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Impact of an on-shelf nutrition labelling system on the nutritional quality of food purchases in Ontario supermarkets: A natural experiment.

Erin Hobin, Bryan Bollinger, Eli Liebman, Jocelyn Sacco, Lana Vanderlee, Laura Rosella, Mary L 'Abbe, Heather Manson, Fei Zuo, David Hammond

May 16, 2017

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Do Canadians KNOW to eat healthy?

Among Canadian adults:

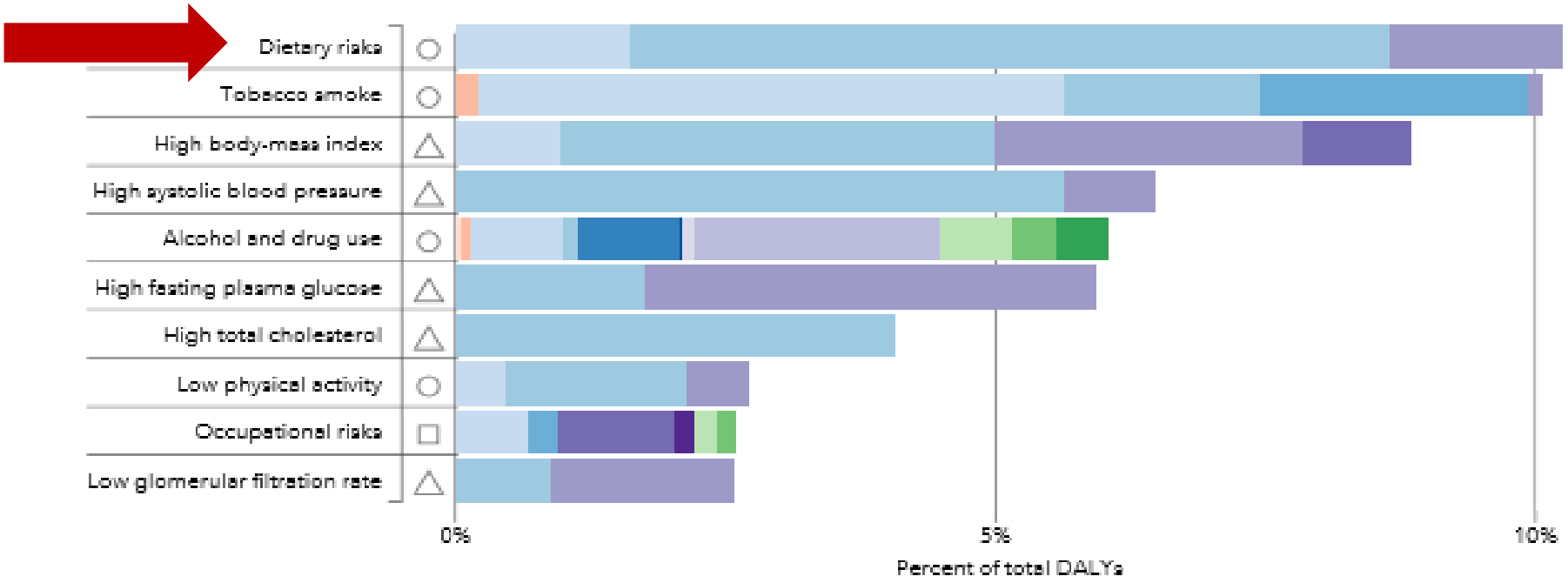
- **78%** rate their **EATING HABITS** as good to excellent.[1]

- **80%** rate their **NUTRITION KNOWLEDGE** as good to excellent.[1]

Source:
(1) Tracking Nutrition Trends 2015 – survey of 1500 adults across Canada.

Diet as a risk factor in Canada

- **Poor diet** is now the #1 leading risk factor for chronic disease and premature death in Canada.[2]



Source:
(2) Institute for Health Metrics and Evaluation. University of Washington. Global Burden of Disease Study 2010 Country Profi
Canada. 2013. http://www.healthdata.org/sites/default/files/files/country_profiles/GBD/ihme_gbd_country_report_canada.pdf

Food environment and dietary patterns in Canada

High availability of low nutrient foods

- 66% of prepackaged foods in supermarkets contain free sugars[3]
- Foods in restaurants contain, on average, 70% of AI level of 1500mg/day of sodium[4]

High consumption of ultra-processed/highly foods[5]

- 48% of calories consumed from ultra-processed foods
- Higher among children and adolescents

Low consumption of fruits and vegetables[6]

- 39.5% consume F&V 5 or more times per day – lower % over past 5 years

(3) Acton et al (2017) Added sugars in the packaged foods and beverages available at a major Canadian retailer. CMAJ Open. 5(1):E1-6.
(4) Arcand et al (2016) Appl Physiol Nutr Metab. 41(6): 684-690.
(5) Moubourac et al. (2017) Consumption of ultra-processed foods predicts diet quality in Canada. Appetite. 108:512-520.
(6) Stats Canada. Fruit and vegetable consumption, 2014. http://www.statcan.gc.ca/pub/82-625-x/2015001/article/14182-eng.htm

Nutrition Labelling as a Public Health Intervention

- Point-of-purchase nutrition information is one approach to support informed and 'healthier' food purchasing decisions

- Nutrition Facts tables (NFt) are mandated in Canada
  - Reported as most common source of nutrition information
  - Perceived as highly credible
  - Link between use of NFt and healthier diet
  - Lower use among:
    - Men
    - Children, adolescents, and older adults
    - Individuals with lower income/education levels
    - Individuals with greater nutrition knowledge , who are concerned with dietary guidelines, or who have diet-related health conditions

Source:
(7) Campos et al. (2011) Nutrition labels on pre-packaged foods: a systematic review. Public Health Nutrition 14(8):1496-1506.

Nutrition Labelling as a Public Health Intervention

- Nutrition Facts tables (NFt) are poorly understood[8]
  - Information is complex
  - Requires time to process
  - Located on the back of package

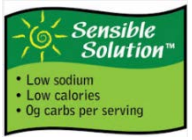
- Recent proposals to update content and format of NFt
  - Health Canada[9]
  - US Food and Drug Administration

Sources:
(8) Health Canada. Canadians' understanding and use of the nutrition facts table: baseline national survey results. Ottawa, ON: Office of Nutrition Policy and Promotion, 2011.
(9) Health Canada. Proposed food label changes. http://healthycanadians.gc.ca/health-system-systeme-sante/consultations/food-label-etiquette-des-aliments/index-eng.php

Front – of – Package Labelling

- Front-of-package (FOP) nutrition labelling systems are increasing in an attempt to simplify informed and nutritious food choices[10]

  - **Summary systems** that broadly suggest a food is “healthy”



  – **Nutrient specific systems** provide specific nutrition information

Source:

(10) Emrich T, Arcand J, L’Abbe M. Front-of-package nutrition labelling systems: a missed opportunity? Canadian Journal of Public Health 2012;103(4):e260-e262.

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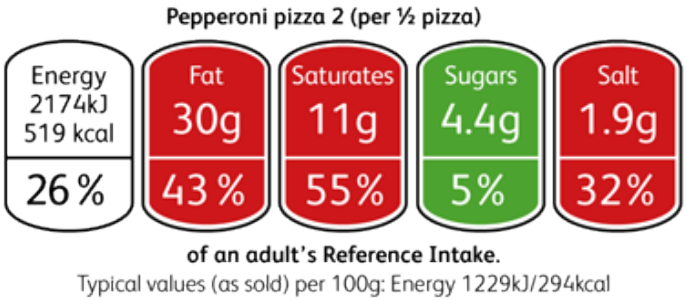
FOP labelling systems in other countries[11]

Nordic, June 2009

EU, 2013

Australia/NZ, June 2014



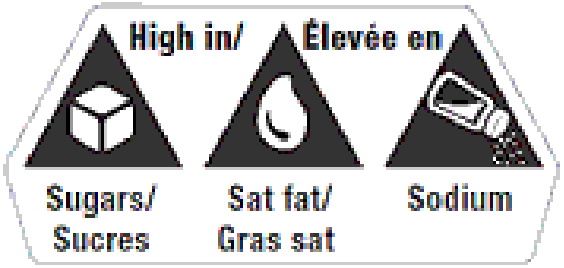
UK, 2013

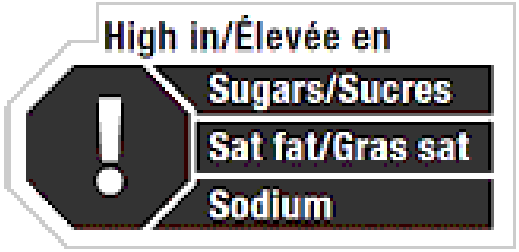
Ecuador, August 2014

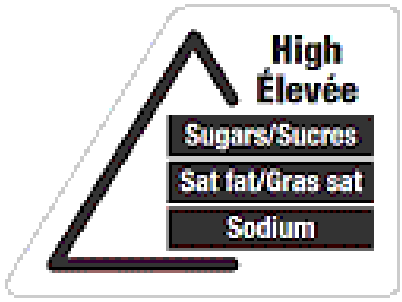
Chile, July 2016

Source:
(11) World Cancer Research Fund International. Nutrition Labels. http://www.wcrf.org/int/policy/nourishing-framework/nutrition-labels

Proposed FOP labelling formats in Canada[12]







Source:
(12) https://www.canada.ca/en/health-canada/programs/front-of-package-nutrition-labelling/consultation-document.html#aa

Proposed FOP labelling system in France[13]

5 Colour Nutrition Label (5CNL)

Source:

(13) Touraine M. Projet de loi n°2302 relatif à la Santé, présenté au nom de M. Manuel Valls, Premier ministre, par Mme Marisol Touraine, ministre des affaires sociales, de la santé et des droits des femmes. Exposé des motifs. Paris: Assemblée Nationale; 2015.

Novel Food Labels

Warning labels[14]

PACE labels[15]

Plain packaging[16]

Sources:
(14) Roberto et al. (2016) Pediatrics 137(2):1-10.
(15) Royal Society for Public Health. Activity equivalent labels. https://www.rsph.org.uk/en/policy-and-projects/areas-of-work/activity-equivalent-labelling/index.cfm
(16) Bollard et al. (2016) Effects of plain packaging, warning labels, and taxes on young people's preferences for SSBs: an experimental study. Poster at IOC, Vancouver

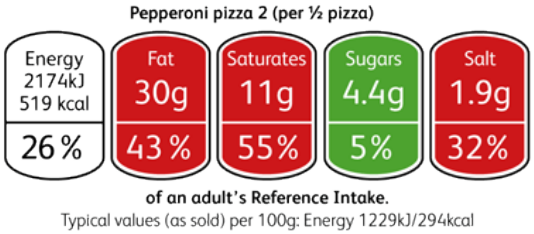
Front – of – Package Labelling Elements

1. Nutrition profiling model that underpins the labelling system and the criteria for rating food profiles.
   - Labonté ME et al. Systematic review of nutrient profile models developed for nutrition-related policies and regulations aimed at noncommunicable disease prevention. PROSPERO. 2015 #CRD42015024750. Available from: http://www.crd.york.ac.uk/PROSPERO/display_record.asp?ID=CRD42015024750)

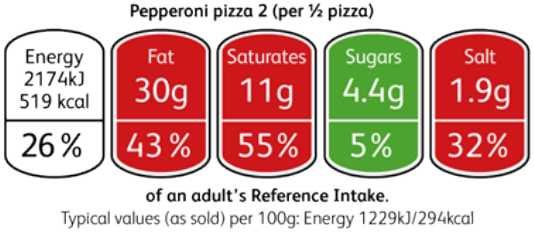
2. Format for communicating nutrition information in a label - eye-catching, and easy for consumers to quickly comprehend, and translate to meaningful information when comparing and choosing foods.

Evidence

- **Nutrient-specific systems superior** to single icon summary systems[17,18]



- **Nutrient-specific systems with text and colour coding superior** to nutrient specific labels with numeric information only[18]



Sources:
(17) Hawley et al. (2013) Public Health Nutrition.
(18) Hersey et al. (2013) Nutrition Reviews.

Gaps in Evidence

- **Uncertain** which is superior?

Nutrient specific with colour coding

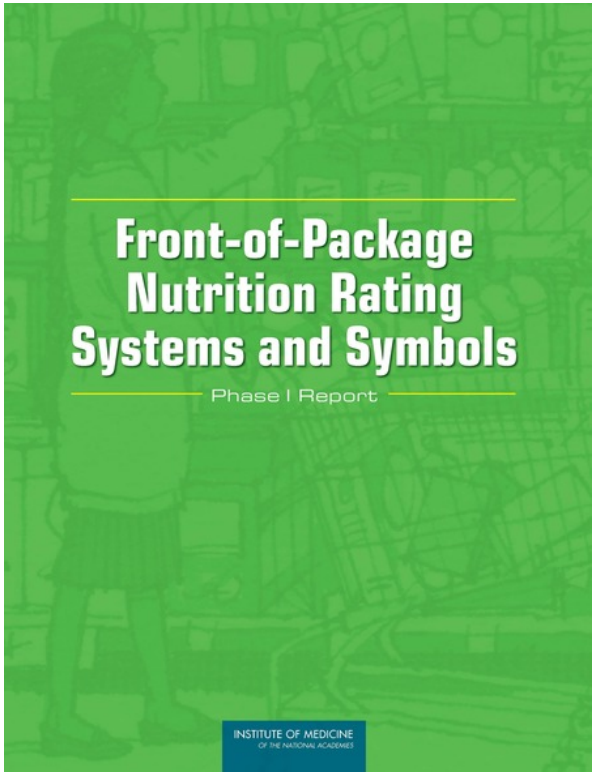
Multilevel summary symbol

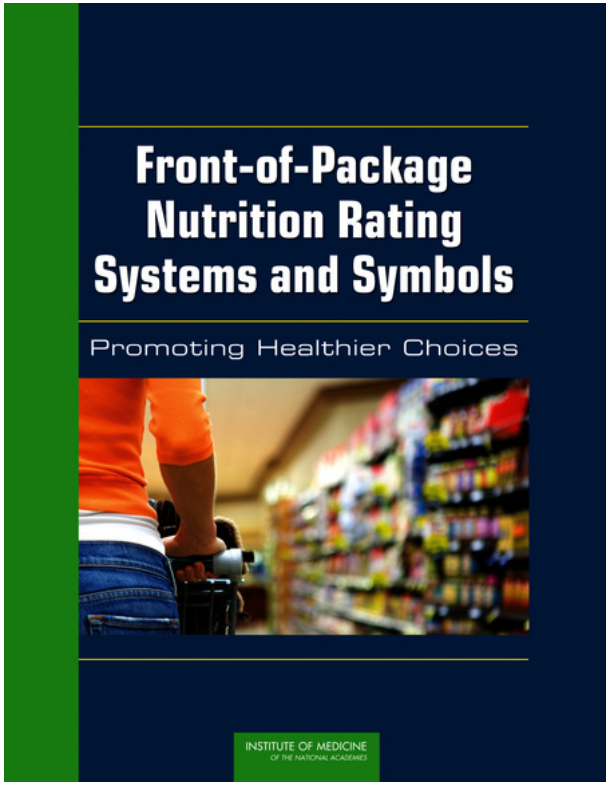
- Little research examining impact of FOP labelling systems on **consumers' actual shopping behaviour and dietary intake.**
- Little **Canadian data.**

Sources:
(17) Hawley et al. (2013) Public Health Nutrition.
(18) Hersey et al. (2013) Nutrition Reviews.

What do nutrition experts recommend?

- Institute of Medicine of the US National Academies (IOM) recommendations for FOP systems:[17,18]





Sources:
(19) Institute of Medicine (IOM). 2010. Front-of-package nutrition systems and symbols. The National Academies Press. Washington, DC.
(20) Institute of Medicine (IOM). 2011. Front of package nutrition rating systems and symbols: promoting healthier choices. The National Academies Press. Washington; DC.

Front – of – Package Labelling

GOAL: Increase the proportion of consumers who readily **notice, understand and use** the information to make more nutritious choices for themselves and their families, and thereby prevent or reduce obesity and other diet-related chronic disease.[19]

- Additional goals:
  - Providing **quick and accurate** nutrition information
  - Supporting more informed and healthier food choices
  - **Educating** consumers
  - Encouraging industry **reformulation**

Sources:
(19) Institute of Medicine (IOM). 2010. Front-of-package nutrition systems and symbols. The National Academies Press. Washington, DC..

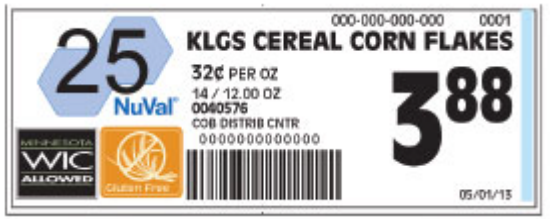
Front – of – Package Labelling

- IOM's recommendations for effective FOP labelling systems:[20]
  - **<u>Standardized across all products</u>**
  - **<u>Simple</u>**
  - **<u>Ordinal</u>**
  - **<u>Interpretive</u>**
  - **Supported by <u>ongoing promotion</u>**

Sources:
(20) Institute of Medicine (IOM). 2011. Front of package nutrition rating systems and symbols: promoting healthier choices. The National Academies Press. Washington; DC. .

On-Shelf Labelling Systems[21]

NuVal – Proprietary System in US



Katz et al (2010) found participants view labels positively and 80% (n=804) said they would use information in making purchase decisions.[22]

Store-level data from US supermarkets indicate a significant increase in products purchased with a higher NuVal score in 8 food categories after 6-months.[23]

(21) Cameron et al. (2016) A systematic review of the effectiveness of supermarket interventions. Curr Nutr Rep. 5:129-138.
(22) Katz et al (2010) Performance characteristics of NuVal and the Overall Nutrition Quality Index (ONQI). Am J Clin Nutr 91(4):1102S-1108S.
(22) Nikolova et al (2016) Healthy Choice: The Effect of Simplified Point-of-Sale Nutritional Information on Consumer Food Choice Behavior. *J Marketing Research Vol LII, 817-835.*

On-Shelf Labelling Systems

Guiding Stars – Proprietary System in US and Canada

Developed by independent scientists in the US[23]

Adapted for Canada (using NFt and Canadian Nutrient File data)

Store-level transaction data in US supermarkets indicate increases in the proportion of products purchased with a star rating between **0.5-1.5% after 1- and 2-years**.[24,25]

(23) Understanding the science behind the Guiding Stars algorithm for Canada.2012.
(24) Sutherland L, Kaley L, Fischer L. Guiding Stars: the effect of a nutrition navigation program on consumer purchases at the supermarket. American Journal of Clinical Nutrition 2010; 91(4):1090S-1094S.
(25) Rahkovsky I, Lin B, Lin C, Lee J. Effects of the guiding Stars program on purchases of ready-to-eat cereals with different nutritional attributes. Food Policy 2013; 43, 100-107.

Objectives

1. Examine the impact of an on-shelf nutrition labelling system **on the nutritional quality of consumer food purchases** in supermarkets for the first time in Canada.

2. Investigate the mechanisms underlying the expected changes in consumer food purchases:
   - extent to which consumers are **aware, understand, and report using** an on-shelf labelling system when purchasing food in supermarkets.

Guiding Stars in Canada

- Implemented in **Loblaw supermarkets** across Canada over a 2 year period (August 2012- September 2014) with a National Media Campaign in January – February 2015

- Given Loblaw is the largest supermarket retailer in Canada (~14million shoppers per week), Guiding Stars is a large-scale intervention with broad reach and potential to have population impact on food purchases

Guiding Stars

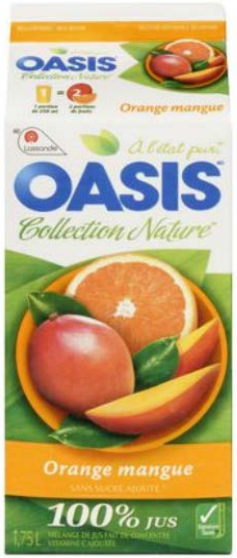
- **Simple, Interpretive & Ordinal:**
  - Includes nutrients to encourage and discourage
  - Generates scores which are translated to ratings of 0 to 3 stars

- **Supported by communication:**
  - In-store signage coinciding with implementation of Guiding Stars
  - Guiding Stars National Launch, Jan and Feb 2015

- **Applied across almost all fresh and packaged products in supermarket**:
  - Separate algorithms for:
    - General foods and beverages
    - Meat/poultry/seafood/dairy/nuts
    - Fats and oils
    - Infant and toddler food

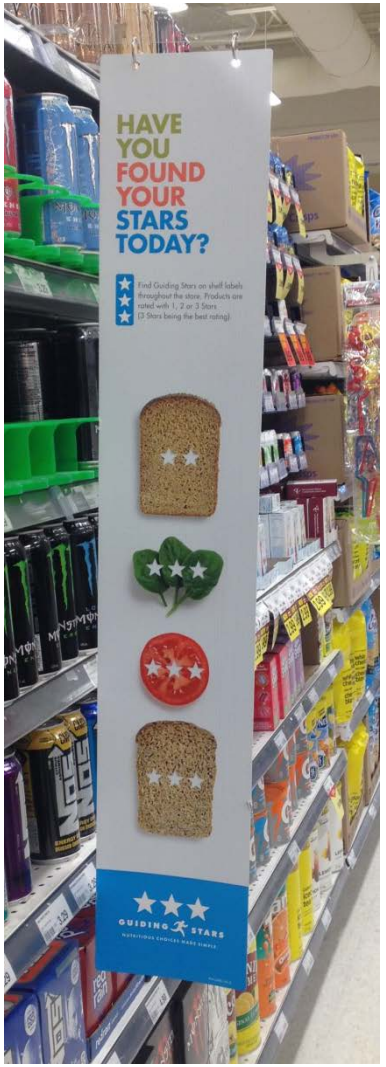
http://guidingstars.ca/about/how-it-works/

Guiding Stars – Product Ratings



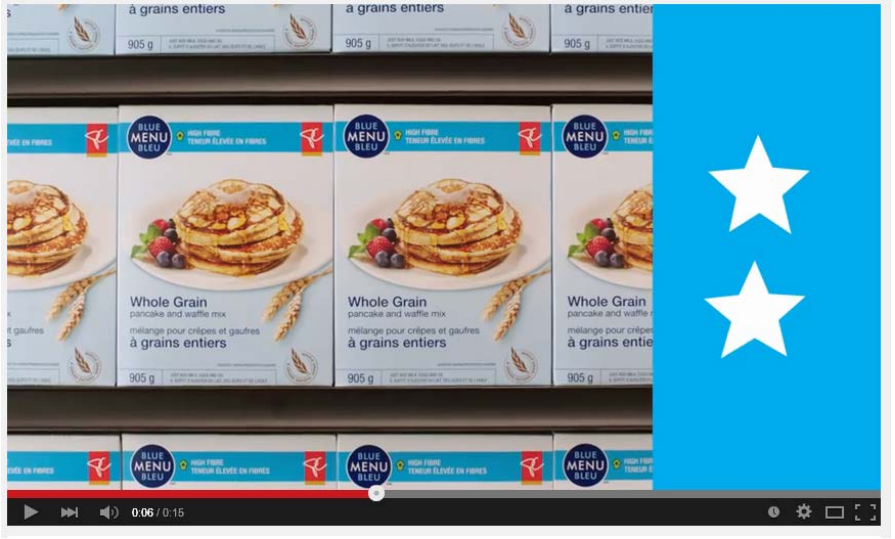
Guiding Stars – Shelf Tags

Guiding Stars In-Store Signage



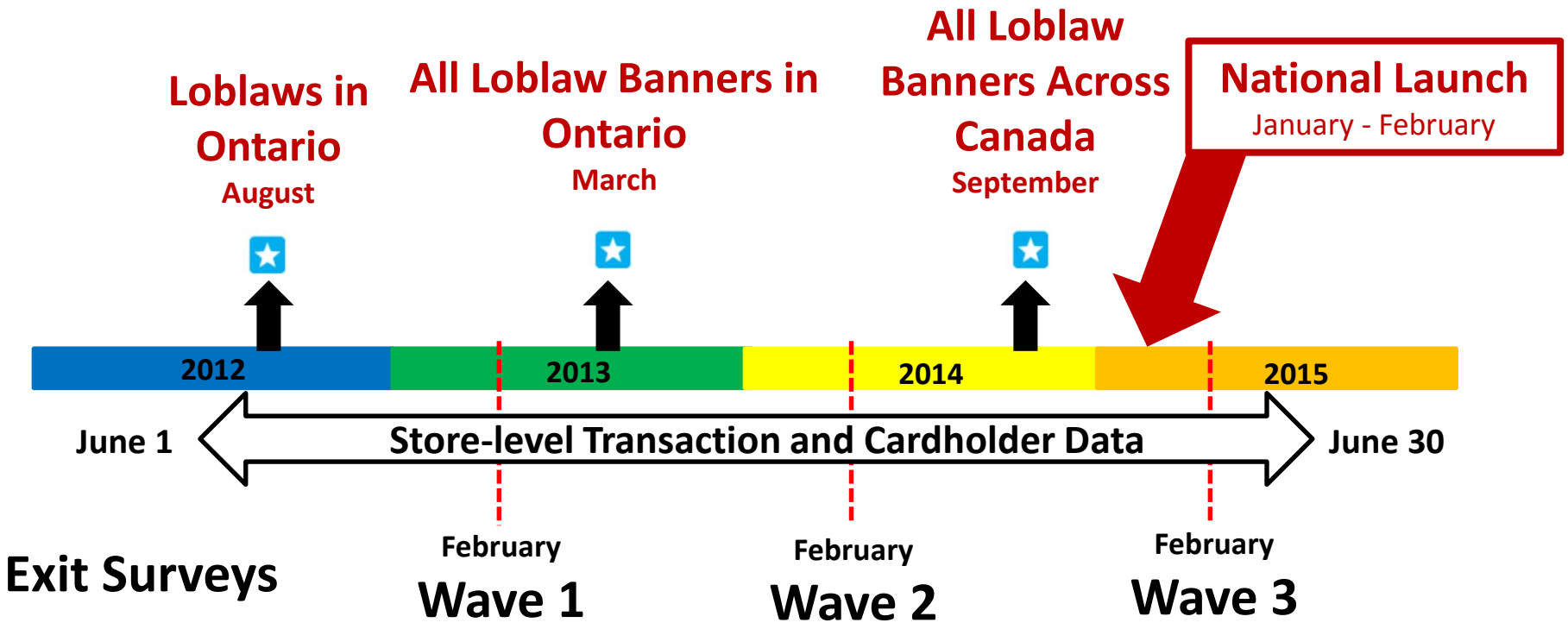
National Launch – Guiding Stars promotion campaign

https://www.youtube.com/watch?v=-4vQTl3dlhs



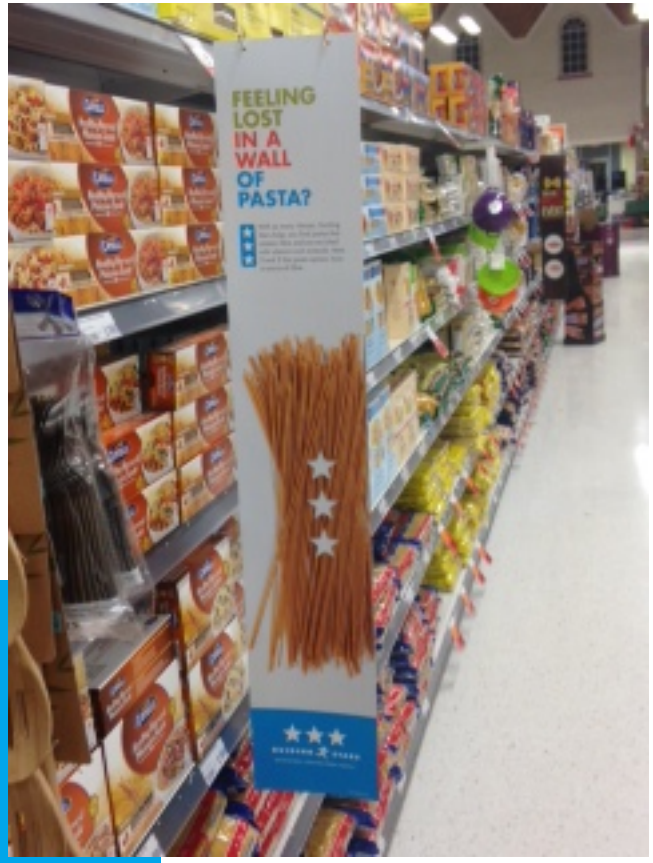
- January-February 2015
- Various formats
  - E.g. TV, radio, online, flyers, in-store promotions

Timeline of Larger Evaluation



Supermarket Transaction Data

Examine the impact of an on-shelf nutrition labelling system **on the nutritional quality of consumer food purchases** in supermarkets in Ontario.



GUIDING STARS

NUTRITIOUS CHOICES MADE SIMPLE.™

Study Design and Data Sources

- Natural experimental study using a controlled QE pre-post design

August 10, 2012

- Store-level transaction data from June 1, 2012 to February 28, 2013 [N=44 Loblaws (intervention), 44 Zehrs and 38 Superstore (control)] in Ontario
- Nutrition database for more than 55,000 fresh and packaged foods in supermarkets

Distribution of product star ratings in supermarkets*

- Not rated – 4%
- 0-star – 52%
- 1-star - 10%
- 2- stars - 8%
- 3-stars - 26%

*As of February 2013. Distribution varies across time due to seasonality, new and discontinued products, etc.

Impact on food purchases

- Change in shares of starred products purchased

0-stars	1-star	2-stars	3-stars
-0.7%	**+2.0%**	**-1.9%**	**+1.9%**
p<0.01	p<0.001	p<0.01	p<0.001

From a nutrient perspective, these changes translate into significantly **more fibre and omega 3 fatty acids**, and **less trans fat and total sugar** purchased.

Impact by product categories

- All foods sorted into 11 food product categories

Product Category	Changes in Stars Purchased
Baby Foods	No star effect
Baking & Spices	Decrease in 2- and 3-stars
Beverages	Decrease in 0-stars
Grains & Breakfast Cereals	Increase in 3-stars, decrease in 2-stars
Condiments & Sauces	Decrease in 2-stars
Dairy & Eggs	Increase in 1- and 3-stars, decrease in 0-star
Desserts & Snacks	No star effect (no product above 1-star)
Fruits & Vegetables	Increase in 3-stars, decrease in 0- and 1-stars
Health Foods	Increase in 0-star, decrease in 1- and 2-stars
Meats, Fish, & Legumes	Increase in 0- and 3-stars, decrease in 2-stars
Mixed Dishes, Soups, & Sides	Increase in 0- and 2-stars

Impact on supermarket revenues

# of items per transaction

+1.6%

p<0.01

Price per item purchased

+1.3%

p<0.001

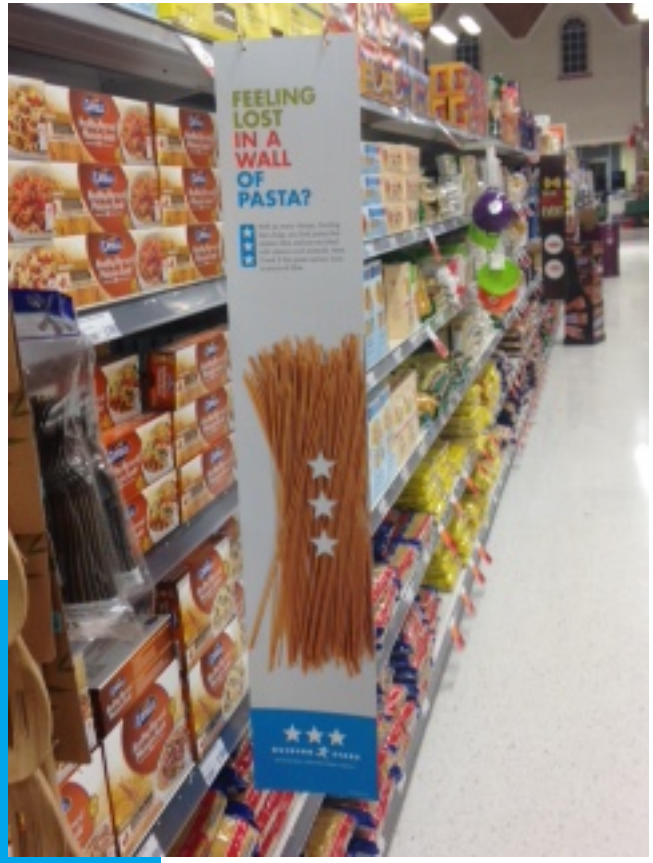
Revenue

+4.2%

p<0.01

Exit Surveys

Investigate the **mechanisms underlying the expected changes** in consumer food purchases: awareness, understanding, use.



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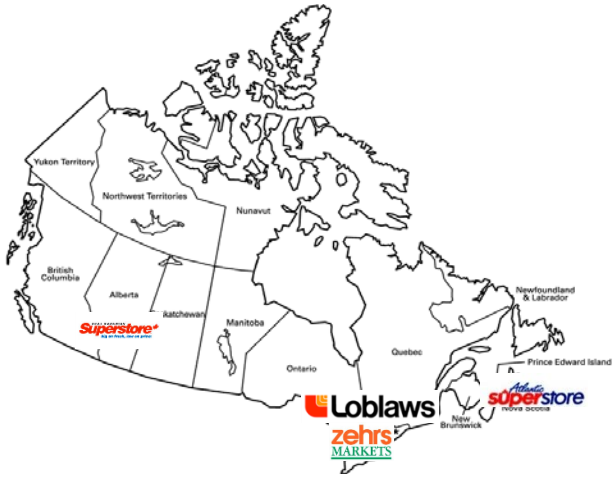
Methods

- **4,107 Exit Surveys**
  - Wave 1 n= 789
  - Wave 2 n= 1,686
  - Wave 3 n= 1,632



- **10-minute intercept survey**
  - Awareness, understanding, and self-reported use of Guiding Stars
  - Sociodemographic information
  - Consumer and behavioural characteristics, including nutrition knowledge, shopping and label reading behaviours

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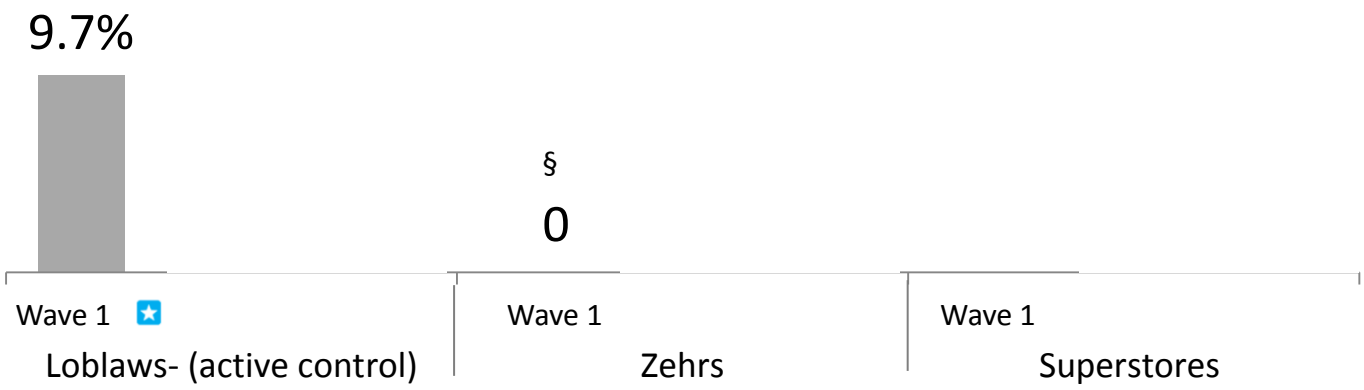
Sample Description

Wave 1 Participants (n=789)	Wave 2 Participants (n=1,686)	Wave 3 Participants (n=1,632)
• 68% Female	• 67.2% Female	• 69.9% Female
• Mean age = 50years	• Mean age = 50years	• Mean age = 50years
• 22% High School or less	• 21% High School or less	• 22% High School or less
• 83% White	• 82% White	• 84% White
• 77% Primary Shopper	• 76% Primary Shopper	• 76% Primary Shopper
• 68% Main Supermarket	• 66% Main Supermarket	• 67% Main Supermarket
• 18% Doing a large shop	• 20% Doing a large shop	• 21% Doing a large shop

Wave 1
Intervention Only

Unprompted Awareness

*Did you **notice a symbol on the shelf tag** located underneath the product beside the price; (*if yes) *can you describe what you saw? (correct if 'stars')*



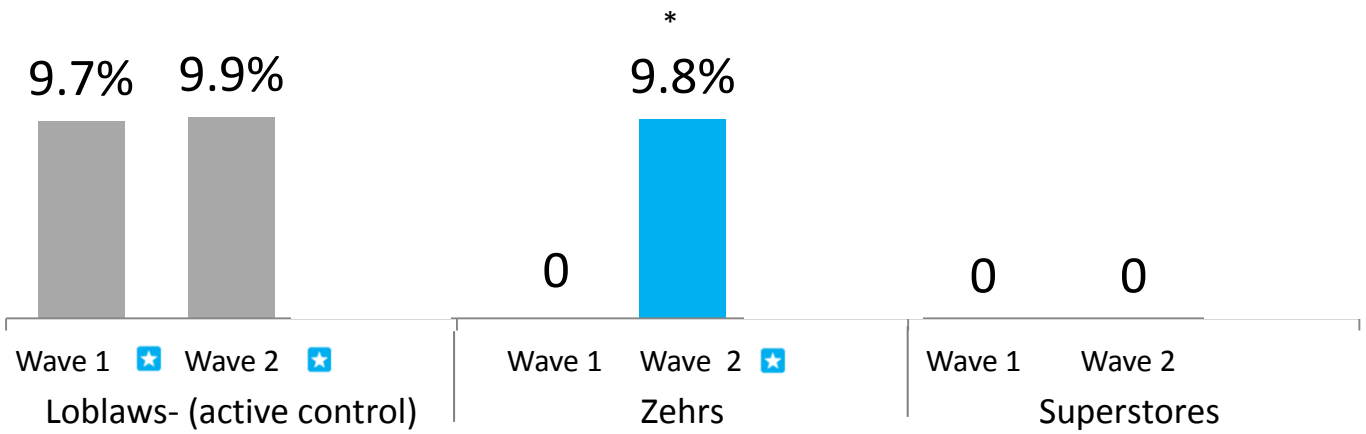
- Awareness significantly **higher in Loblaws than Zehrs and Superstores** $p<0.05$

§ – significantly different from same wave in Loblaws, $p<0.05$

Wave 1 vs. Wave 2
Intervention Only

Unprompted Awareness

*Did you **notice a symbol on the shelf tag** located underneath the product beside the price; (*if yes) *can you describe what you saw? (correct if 'stars')*



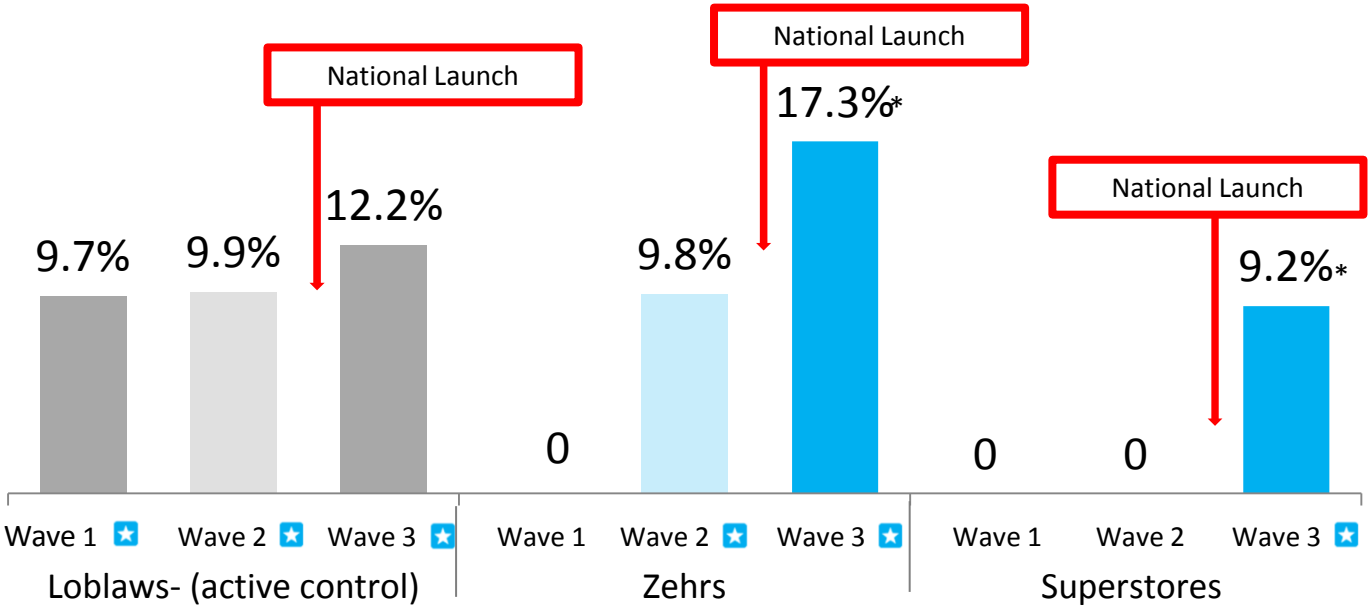
- Awareness **increased significantly in Zehrs** from Wave 1 to Wave 2, compared to Loblaws ($p<0.05$; adjusted regression analyses)
- Those more likely to be aware: **aged 25-44 years vs. 45+ years**

* significantly different from W1, $p<0.05$

Wave 1 vs. Wave 3
Intervention + National Launch

Unprompted Awareness

*Did you **notice a symbol on the shelf tag** located underneath the product beside the price; (*if yes) *can you describe what you saw? (correct if 'stars')*



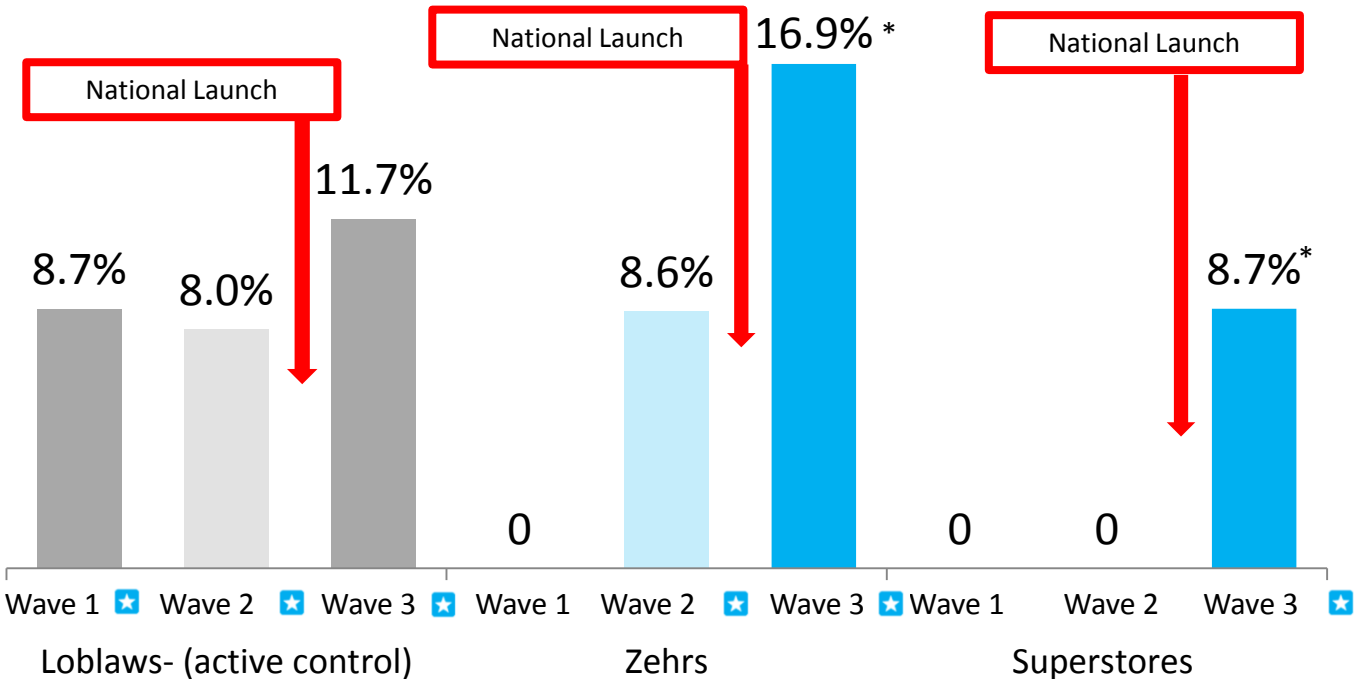
- Awareness **increased significantly in Zehrs and Superstore** from Wave 1 to Wave 3, compared to Loblaws ($p<0.05$; adjusted regression analyses)
- Those more likely to be aware: shopping in their **main store, frequently use nutrition information when choosing foods**

* significantly different from W1, $p<0.05$

Understanding

*Can you please tell me **what the symbol means**?*

(correct responses included a reference to 'health', 'nutrition', or 'diet')



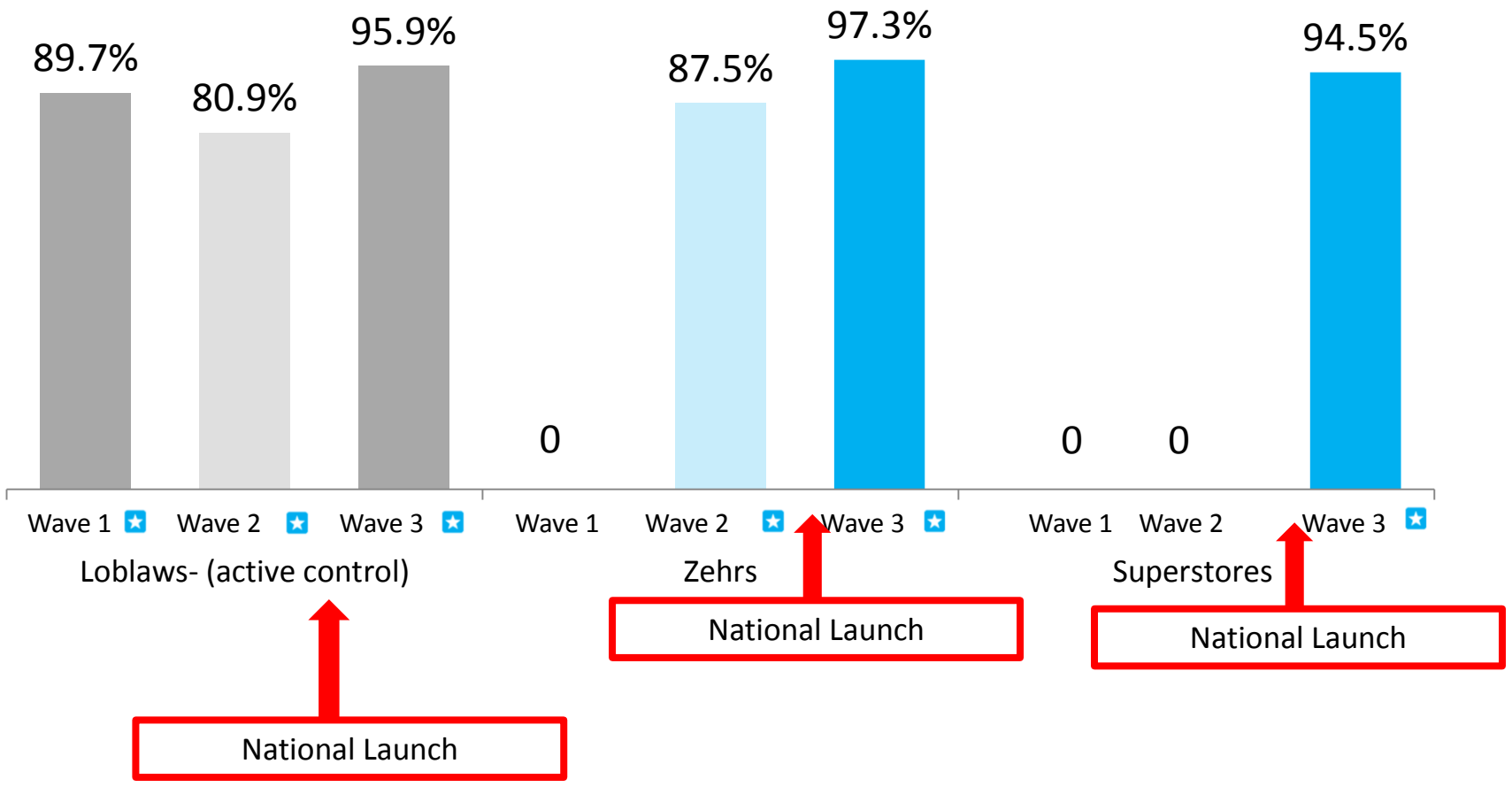
- Understanding **increased significantly in Zehrs and Superstore** from Wave 1 to Wave 3, compared to Loblaws over the same period ($p<0.05$; adjusted regression analyses)
- Those more likely to understand Guiding Stars: **main store, frequently use nutrition information when choosing foods**

* significantly different from W1, $p<0.05$

Wave 1 vs. Wave 3

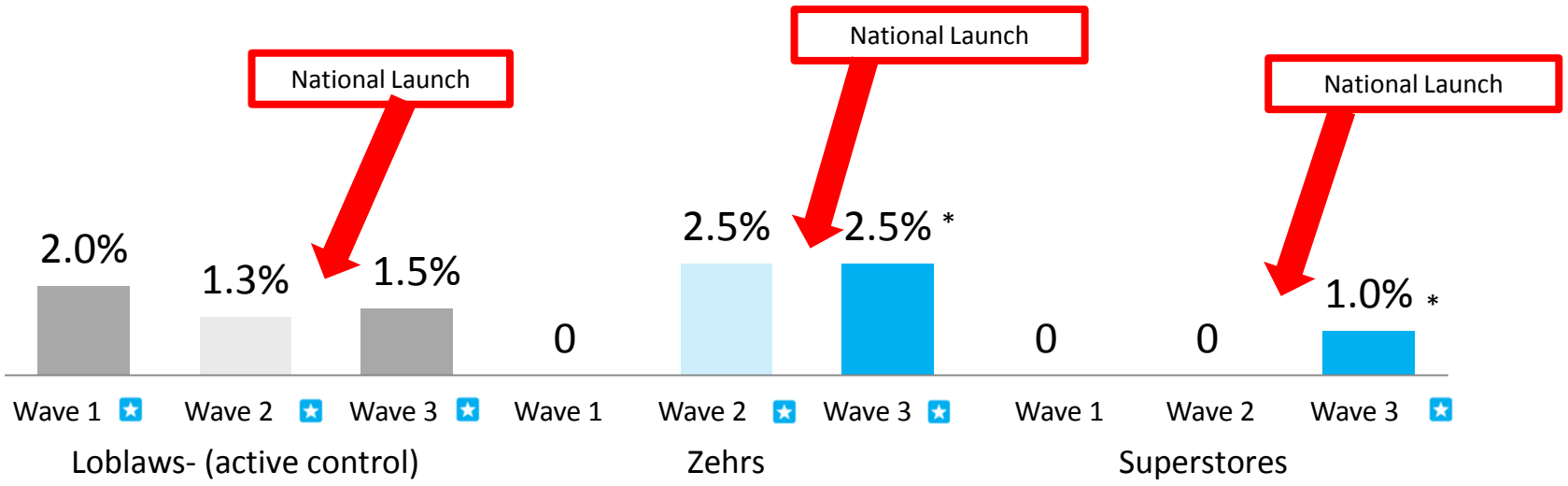
Intervention + National Launch

% that Understood, among those who aware



Self-Reported Use

*Did you **use the symbol** to help you decide on food purchases today?*

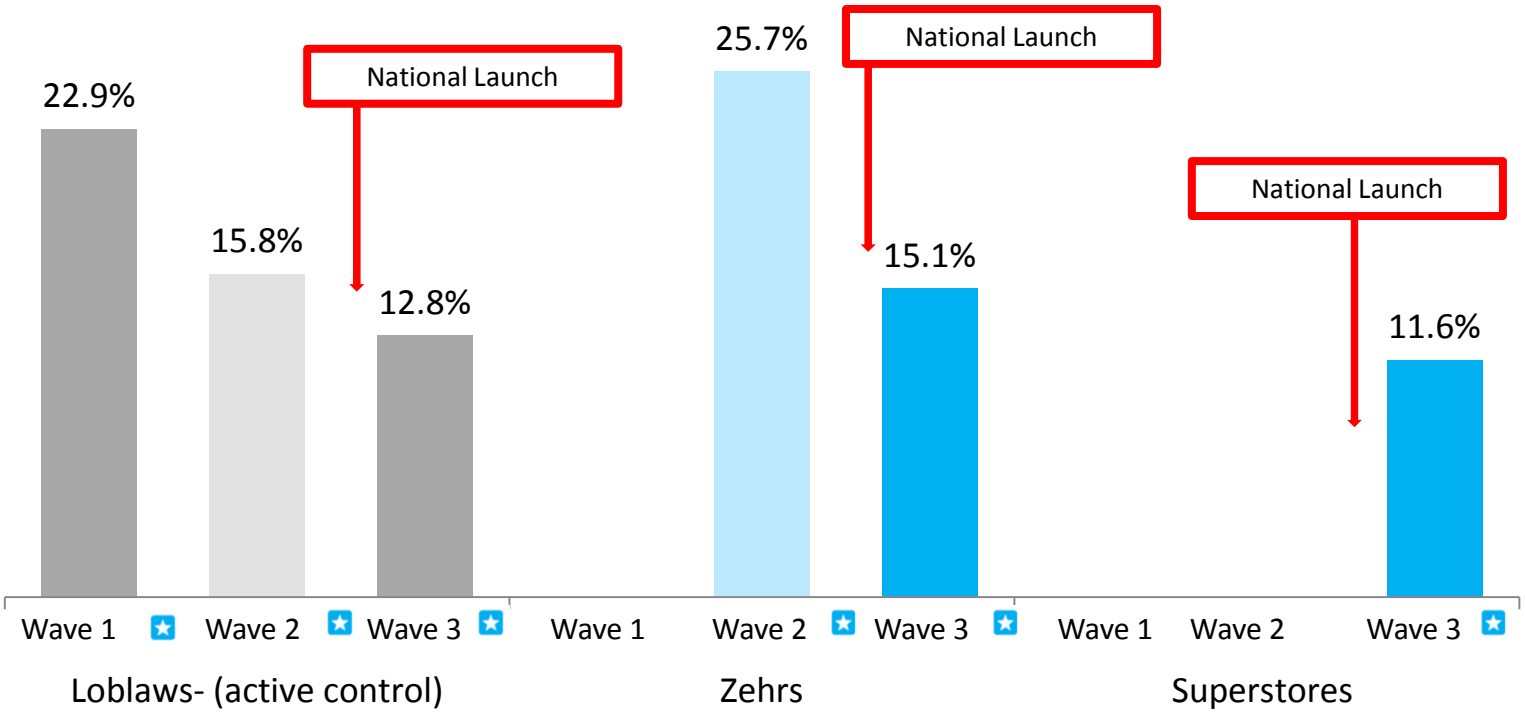


- Self-reported use **increased significantly in Zehrs and Superstore** from Wave 1 to Wave 3, compared to Loblaws over the same period ($p<0.05$; adjusted regression analyses)
- Those more likely to use Guiding Stars: **aged 25 to 44 years vs. 45+ years**

* significantly different from W1, $p<0.05$

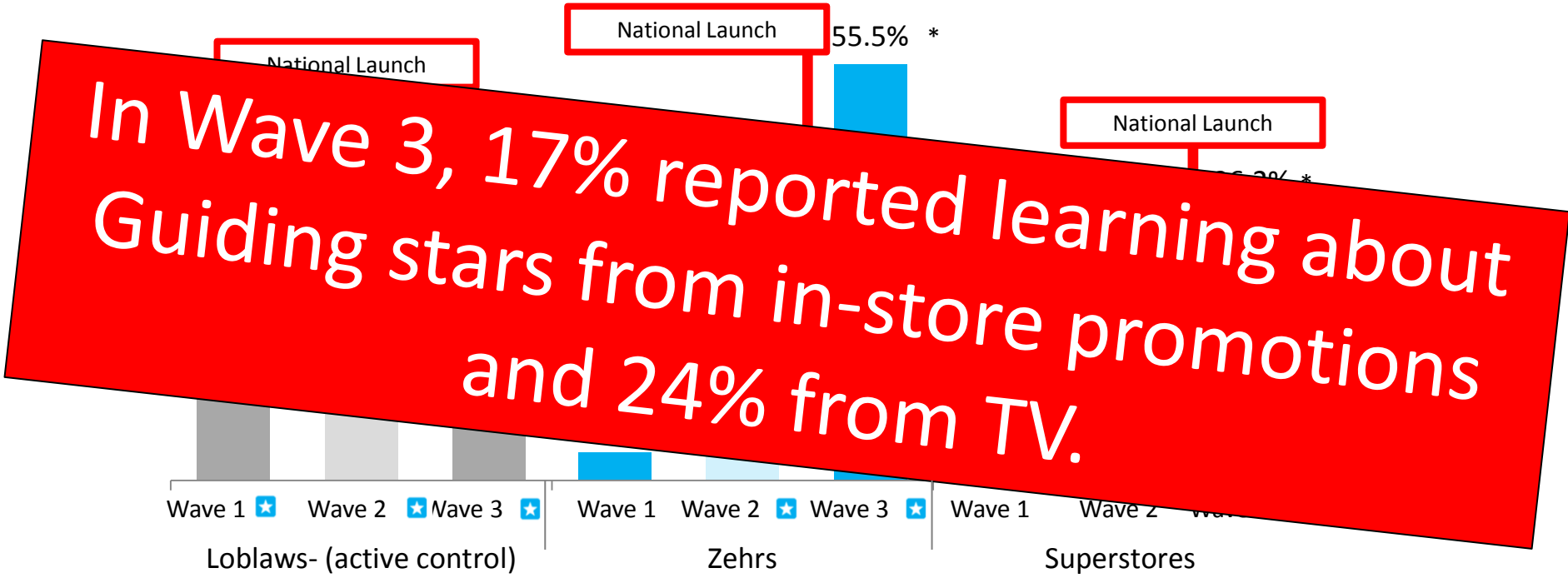
Self-reported Use

% Self-Reported Use among those aware/understood



Prompted Recall

Before this interview, were you aware of the Guiding Stars on-shelf nutrition labelling program in supermarkets?



In Wave 3, 17% reported learning about Guiding stars from in-store promotions and 24% from TV.

- Prompted recall **increased significantly in Zehrs and Superstores** from Wave 1 to Wave 3, compared to Loblaws ($p<0.05$; adjusted regression analyses)
- Those more likely to be aware: **female, main store, frequently use nutrition information when choosing foods.**

* significantly different from W1, $p<0.05$

Summary

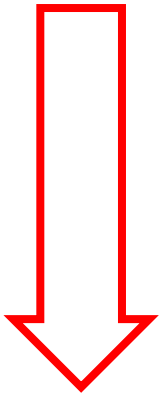
- Modest level of awareness of Guiding Stars among participants
- Majority of participants who are aware of Guiding Stars, understand it

Awareness & Understanding

Summary

- Modest level of awareness of Guiding Stars among participants
- Majority of participants who are aware of Guiding Stars, understand it

Awareness & Understanding



- Overall self-reported use is low

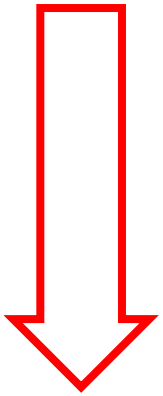
Use

Summary

- Modest awareness of Guiding Stars
- Majority of those who are aware of Guiding Stars, understand it

Awareness & Understanding

- Gap between awareness and self-reported use
  - Consistent with nutrition labelling literature[9]



- Overall self-reported use is low

Use

(9) Wills et al. Do European consumers use nutrition labels? 2009. *Agro*Food *industry hi-tech* - September/October 2009 - vol 20:5

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Summary

- Promotion improves awareness

Promotion

Awareness & Understanding

Use

Summary

- Promotion improves awareness

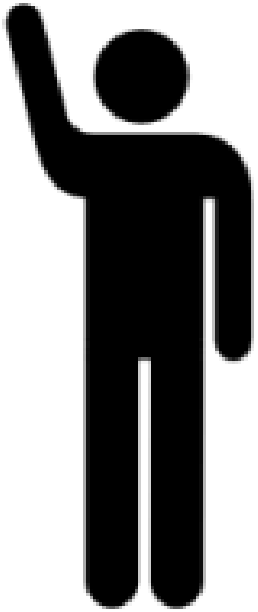
Promotion → Awareness & Understanding → Use

- Increases in promotion did not increase self-reported use

Strong support for on-shelf nutrition labels

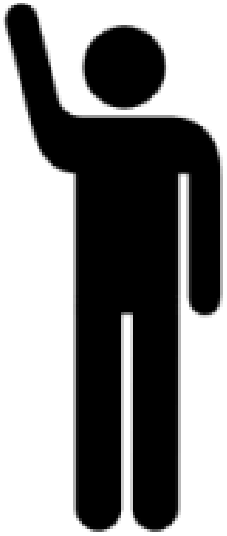
…in supermarkets

Exposed to Guiding Stars



85%

Not exposed to Guiding Stars



80%

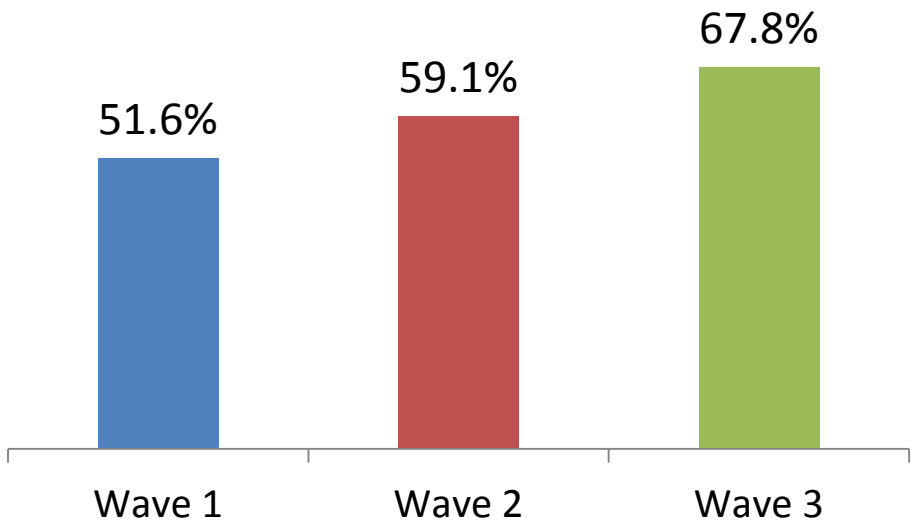
p<.0001

Understanding of 3-star products versus 1- or 2-starred products (correct response = healthier, more nutritious)

Exposed to Guiding Stars

63%

Correct response



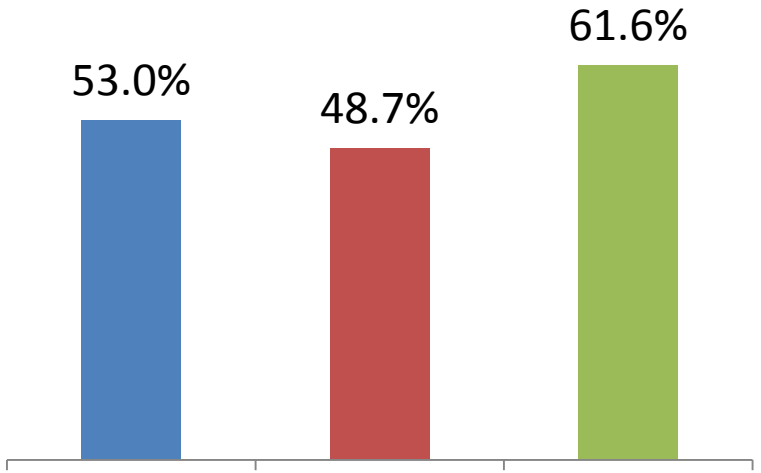
Understanding of 0-star products/no symbol

(correct response = 0-star product, less healthy/nutritious, <5cal/serving, not yet rated)

Exposed to Guiding Stars

53%

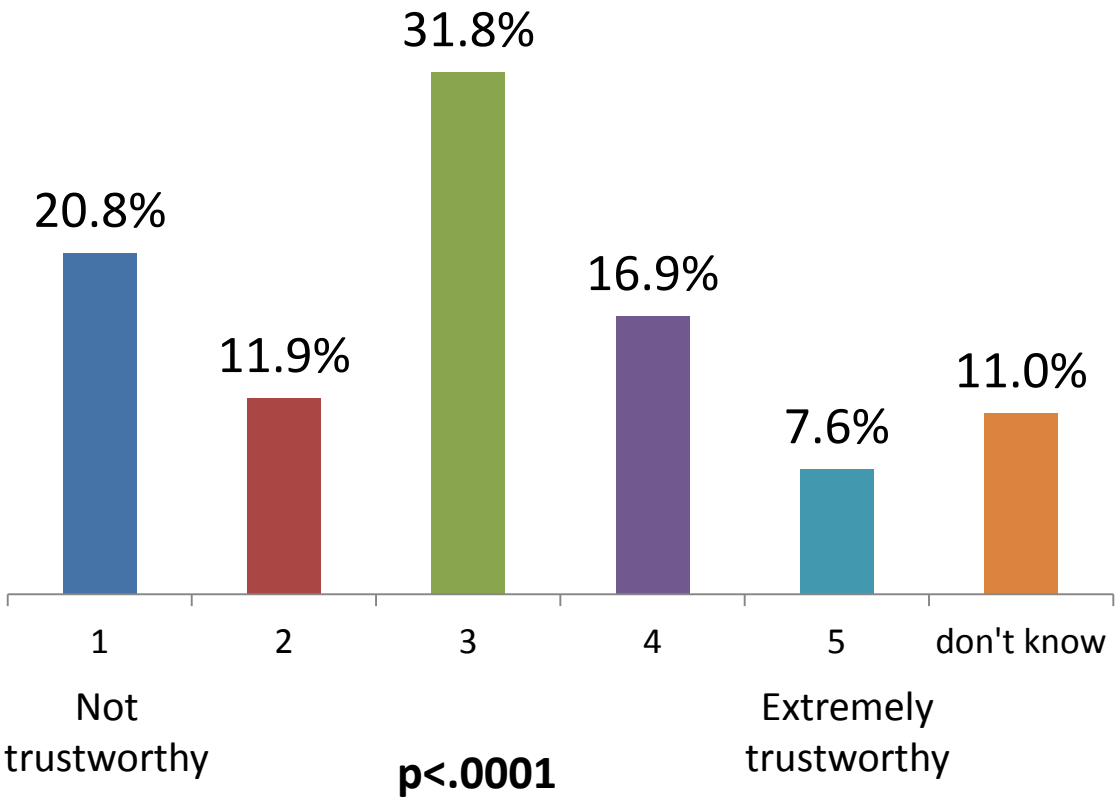
Correct response

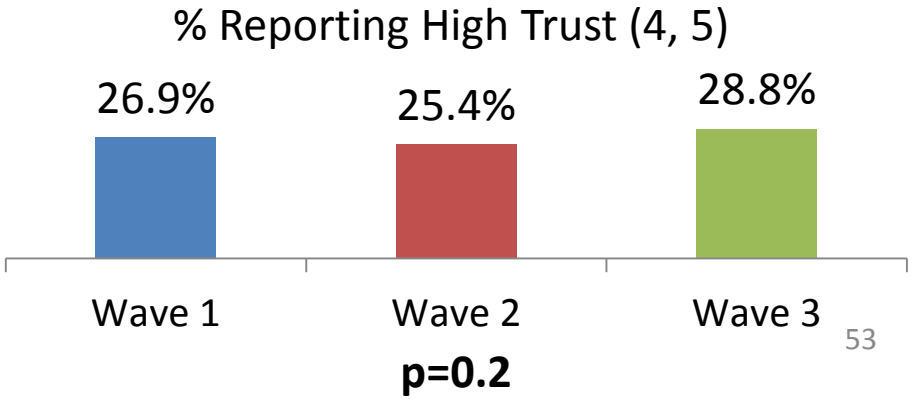


Incorrect/Don't know: *(47.0%)* *(51.3%)* *(41.9%)*

P<0.01

Trust of Guiding Stars (among exposed)





What do we know?

- Guiding Stars has **small but significant and positive impact** on food purchases after 6-months.
- Magnitude of the effect of Guiding Stars in Canada is **comparable to the effect** in US supermarkets.
- Direction and magnitude of the effect **varies by food category**.
- Level of **awareness** is modest (10%) and increases slightly after National campaign, but **self-reported use remains low**.
- Some **consumer confusion** related to products with stars as well as products with no symbol on the label, and ~25% trust Guiding Stars.

Future research

- Examine **longer term impact of Guiding Stars system** as well as impact of the **National Media campaign** across banners
- Investigate consumer substitution patterns to better understand **the nature of shifts in purchase decisions** (e.g., shift within product category OR from prepackaged to whole foods)
- Experimentally test FOP labelling formats (e.g., nutrient specific labels vs. warning labels vs. graded summary labels) and elements: size, appropriate scale, location.
- Examine **complementary interventions** (e.g., financial incentives, choice architecture interventions)

On-shelf labels* + signage, staff training, and displays in supermarkets in Australia

*Health Star shelf tags on healthiest items only (4.5 or 5 stars)

Adrian Cameron, Deakin University, Melbourne, Australia

Potential contributions

- On-shelf nutrition labelling systems can have a small impact on consumer food purchases, and will likely need to be one **key part of a larger comprehensive nutrition strategy**.
- Labels need to be noticed, be easy to quickly comprehend, and facilitate comparisons across multiple products.
- Importance of an intense and sustained **educational and promotional campaign** that directly connects where to find and how to use the labelling system in supermarkets.
- Not labelling all products in a supermarket can **create consumer confusion**. Should only the most/least nutritious foods be labelled? Should prepackaged food be labelled, or should all fresh and prepackaged foods be labelled? FOP or on-shelf or mix?

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Thank you

Erin Hobin

Email: Erin.Hobin@oahpp.ca

Twitter: erinhobinPhD