.7515)
Middle income	1.4072 (0.6229)
High income	1.3796 (0.5959)
N	2046

# Results: Associations of census tract characteristics with the likelihood of classification match by retailer type

<b>Restaurant: InfoUSA</b>	<b>Fast food chain</b>	<b>Fast food non-chain</b>
Hispanic	1.6132 (0.9932)	0.8875 (0.2588)
Black	1.2939 (1.0096)	0.1650*** (0.0442)
Mixed race	1.7088 (0.7515)	0.7974 (0.1080)
Middle income	1.4072 (0.6229)	0.8347 (0.1213)
High income	1.3796 (0.5959)	0.9026 (0.1319)
N	2046	2046



# Results: Associations of census tract characteristics with the likelihood of classification match by retailer type

Restaurant: InfoUSA	Fast food chain	Fast food non-chain	Full service
Hispanic	1.6132 (0.9932)	0.8875 (0.2588)	0.9211 (0.4507)
Black	1.2939 (1.0096)	0.1650*** (0.0442)	1.6026 (0.4729)
Mixed race	1.7088 (0.7515)	0.7974 (0.1080)	1.4537** (0.2735)
Middle income	1.4072 (0.6229)	0.8347 (0.1213)	0.7056* (0.1361)
High income	1.3796 (0.5959)	0.9026 (0.1319)	0.7318 (0.1395)
N	2046	2046	2046

# Results: Associations of census tract characteristics with the likelihood of classification match by retailer type

Restaurant: InfoUSA	Fast food chain	Fast food non-chain	Full service	Specialty
Hispanic	1.6132 (0.9932)	0.8875 (0.2588)	0.9211 (0.4507)	0.916 (0.2897)
Black	1.2939 (1.0096)	0.1650*** (0.0442)	1.6026 (0.4729)	0.1298*** (0.0312)
Mixed race	1.7088 (0.7515)	0.7974 (0.1080)	1.4537** (0.2735)	0.5836*** (0.0876)
Middle income	1.4072 (0.6229)	0.8347 (0.1213)	0.7056* (0.1361)	0.9968 (0.1592)
High income	1.3796 (0.5959)	0.9026 (0.1319)	0.7318 (0.1395)	1.0575 (0.1740)
N	2046	2046	2046	2046

# Implications

## What we Learned ...

- We found statistically significant differences in retailer characteristics by classification match status.
  - Large supermarkets and grocery stores and specialty food stores with fresh produce or meat tended to be more accurately classified in both business lists.
  - Convenience stores with some fresh fruits and vegetables were more likely to be listed as a convenience store in D&B whereas it was opposite in InfoUSA.
  - Convenience stores attached to a gas station were less likely to be listed as such in D&B whereas it was opposite in InfoUSA.
  - Restaurants that were attached to or within another retailer were less likely to be classified correctly in InfoUSA.

## What we Learned ...

- Our multivariate regression models showed that:
  - The likelihood of classification match for supermarkets and grocery stores did not vary by tract characteristics in both D&B and InfoUSA.
  - The likelihoods of classification match for convenience stores, non-chain fast food restaurants, and full service restaurants were statistically significantly lower in Black census tracts as compared to White tracts in both business lists.
  - Classification match for convenience stores (D&B only) and specialty food stores were significantly higher in Hispanic tracts than non-Hispanic tracts.

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