ai and data science in public health nutrition
The ecological model of eating is a framework that considers the multiple environmental factors influencing diet and eating behaviors. It categorizes these factors into macro, physical, social, and individual environments.

- **Macro environment**: home, school, worksites, neighborhoods, food outlets, food policy, food industry, food marketing.
- **Physical environment**: genetics, physiology, beliefs & emotions, behavior & habits, economics, social norms, social support, discrimination, social networks.
- **Social environment**: behavior & habits, economics.
- **Individual**: beliefs & emotions, behavior & habits, economics.

**dynamic system model of eating**

- home
- school
- worksites
- neighborhoods
- food outlets

- genetics
- physiology
- beliefs & emotions
- behavior & habits
- economics

- food policy
- food industry
- food marketing

- social norms
- social support
- discrimination
- social networks

Foresight. Obesity System Map
Social network analysis shows that nutritional health & social networks are interdependent

Social networks form & evolve based on (nutritional) health

Social networks influence food access, food choice, eating and nutrition
Mobility data provides valuable insight into “mobile” food environments and their impact on food choice

1 in 4 Los Angeles County residents live in a “food desert” (USDA, 2019)

Large-scale mobility data shows:

- food environment exposures and food outlet visits are often >10km from home
- the quality of mobile food environments impacts food choice

The nutritional quality of food outlets and environments can be better understood using **digital menu data**.

**Algorithm predicts 20+ nutrient values across 100k menu items**

**Deep learning algorithm**

**Input**
- Menu Item Label

**Low Nutritional Density** | **RRR score** | **Middle Nutritional Density** | **RRR score** | **High Nutritional Density** | **RRR score**
--- | --- | --- | --- | --- | ---
Vanilla Creme Donut | 0.16 | Huesos Rancheros | 1.17 | Grilled Chicken Breast | 2.15
Chips (1 oz) | 0.62 | Chicken Quesadilla | 1.30 | Black Beans & Rice | 2.80
Five Cheese Tomato Pizza | 0.71 | Sauteed Steak | 1.5 | Mung Bean Salad | 5.84

**Low RNQ** | **RNQ score** | **Middle RNQ** | **RNQ score** | **High RNQ** | **RNQ score**
--- | --- | --- | --- | --- | ---
Cold Stone Creamery | 0.16 | Subway | 1.15 | Sweetgreen | 1.82
Buffalo Wild Wings | 0.18 | El Pollo Loco | 1.18 | Salsal Japanese Grill | 1.86
McDonald’s | 0.34 | Distrito Taco | 1.44 | Veggie Patch | 2.50

"most nutritious": Top 7% | RNQ > 1.3
"least nutritious": Bottom 7% | RNQ < 0.3

Team: Abigail Horn, Keith Burghardt (ISI), AD Seo (Viterbi MS), I Liu (Viterbi MS graduate), A Abeliuk (University of Chile), K de la Haye (KSOM)
Integrating novel food system data sources and insights to map and monitor food systems & and build virtual labs

Smart & Connected Community Food Systems: K de la Haye (USC), J Wilson (USC), W Bruine de Bruin (USC), B Lee (CUNY), A Horn (USC)

NPH AI & Modeling Center (AIMINGS): B. Lee (CUNY), S. Kleinberg (Stevens Institute), K de la Haye (USC), D. Thomas (West Point)