



Office of Health Equity

Healthy Communities Data and Indicators Project

Short Title: Retail food environment.

Full Title: Modified retail food environment index.

1. Healthy Community Framework.

Meets basic needs of all.

2. What is our aspirational goal?

Affordable, accessible and nutritious foods.

3. Key factors as they relate to health and mental health disparities and inequities ([California Health and Safety Code Section 131019.5](#)):

Food security and nutrition such as food stamp eligibility and enrollment, assessments of food access, and rates of access to unhealthy food and beverages.

4. Why is this important to health?

a. Description of significance and health connection.

An adequate, nutritious diet is a necessity at all stages of life. Pregnant women and their developing babies, children, adolescents, adults, and older adults depend on adequate nutrition for optimum development and maintenance of health and functioning. Inadequate diets in children can impair intellectual performance and have been linked to frequent school absence and poorer educational achievement. Nutrition also plays a significant role in causing or preventing a number of illnesses, such as cardiovascular disease, some cancers, obesity, type-2 diabetes, and anemia. These weight-associated illnesses are no longer restricted to adults as the prevalence of obesity has more than doubled in children in the last 40 years. Obese children have an increased risk of heart disease and of becoming obese adults.

Lower income families are less likely to have a nutritious diet than those with higher incomes. Peoples' food choices and their likelihood of being overweight or obese are also influenced by their food environment: the foods available in their neighborhoods including stores, restaurants, schools, and worksites. There is a strong association between consumption of calorie-dense foods with low nutritional value and being overweight or obese when one or more calorie-dense meals are consumed per week. High-fat and high-sugar foods are available at most elementary and middle schools. Since the 1970s, the



number of fast food restaurants has more than doubled and the proportion of daily calorie intake from foods eaten away from home has increased.

b. Summary of evidence.

Measures of food availability in the environment include distance to food retailers, cost of foods, or density of food outlets. Due to the lack of standardization of food environment metrics and differences among populations studied, it is difficult to generalize the evidence on the relationship between the food environment and health. Nevertheless, various cross-sectional and longitudinal studies show a positive association between the density of fast-food restaurants and/or convenience stores with Body Mass Index (BMI), obesity and overweight rates; and a negative association with fruit and vegetable intake. The size of this relationship can vary with race/ethnicity. In California, adults living in cities or counties with 16.7% healthy food retailers or less had a 20 percent higher prevalence of obesity and a 23 percent higher prevalence of diabetes than adults living in areas with 25.0% healthy food retailers or more; this relationship held true regardless of household income, race/ethnicity, age, gender, or the physical activity levels of respondents.

c. References.

1. California Center for Public Health Advocacy. [Searching for Healthy Food: The Food Landscape in California Cities and Counties](#). 2007. Accessed November 8th, 2013.
2. Robert Wood Johnson Foundation Commission to Build a Healthier America. [Improving the Health of All Americans through Better Nutrition](#). 2009. Accessed November 8th, 2013.
3. California Center for Public Health Advocacy, PolicyLink, UCLA Center for Health Policy Research. [Designed for Disease: The Link Between Local Food Environments and Obesity and Diabetes](#). 2008. Accessed November 8th, 2013.
4. U.S. Department of Agriculture and U.S. Department of Health and Human Services. [Dietary Guidelines for Americans](#). 7th ed, Washington, DC: U.S. Government Printing Office; 2010. Accessed November 8th, 2013.
5. Papas M A, Alberg, AJ, Ewing R, Helzlsouer KJ, Gary TL, Kalssen AC. The built environment and obesity. *Epidemiol Rev.* 2007; 29(1):129-143.
6. Gibson DM. The neighborhood food environment and adult weight status: estimates from longitudinal data. *Am J Public Health.* 2011; 101(1): 71-78.
7. Zenk SN, Lachance LL, Schulz AJ, Mentz G, Srimathi K, Ridella W. Neighborhood retail food environment and fruit and vegetable intake in a multiethnic urban population. *Am J Health Promot.* 2009; 23(4): 255-264.



5. What is the indicator?

a. Detailed Definition.

Modified retail food environment index (mRFEI) =
No. of healthy food retailers/(No. of healthy + No. of less healthy food retailers) *100

A mRFEI score of zero generally corresponds with the concept of food desert. Read more about interpreting the mRFEI here: https://ftp.cdc.gov/pub/Publications/dnpao/census-tract-level-state-maps-mrfei_TAG508.pdf.

b. Stratification.

None.

c. Data Description.

- i. Data sources: Dun and Bradstreet (<http://www.dnb.com/>) retail database (July 2017).
- ii. Years available: 2017.
- iii. Updated: unknown.
- iv. Geographies available: census tracts, cities/towns, counties, regions, and state.

Dun and Bradstreet geocoded data on the locations of food retailers in California was obtained via an internal data user agreement with the California Department of Public Health, Nutrition Education and Obesity Prevention Branch (NEOPB). Methodology developed by the Centers for Disease Control and Prevention (CDC) was used to calculate the modified retail food environment index, with some modifications (https://ftp.cdc.gov/pub/Publications/dnpao/census-tract-level-state-maps-mrfei_TAG508.pdf). The number of food retailers within a census tract or half a mile from the tract boundary was obtained by intersecting the geocoded data with shapefiles of census tracts or cities/towns (2010 vintage) in ArcMap. The data was exported to SAS and food retailers were classified as healthy or less healthy as follows. Healthy food retailers included supermarkets and larger grocery stores (North American Industry Classification Code –NAICS- 445110), fruit and vegetable markets (NAICS 445230) and warehouse clubs (NAICS 452910). Less healthy food retailers included fast food restaurants (NAICS 722513), convenience stores (NAICS 445120) and small grocery stores (NAICS 445110). The retailers in NAICS 445110 were identified as healthy if they met one of the following criteria: ten or more employees, sales volume higher than one million dollars (sales volume criteria has been used previously, see [here](#)), or if they were identified in the database as California Women’s Infant and Children program (WIC) or Supplemental Nutrition Assistance Program (SNAP or Cal Fresh) authorized vendors. A list of parent business names was created from those retailers classified as healthy. If any of the remaining unclassified retailers was identified to belong to any of the identified healthy parent businesses, they were added to



the healthy category. The rest of 445110 that could not be classified as healthy were included in the less healthy category. Census tract level data was aggregated to calculate county, region and state index values. Regions were based on counties of metropolitan transportation organizations (MPO) regions as reported in the [2010 California Regional Progress Report](#).

6. Limitations.

Travel distances to food retailers are not considered in this indicator. Ground verification has shown that business lists from private companies can have poor performance when used to measure the food environment. The approach used here to identify healthy and less healthy grocery stores (NAICS 445110) has important limitations. Manual screening of a random sample of census tracts revealed that mailing addresses where retail activity might not be occurring are included in the dataset and also that small ethnic markets can get classified as less healthy due to their small number of employees, low sales volume, or not being WIC or Cal Fresh authorized vendors. This methodology also leaves out meat and fish markets and other stores that might offer healthy foods. The CDC methodology recommends classifying NAICS 445110 as healthy or less healthy based on the number of employees alone (https://ftp.cdc.gov/pub/Publications/dnpao/census-tract-level-state-maps-mrfei_TAG508.pdf). With our modified methodology the number of healthy NAICS 445110 was 8,220 with an average sales volume of \$8,577,550, and an average number of employees of 42.0. Less healthy NAICS 445110 were 5,502, with sales volume of \$215,428 and 3.2 employees on average. With the CDC methodology healthy NAICS 445110 would have been 4,397 with an average sales volume of \$15,757,909, and an average number of employees of 75.6. Less healthy NAICS 445110 would have been 6,967, with sales volume of \$194,527 and 2.6 employees on average. The remaining 2,358 retailers would have been left unclassified as they lacked data on the number of employees. Due to these limitations this index should be considered as an initial screening tool and further analysis should be performed for a jurisdiction of interest.

7. Projects using this indicator.

1. Centers for Disease Control and Prevention. CDC's LEAN Works: A Workplace Obesity Prevention Program. Centers for Disease Control and Prevention; 2007.
<http://www.cdc.gov/leanworks/>.
2. San Francisco Department of Public Health. Sustainable Communities Index. San Francisco, CA: San Francisco Department of Public Health; 2013.
<http://www.sustainablecommunitiesindex.org/>.