

# Applying Density-Based Indices to Surveillance at Multiple Levels

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# Channels Along the Food Stream

## Supply

- Production
- Imports
- Exports
- Availability

## Processing

- Manufacturers

## Access

- Communities
- Markets
- Outlets
- Schools/org
- Households

## Consumption

- Individuals

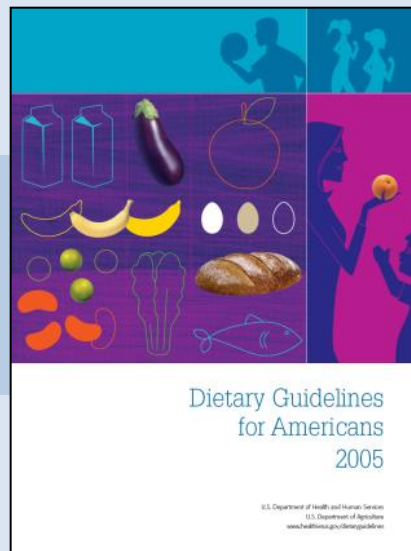
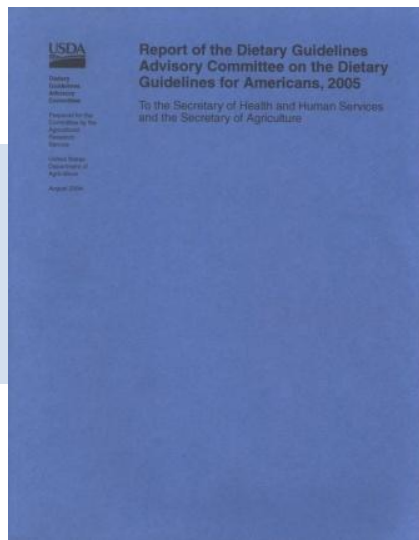
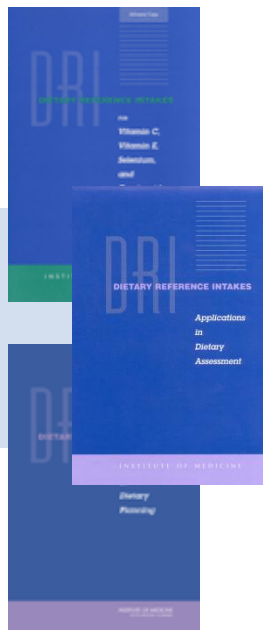
# Key Question

- How can we measure the quality of foods offered and distributed through various channels?
  - National food supply
  - Food industry
  - Food outlets
  - Markets
  - Schools
  - Households
- Would a common metric work for all channels (and be consistent with individual-level metrics)?

# Innovative Aspects

- Using a density basis within a healthy eating index
  - Solved a problem at the individual level: gauging adequacy and moderation relative to person-specific needs
  - Uncouples quality from total amount of food or energy
  - Expresses scoring standards as ratios, usually per 1000 kcal
  - Assesses the mix of foods (quality)
  - Assumes recommendations, when expressed per 1000 kcal, are similar and lend themselves to a single set of standards for each component

# Similar Recommendations Leading to Common Standards



## USDA Food Patterns

The Food Patterns suggest amounts of food to consume: recommended nutrient intakes at 12 different calorie levels calculated according to the nutrient-dense forms of food shows the number of calories from solid fats and added sugars in addition to the suggested amounts of nutrient-dense foods.

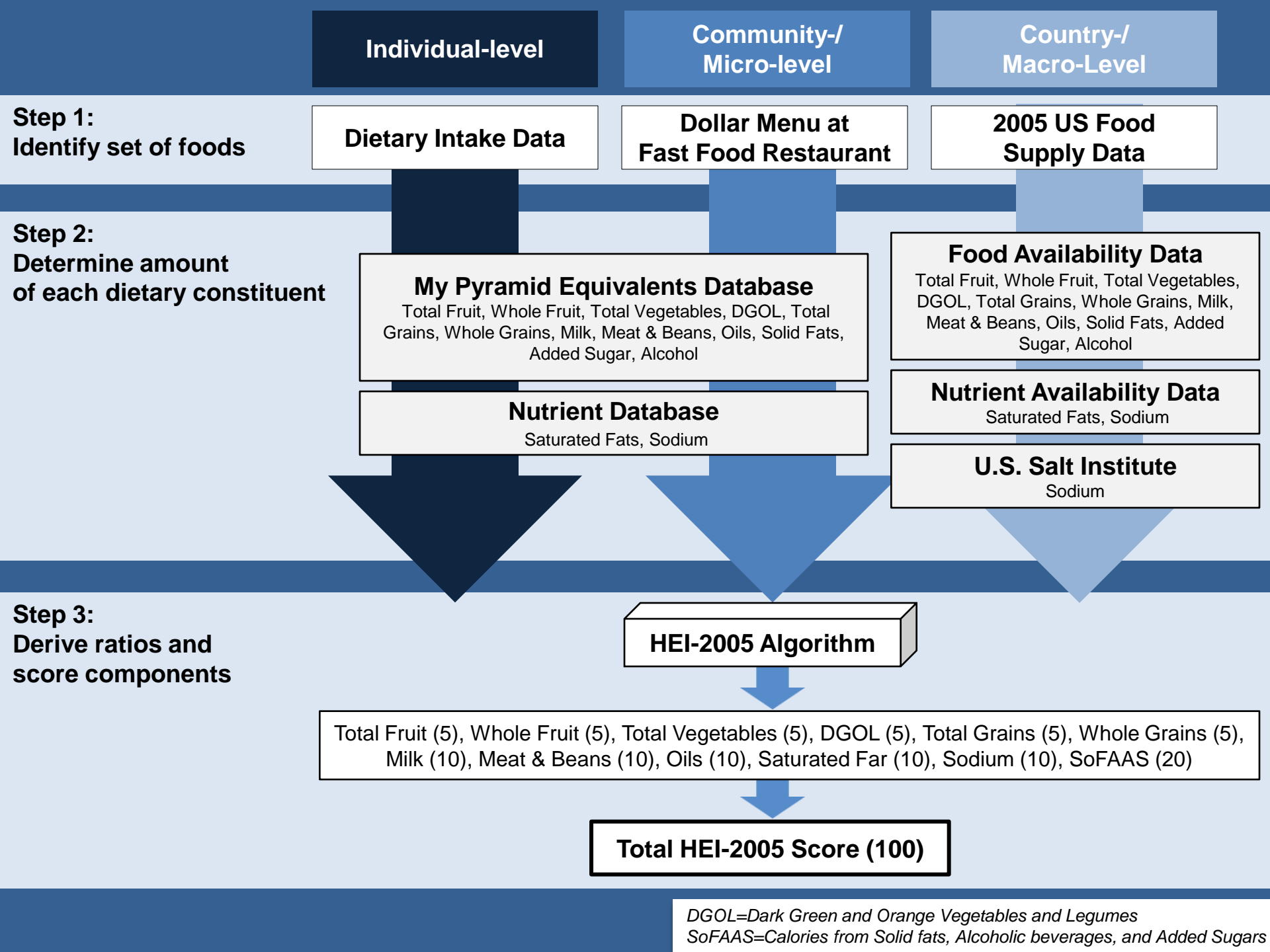
### Daily Amount of Food From Each Group

Calorie Level <sup>1</sup>	1,000	1,200	1,400	1,600
Fruits <sup>2</sup>	1 cup	1 cup	1½ cups	1½ cups
Vegetables <sup>3</sup>	1 cup	1½ cups	1½ cups	2 cups
Grains <sup>4</sup>	3 oz-eq	4 oz-eq	5 oz-eq	5 oz-eq
Protein Foods <sup>5</sup>	2 oz-eq	3 oz-eq	4 oz-eq	5 oz-eq
Dairy <sup>6</sup>	2 cups	2½ cups	2½ cups	3 cups
Oils <sup>7</sup>	15 g	17 g	17 g	22 g

# HEI-2005

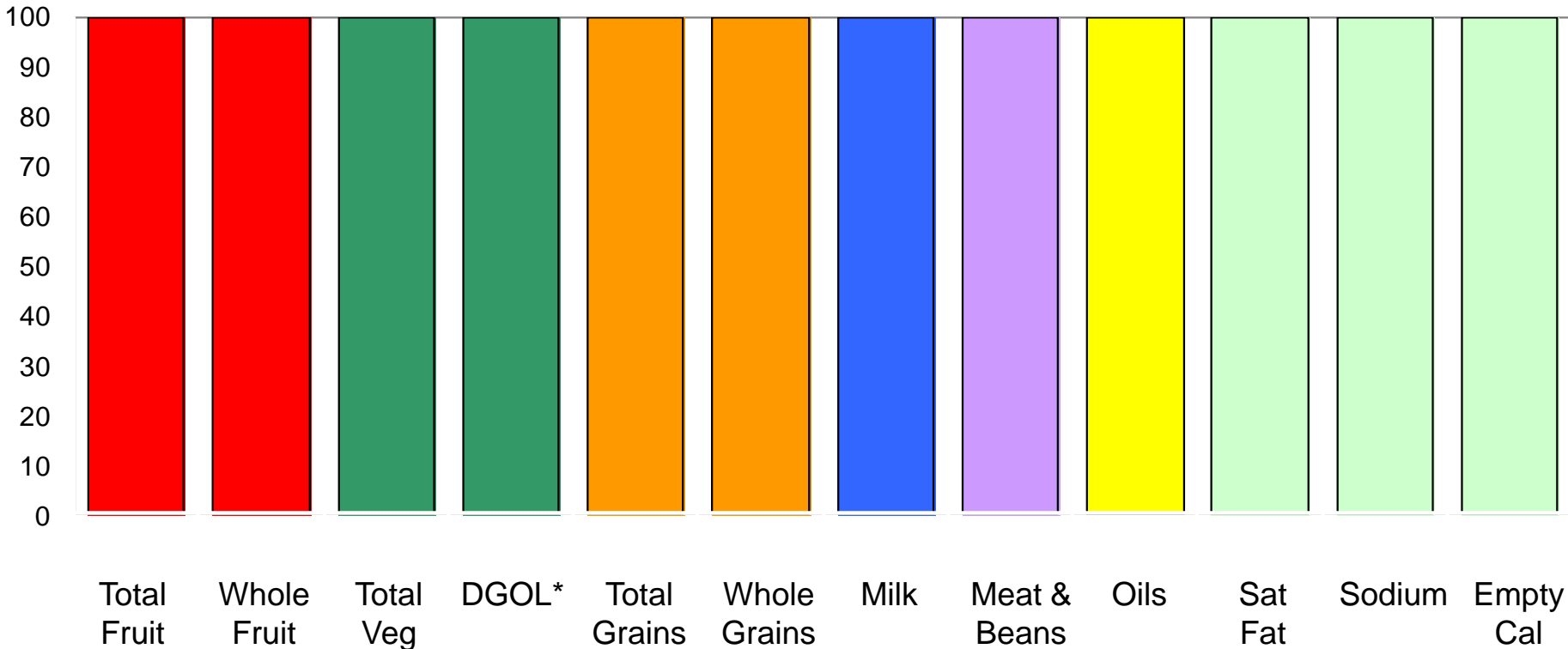
# HEI-2005 Standards

Component	Standard for minimum score of zero	Standard for maximum score
Total Fruit (includes 100% juice)	No Fruit	≥0.8 cup equiv. per 1,000 kcal
Whole Fruit (not juice)	No Whole Fruit	≥0.4 cup equiv. per 1,000 kcal
Total Vegetables	No Vegetables	≥1.1 cup equiv. per 1,000 kcal
Dark Green/Orange/Legumes	No Dark Green Vegetables or Legumes	≥0.4 cup equiv. per 1,000 kcal
Total Grains	No Total Grains	≥ 3.0 oz equiv per 1,000 kcal
Whole Grains	No Whole Grains	≥1.5 oz equiv. per 1,000 kcal
Milk	No Milk, Cheese or Yogurt	≥ 1.3 c per 1,000 kcal
Meat & Beans	No Meat & Beans	≥2.5 oz equiv. per 1,000 kcal
Oils	No Oils	≥ 12 gm per 1000 kcal
Saturated fat	≥ 15 % of energy	≤ 7% of energy
Sodium	≥2.0 grams per 1,000 kcal	≤ 0.7 gram per 1,000 kcal <sup>5</sup>
Calories from SoFAAS (“Empty”)	≥50% of energy	≤20% of energy



# Optimal HEI-2005 Scores, as % of Standard

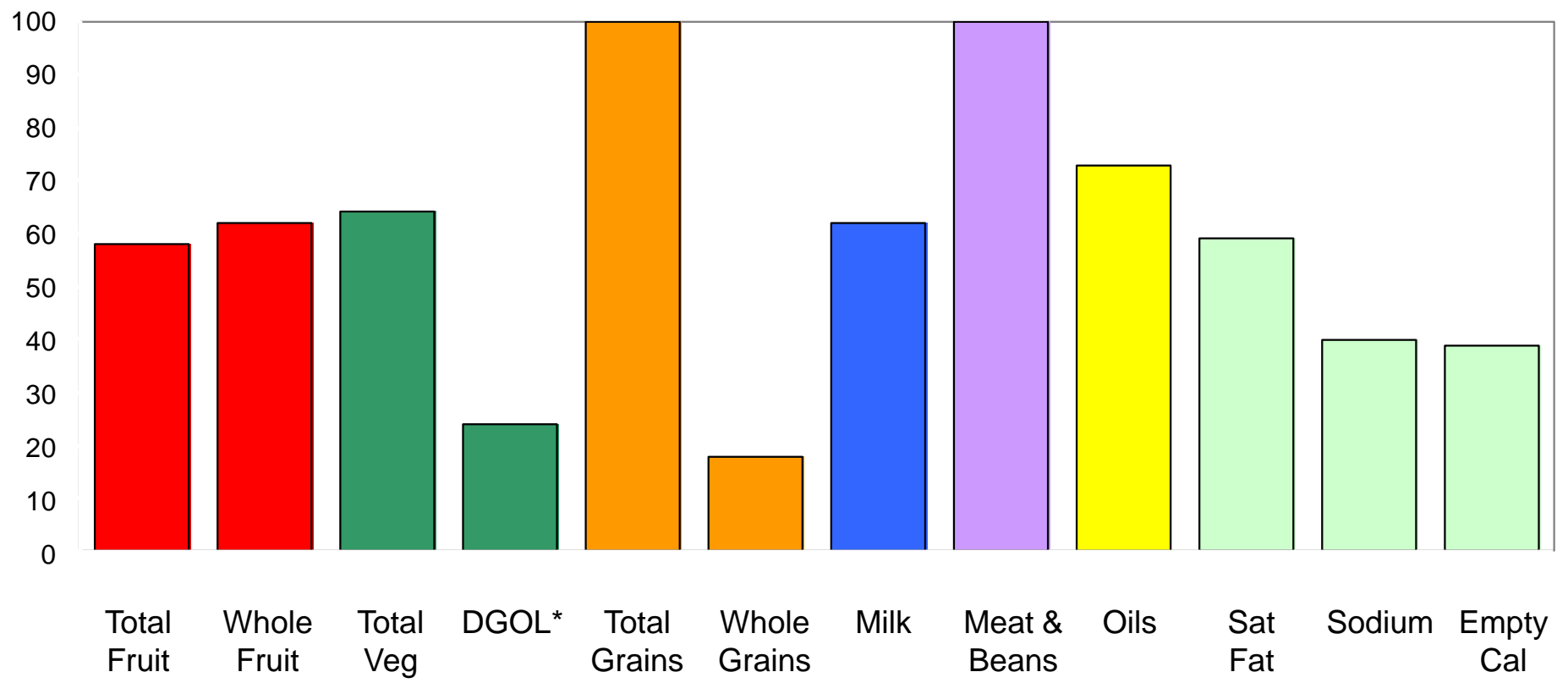
Total score = 100



\* Dark Green and Orange Vegetables and Legumes

# US Population, Ages 2+ HEI-2005 Scores, as % of Standard

Total score = 58

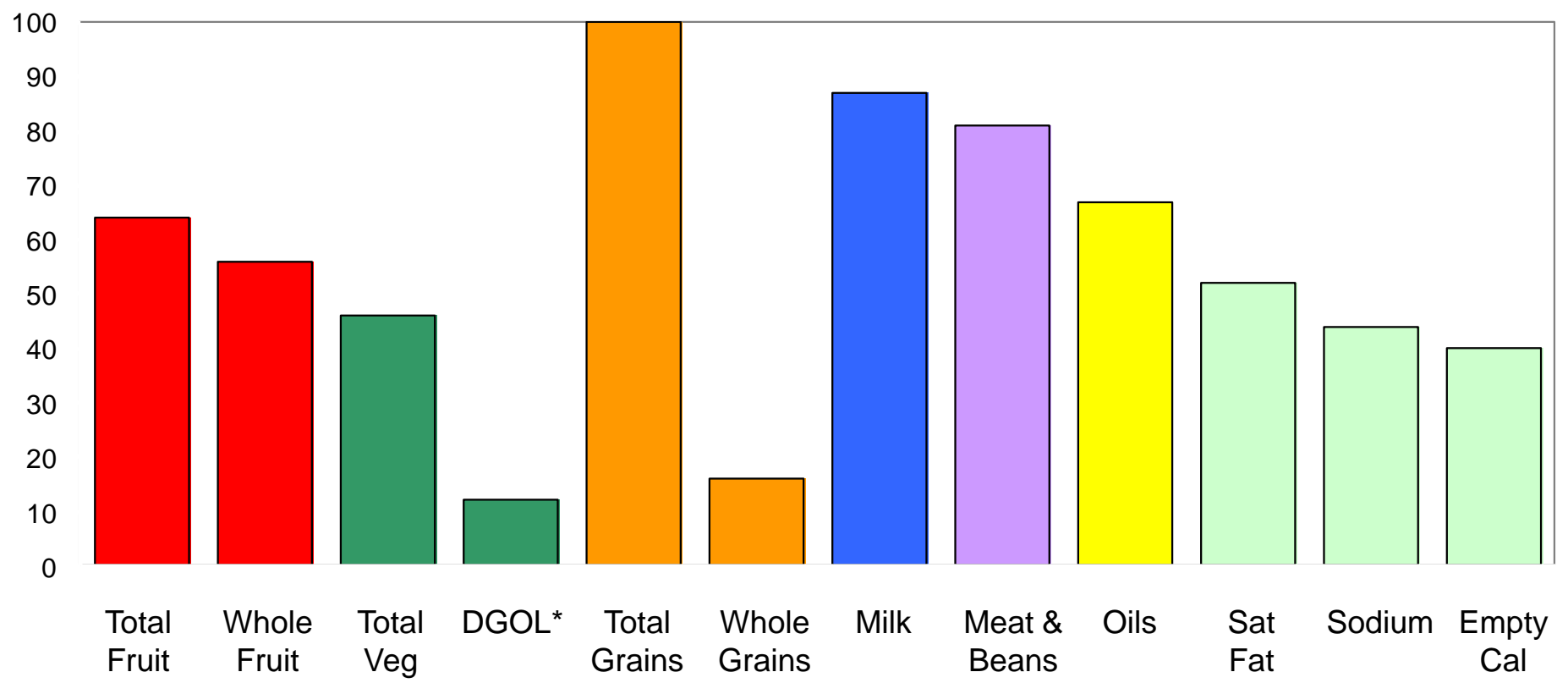


\* Dark Green and Orange Vegetables and Legumes

# US Children, Ages 2-18

## HEI-2005 Scores, as % of Standard

Total score = 56

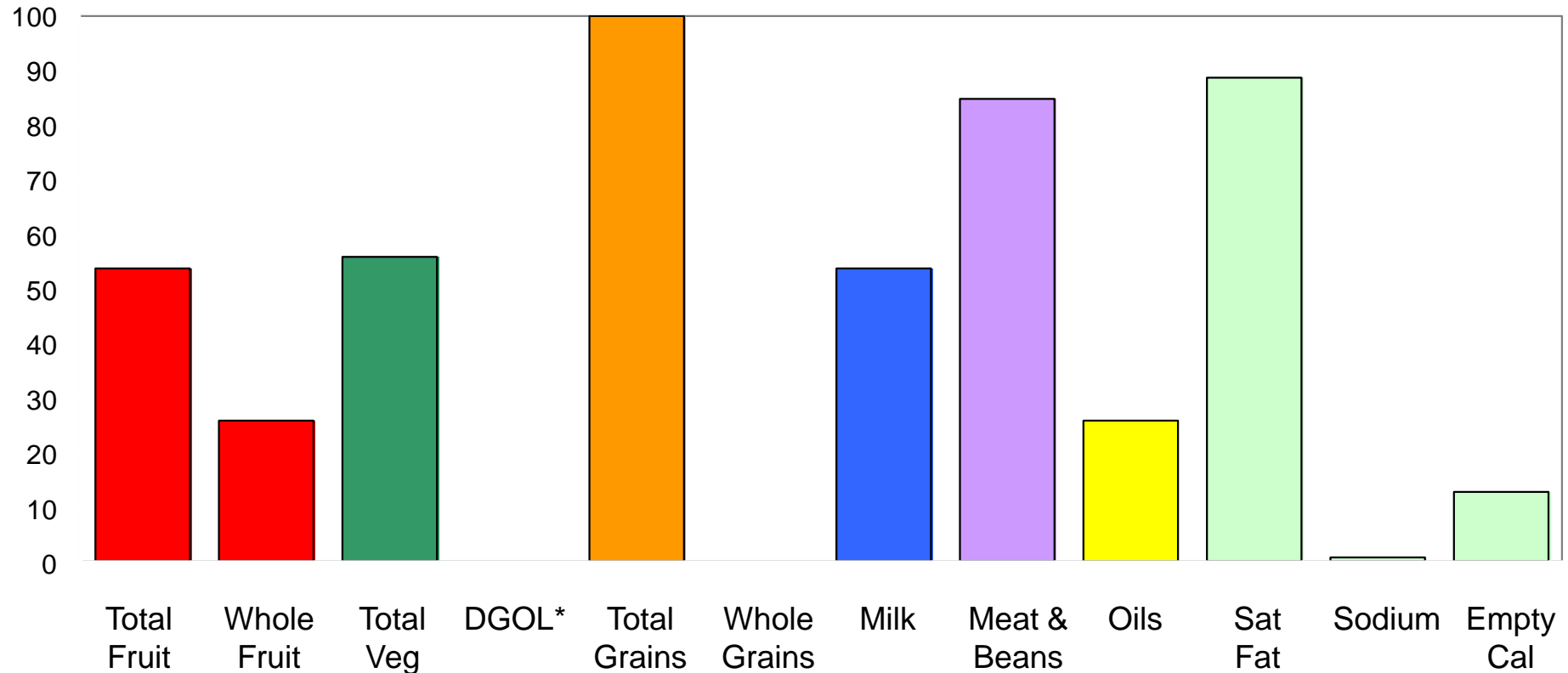


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# Taco Bell Menu

## HEI-2005 Scores, as % of Standard

Total score = 40

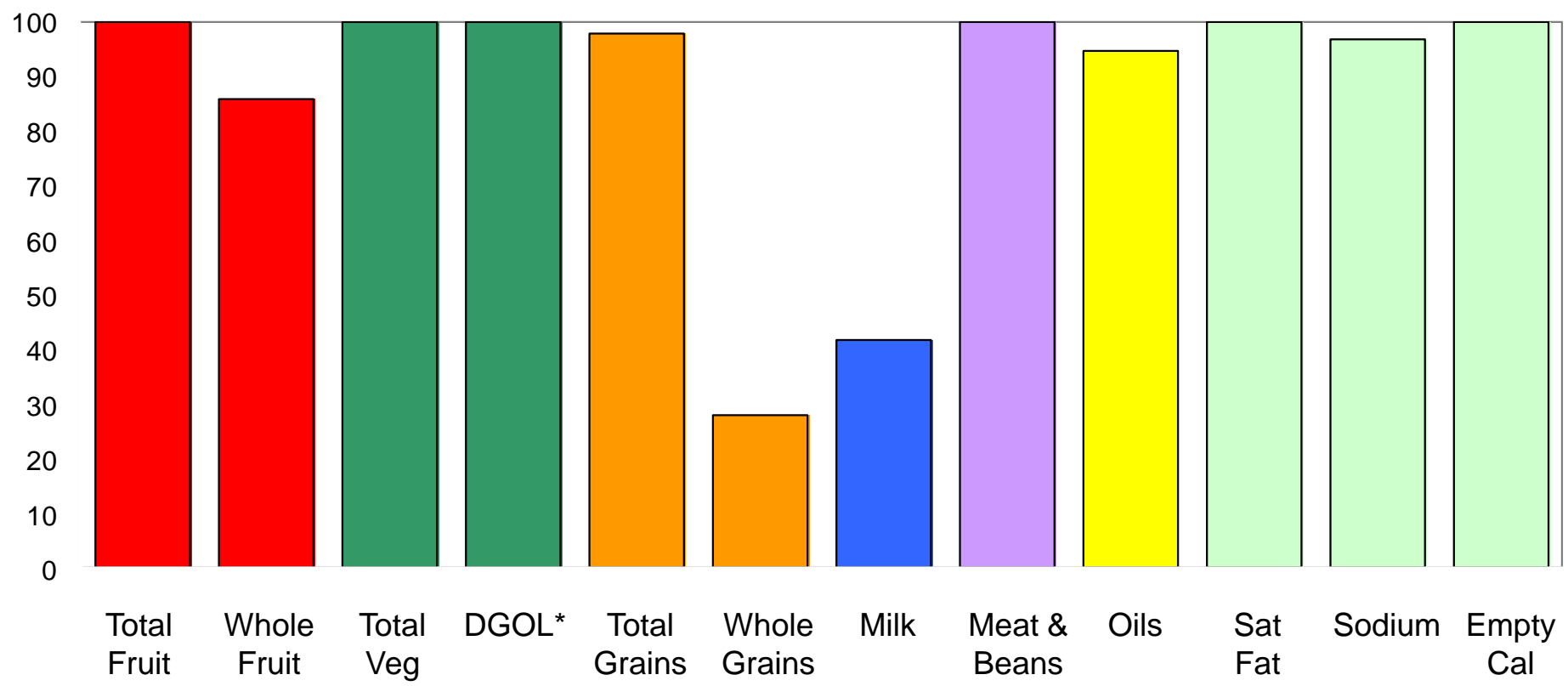


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# The Emergency Food Assistance Program

## HEI-2005 Scores, as % of Standard

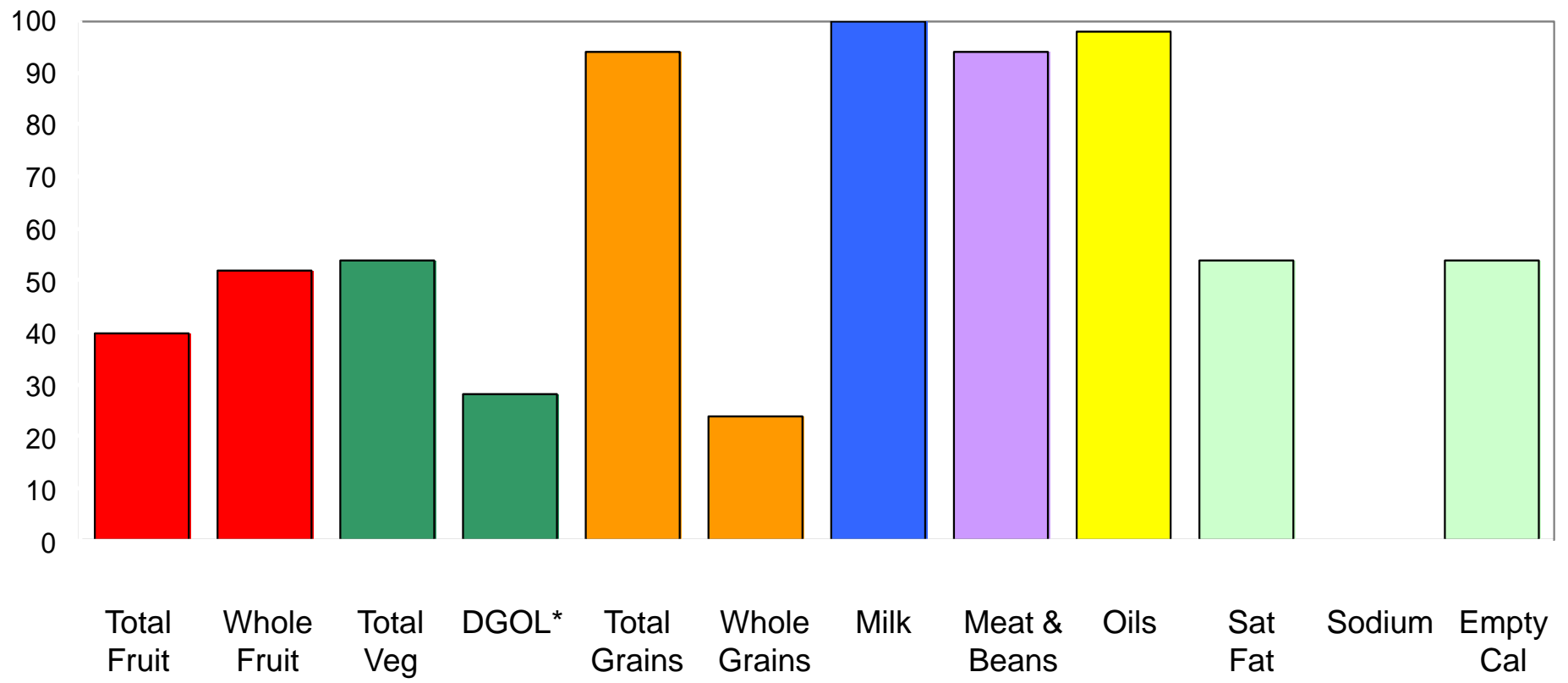
Total score = 89



\* Dark Green and Orange Vegetables and Legumes

# The 2005 US Food Supply HEI-2005 Scores, as % of Standard

Total score = 55



\* Dark Green and Orange Vegetables and Legumes

# Density-Based Indices Can Advance the Field

- Multi-dimensional indices can be density-based
- Density-based indices capture
  - Composition
  - Mix of foods
  - Balance among dietary components
- ...and provide a common metric across all levels of the food stream

# Ongoing Questions

- How can we best operationalize dietary recommendations?
  - Assumption about single set of standards across population
  - Scoring and weighting
  - Directionality
  - Truncation
  - Integrating multidimensionality into a linear score
- How do we identify the most appropriate indices across populations and cultures?
- How can data visualization techniques help us make sense of complex pattern data?