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Background

- **Voluntary provincial nutrition guidelines** (nutrient profiling systems) exist for recreation facilities (sports clubs) in Canada.
- **Implementation of guidelines is poor.** Recreation facilities commonly sell high calorie, low nutrient foods¹.
- Fears of poor sales and revenue loss are cited barriers to adopting and implementing nutrition guidelines².
- Product labeling is a marketing strategy that can increase sales of promoted items³.
- **Point of purchase nutrition labeling can influence consumer choice may be particularly useful on vending machines** since only the front of a food or beverage product is visible.
- **Vending operators may place sticker-like labels on product slots in vending machines to promote the products' health qualities** (see pictures).

The purpose of this study was to assess how well vendor 'health' labels on product slots in vending machines matched provincial nutrition guidelines.

Objectives

1. Determine whether vendor product labels agree with provincial nutrition guideline ranks

i.e. A vendor labels product X as "Choose Most". Is product X "Choose Most" when classified by provincial nutrition guidelines?

2. When a vendor mislabels a product as healthier than it actually is, determine how much it exceeds nutrient recommendations for the rank it is labeled as

i.e. A vendor labels product X as "Choose Sometimes" but it actually ranks as "Choose Least" by the guidelines. How much does product X exceed recommended levels for a "Choose Sometimes" product for energy, fats, sugar, or sodium?

3. Compare nutrient content of "healthy" and "unhealthy" products as labeled by the vendor

i.e. A vendor labels products XYZ as "Choose Most" or "Choose Sometimes" (healthy) and products ABC as "Choose Least" (unhealthy). How do XYZ "healthy" products and ABC "unhealthy" products differ in terms of their content of energy, fats, sugar, and sodium?

Methods

- Audits of vending machines identified foods/beverages for sale and the presence of vendor labels that indicated the healthfulness of products. 17 (21%) vending machines in 7 (28%) facilities in 2 Canadian provinces had food/beverages labeled by vendors to signify product healthfulness. Foods (n=371) and beverages (n=154) from machines with labels were analyzed.
- Using product nutrient content from the Brand Name Food List (<https://bnfl.healthlinkbc.ca/>), each product was assigned a rank according to the provincial nutrition guidelines that represented its actual nutrition quality (Table 1).
- Agreement between vendor labels and guidelines was determined by cross-tabulation and weighted Cohen's kappa.
- Disagreements between vendor labels and actual product nutrient content were explored using descriptive statistics*.
- Mann-Whitney tests* compared the nutrient content of products vendors labeled as "healthy" versus "unhealthy". See Table 1 for matching of vendor labels and guideline ranks for "healthy"/"unhealthy".

*Products without complete product or nutrient information (n=48) and products that did not have guideline nutrient criteria (i.e. chocolate, candy) (n=58) were excluded.

SPSS version 24 was used for statistical analysis.

Table 1: Classification of vendor product "health" labels and corresponding provincial nutrition guideline category ranks

Classification	Healthy Products	Unhealthy Products
Alberta Vendor Labels	vendor label	no vendor label
Alberta Nutrition Guideline Category Ranks ⁴	"Choose Sometimes"; "Choose Most Often"	"Choose Least Often"
British Columbia Vendor Labels ⁵	"Choose Most" label; "Choose Sometimes" label	"Choose Least" label; "Not Recommended" label; no vendor label
British Columbia Nutrition Guideline Category Ranks ⁶	"Sell Most"; "Sell Sometimes"	"Do Not Sell"

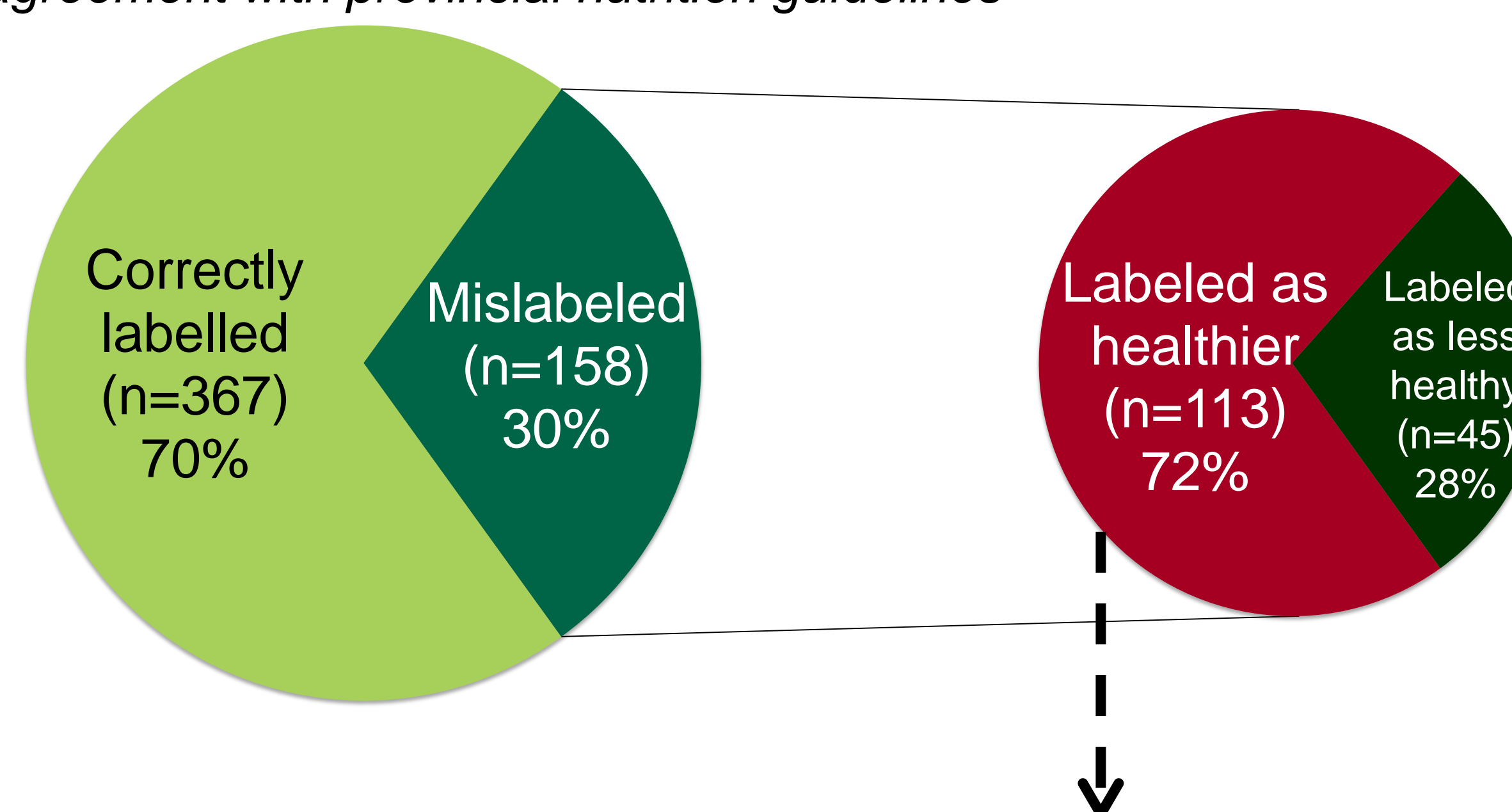
Results

1. Agreement between vendor product labels and provincial nutrition guideline ranks

There was moderate correlation between vendor labels and provincial nutrition guidelines for all products [$\kappa_w = 0.518$ (95% CI, 0.452 to 0.585, $p < 0.001$)].

Foods were more frequently mislabeled than beverages. Nuts and trail mix, bars (granola, energy, protein), chips, and salty snacks were most frequently mislabeled. **The majority of products were labeled healthier than their actual rank** (Figure 1).

Figure 1. Proportion of products with vendor labels by their agreement with provincial nutrition guidelines



2. Nutrient content of products mislabeled as healthier than its actual guideline rank*

- Products mislabeled as healthier than their actual rank exceeded at least one nutrient recommendations 33-50% of the time (Table 2). This means that 1/3 to 1/2 of products contained **too much** of a nutrient.

Table 2: Nutrient criteria violation for foods and beverages mislabeled by vendor as healthier than their actual nutrition guideline rank

Nutrient	Mislabeled products that exceeded [†] nutrient recommendations (%)	Nutrient content above recommended levels [‡]	Interquartile Range (25 th percentile, 75 th percentile)
Energy	34%	+84 kJ (20 kcal)	(67, 335 kJ) (16, 80 kcal)
Total Fat	50%	+4 g	(3, 9 g)
Total Sugar	33%	+6 g	(4, 20 g)
Sodium	34%	+33 mg	(13, 70 mg)

[†] "exceeded" in the sense that the product contained too much of a nutrient;

[‡] median product content – median nutrient recommendation cut-off

3. "Healthy" products versus "unhealthy" products as per vendor labels (regardless of actual guideline rank)*

Overall, products labeled as "healthy" by vendors were healthier than products labeled as "unhealthy", with the exception of sugar content. **"Healthy" foods had significantly lower median contents of energy (-412 kJ, -98 kcal), total fat (-10 g), and sodium (-175 mg) but had significantly more sugar (+2g) (p values <0.001).**

This did not hold true for all food types:

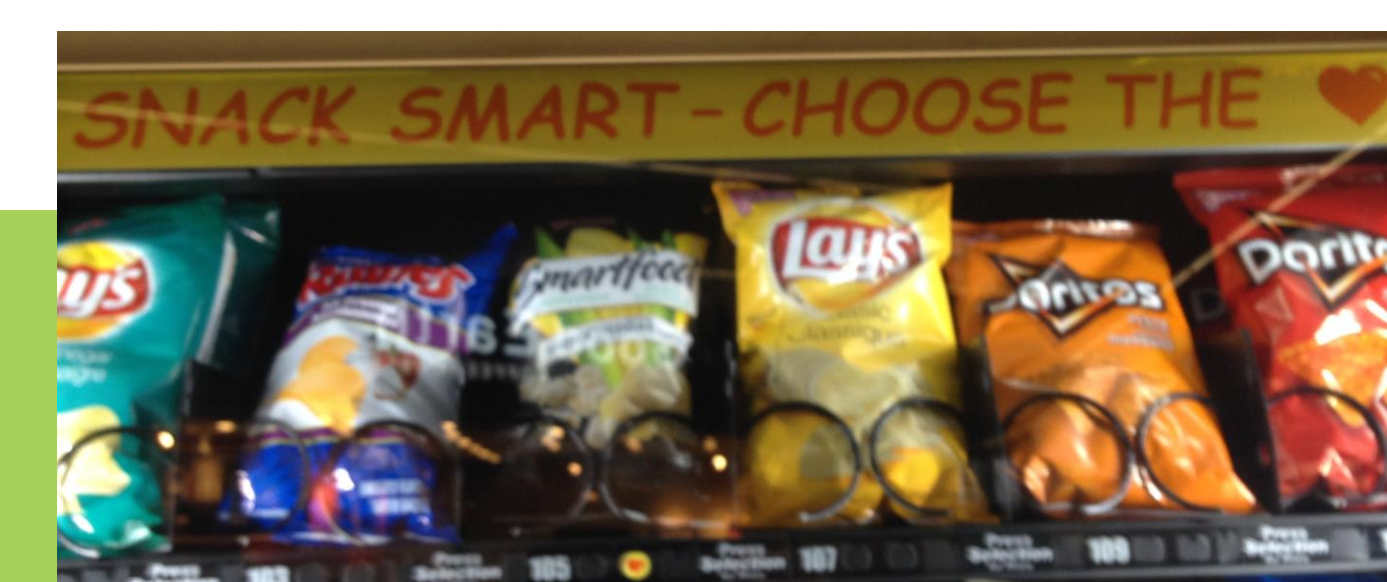
- "Healthy" **bars** (granola, energy, protein), and **fruit snacks** were no different than "unhealthy" bars, and fruit snacks.
- All **nuts and trail mix** were labeled as "healthy" by vendors, however more than half would actually be classified as "unhealthy".

Conclusions

Most vending products were accurately labeled by vendors according to their nutrient content; however, more than one in every five products were mislabeled as healthier than they actually were ranked by provincial nutrition guidelines.

Despite misclassification, **"healthy" labeled products were generally lower in energy, fat, and sodium than the "unhealthy" products, with the exception of bars, fruit snacks, and nuts and trail mixes.**

Provincial nutrition guidelines are somewhat inaccurately implemented into labeling strategies by vendors. Additional resources and supports may be needed for better implementation.



Examples of vending product health labeling with heart (above) and checkmarks (below)

