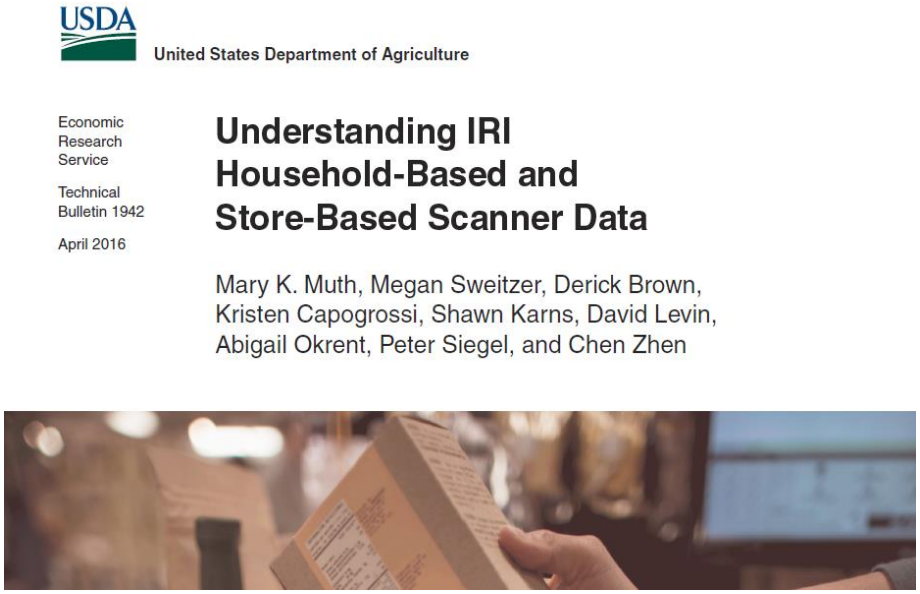
Assessment of Commercial Store and Household Scanner Data: Methods, Content, and Cautions

Presented at FCSM/WSS Workshop on Transparent Reporting on the Quality of Integrated Data, Washington, DC, December 1, 2017

Mary K. Muth

Director, Food, Nutrition, & Obesity Policy Research Program



Acknowledgments and Disclaimer

- Most of the content for this presentation was developed under Agreement 58-5000-3-0069 with the U.S. Department of Agriculture (USDA), Economic Research Service (ERS) and under data use agreements with IRI to access the InfoScan and Consumer Network data.

- Collaborators on this work include Megan Sweitzer (ERS), Abigail Okrent (ERS), David Levin (ERS), Shawn Karns (RTI), Peter Siegel (RTI), Derick Brown (RTI), and Chen Zhen (UGA).

- Any opinions, findings, conclusions, or recommendations expressed in this presentation are not attributable to USDA, ERS, or IRI.

Introduction

- Primary types of scanner data available from commercial suppliers (specifically, IRI and Nielsen in the U.S.)
  - Store-based
  - Household-based

- *Advantages of scanner data*
  - Provide high frequency product prices and purchase quantities at the store-keeping unit (SKU) level
    - By Universal Product Code (UPC) or Price Lookup Code (PLU)
    - By individual household, individual store, or geographic area

- *Considerations in using scanner data*
  - Cost of purchasing or obtaining license to use the data
  - Limited availability of documentation on sampling, data collection, and weighting methods
  - Representativeness depending on particular application
  - Potential restrictions on release of analysis results

Introduction (continued)

- Examples of current government uses
  - Construct prices for ERS Quarterly Food at Home Price Database
  - Calculate cost of the WIC food package
  - Calculate cost of the Thrifty Food Plan, which is the basis for the SNAP allotment formula (updated using CPI)

- Importance of understanding the properties of the data
  - Sample selection methods
  - Data collection and processing methods
  - Weighting methods
  - Comparisons to other data sources

IRI InfoScan Store Scanner Data: Contents

- Data obtained from transactions data provided by retailers to IRI
  - Includes IRI "census" stores that have agreed to provide sales for all stores
    - Excludes "sampled" stores that IRI randomly selects from the remainder
  - Includes private label (store brand) sales from selected retailers
    - A few retailers only release data at the brand/category level, which means package size information is not available
  - Some retailers release individual store data while others aggregate to retailer marketing area (RMA)

- Data obtained by ERS represent an unprojected (unweighted) subset of the total IRI store data

- Dataset components:
  - Week
  - Store ID or geography key (RMA-level data)
  - UPC code (indicating package size)
  - Quantity
  - Total value of purchase
  - Can be linked to store and product information

InfoScan Store Scanner Data: Data Collection Procedures

- IRI receives daily sales data from retailers including products with UPCs and random-weight products
  - Retailers aggregate individual transactions to the UPC or product level
  - IRI aggregates to a weekly level and conducts quality control checks

- Note about random-weight and uniform-weight perishable products (e.g., fresh produce, meat, deli, bakery)
  - Some products are scanned
    - Products with UPC codes (uniform-weight)
    - Products that are pre-weighed and labeled at the store
  - Some products are weighed and product codes are entered by the cashier
    - Products with price lookup codes (PLUs)

- Most retailers report total units sold and total dollars
  - Total dollars are net of loyalty card discounts
  - Can calculate unit prices (e.g. price per ounce) by dividing weighted-average price by number of units in the package

InfoScan Store Scanner Data: Store Counts

Numbers of Stores Represented, 2012

	UPC			Random weight		
	Store-level	RMA-level	Total	Store-level	RMA-level	Total
Convenience	9,613	0	9,613	0	0	0
Defense	515	10	525	0	0	0
Dollar	8,237	0	8,237	1,282	0	1,282
Drug	12,497	7,358	19,855	12,176	7,341	19,517
Grocery	7,100	5,743	12,841	6,720	5,743	12,463
Liquor	341	464	805	0	0	0
Mass/club	3,140	4,521	7,661	1,786	4,485	6,271
Total	**41,443**	**18,096**	**59,537**	**21,964**	**17,569**	**39,533**

InfoScan Store Scanner Data: Comparisons

InfoScan Relative to Census Bureau Data, 2012

	Percentage of Stores			Percentage of Sales		
	Store-level	RMA-level	Total	Store-level	RMA-level	Total
Convenience	36%	0%	36%	35%	NA	35%
Dollar	23%	0%	23%	19%	NA	19%
Drug	29%	17%	46%	69%	50%	119%
Grocery	25%	20%	46%	25%	25%	50%
Liquor	1%	1%	2%	2%	4%	7%
Mass/club	61%	88%	150%	9%	70%	79%
Total	**28%**	**12%**	**41%**	**22%**	**34%**	**55%**

Census Bureau estimates are from the 2012 Economic Census, Industry Series.

InfoScan Store Scanner Data: Considerations

- Stores represented in the data
  - Data collection process is not designed to capture sales from smaller, independent stores
- Private-label product data
  - Not provided by all retailers
  - Aggregation of data by some retailers prevents calculation of unit prices
- Random-weight data (e.g., produce, meat, deli, bakery)
  - Only available for some stores
  - Product information is limited
  - Must determine if units are weights or counts
- Projection factors (or weights)
  - Not provided with ERS data; therefore unable to calculate national estimates
  - RTI has a contract to develop weights for use by ERS

IRI Consumer Network Household Scanner Data: Contents

- Data obtained from the National Consumer Panel (joint venture between IRI and Nielsen)
  - Households are recruited online and complete demographic survey
  - Households are randomly selected to meet quotas by demographic category
  - Household record purchases using an in-home scanner or mobile app
- Data are weighted using a raking (IPF) procedure
- Dataset components:
  - Purchase date
  - Household ID
  - Store ID
  - UPC code
  - Quantity
  - Price (and use of coupons or deals)
  - Projection factor
  - Can be linked to store, household, and product information

CN Household Data: Household Counts (2012)

- All households in the panel record UPC products and a portion also records random weight products
- Households are included in the annual "static" panel if they meet requirements for
  - Minimum frequency of reporting
  - Minimum average spending level for household size
- Projection factors are calculated for the static panel

	No. of Households			No. of Transaction Records		
Dataset	Static	Total	Static %	Static	Total	Static %
Consumer Network	62,517	126,040	50%	58.8 MM	72.1 MM	82%
Random Weight	33,852	78,992	43%	5.0 MM	6.4 MM	78%

CN Household Data: Data Collection Procedures

- Purchase recording by households
  - Indicate store where purchased
  - Packaged products—scan UPC; indicate if product on sale or received a deal
  - Random weight products—select from list of products or scan code on reference card and enter total amount paid (no quantities recorded)

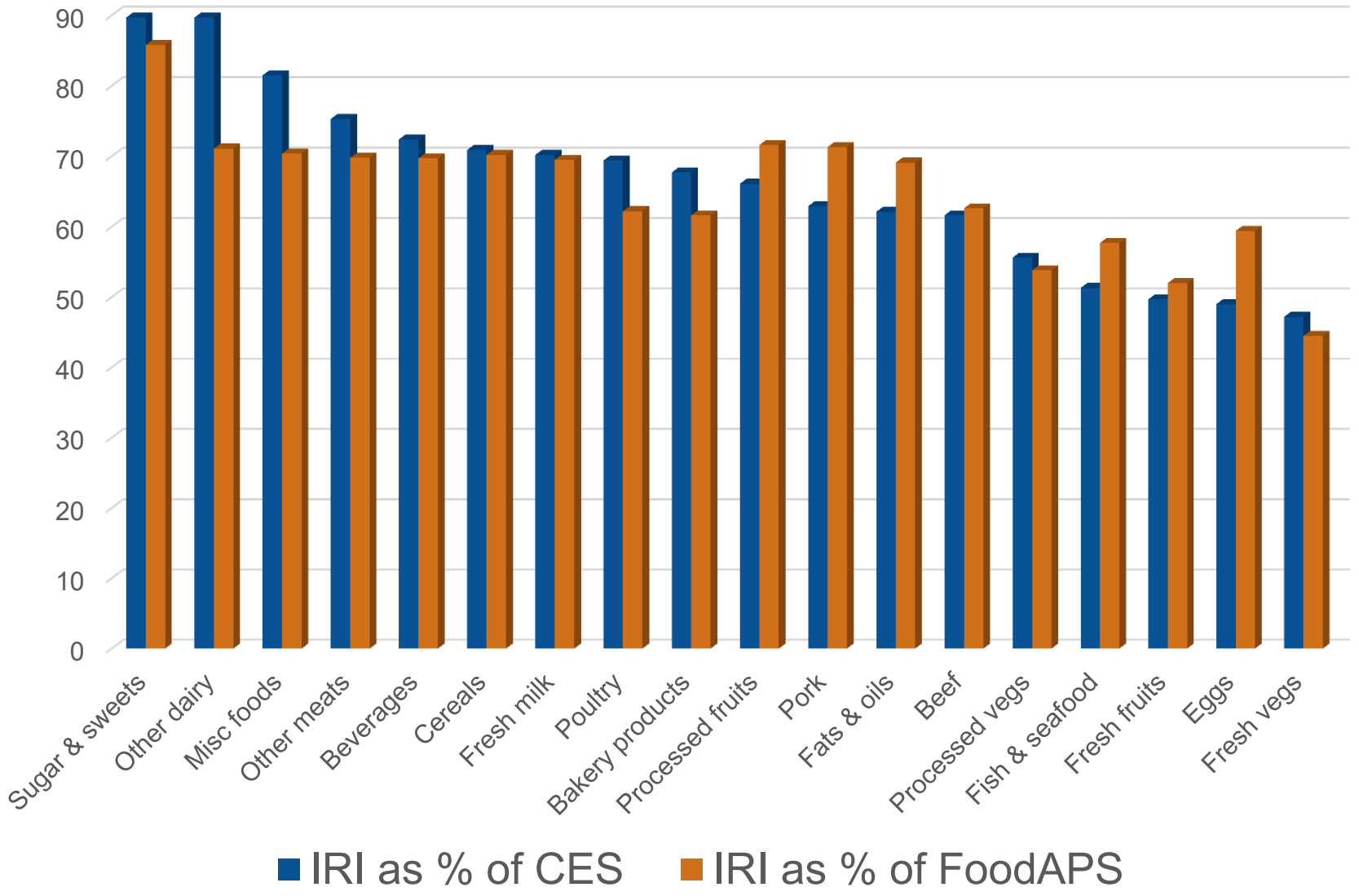
- IRI price assignment
  - Assigns average price for store chain and market area using store scanner data
    - If not available, assigns average price for store type and market area
  - If no store scanner data, household enters price
  - Last resort, assign “dictionary” price

CN Household Data: Weighting

- IRI calculates projection factors using Iterative Proportional Fitting
  - Separate weights for entire static panel and static random weight panel
  - Demographic targets are based on Census demographic data (obtained through PopStats™)
    - Household size, age of household head, household income, ethnicity, race, presence of children, county size

- Projection factors are dynamic
  - Households appearing in the data across multiple years have new projection factors each year

CN Household Data: Comparison of Average Weekly Household Expenditures to Other Sources, 2012



CN Household Data: Considerations

- Households that participate are likely different from the general population
  - Intensive data collection process
  - More aware consumers
- Some types of households are less like to meet qualifications for inclusion in static panel
  - Younger (under age 35) households
  - Lower income households
  - Black and Hispanic households
  - Households with children
- Prices are typically not exact prices paid by the household
- Data are weighted based on demographics, not shipment or expenditure totals

Conclusions

- Data are collected for commercial purposes
  - Not necessarily designed for research purposes
- Goals of the data vendors are to:
  - Adhere to agreements with stores regarding level of disclosure
  - Ensure confidentiality of household participants
  - Protect their competitive information
- In using the data, it is important to understand the data collection and processing procedures and assess implications for results of analyses based on:
  - Characteristics of stores and households that participate
  - How quantities, prices, or expenditures are recorded
  - How the weights are constructed (if available)
- But no other comparable data source provides the same level of granularity and detail needed for many types of analyses

More Information

Mary K. Muth, PhD
919.541.7289
muth@rti.org