Neighborhood Food Retail in Philadelphia Technical Appendix

Data shown in the report can be downloaded from Open Data Philly

Data Sources and Definitions

Stores with High-produce Supply

Supermarkets - Supermarket data for Philadelphia County for 2017 were purchased from Nielsen-Trade Dimensions using their TD Linx dataset. This dataset came with the street address, estimated sales volume, store trade channel, store sub channel, chain/independent status, number of employees, square footage of the store, and other attributes describing the store.

Supermarkets were identified by the trade channel "Grocery" and a sub-channel of either "Limited Assortment," "Natural/Gourmet Foods," "Warehouse," or "Supermarket." Supermarkets within a half mile of Philadelphia were included to account for border-crossing. Additional verification of this list was conducted through web searches.

Big Box Stores - Big Box stores include Kmart, Big Lots, BJ's, Sam's Club, Target, Walmart, and other mass merchandisers. These stores were primarily determined using TD Linx data for Philadelphia County for 2017 purchased from Nielsen-Trade Dimensions. These stores were identified by the trade channel "Grocery" and the sub-channel "Supercenter" or using the trade channel "Mass Merchandiser" and a sub-channel of either "General Merchandise" or "Conventional." Additional stores were identified from web searches. Big Box stores within a half mile of Philadelphia were included, as well.

Farmers Markets - According to the United States Department of Agriculture, farmers markets are a shared space, usually outdoors, where farmers meet regularly to sell locally-grown fresh fruits, vegetables, and other farm products directly to customers. Most farmers markets in Philadelphia are operated by one of two organizations—The Food Trust and Farm to City. There are, however, over 15 other organizations that operate markets in Philadelphia that were also included in our enumeration of farmers markets. Our list of markets does not include markets operating as part of special events or on a one-time basis.

Produce Stores - These are typically small stores selling primarily fresh fruits and vegetables. The Division of Environmental Health Services (EHS) of the Philadelphia Department of Public Health licenses and inspects food service establishments in Philadelphia. We extracted produce vendors from the EHS facilities database by searching for the terms "produce," "fruit," and/or "veg" in the business name. Facilities formatted as mobile vendors were identified first and then the remaining facilities were classified as produce stores. Additional produce stores were identified from a list of retailers that accept Supplemental Nutrition Assistance Program (SNAP) benefits from 2018, provided by the USDA. Again, retailers with the terms "produce," "fruit," and/or "veg" in the name were included. The same process

was applied to a list of merchants in the Italian Market from 2018, provided by the 9th Street Merchants Association.

Mobile Produce Vendors - The Division of Environmental Health Services (EHS) of the Philadelphia Department of Public Health licenses and inspects food service establishments in Philadelphia. We extracted produce vendors from the EHS food retailer database by searching for the terms "produce," "fruit," and "veg" in the business name. Those formatted as mobile vendors were designated as mobile produce vendors.

Some of the identified retailers may sell items other than produce. This list, by definition, does not include unlicensed produce vendors, which are not uncommon and take the form of people selling fruits and vegetables from the backs of trucks.

Buying Clubs and CSAs - Buying Clubs and Community Supported Agriculture (CSA) allow people to purchase food straight from local farmers and producers at wholesale prices. Members typically purchase fresh fruits and vegetables but may also wish to receive meat, eggs, cheese, and more. This list of drop off locations is maintained internally by Get Healthy Philly, who compiled it via web searches and phone calls.

Stores with Low-produce Supply

Chain Convenience Stores - Convenience store data for Philadelphia County for 2017 were purchased from Nielsen-Trade Dimensions using TD Linx data. These stores were identified by the trade channel "Convenience" and the sub channel "Conventional." Non-chain stores and those that sold gas were included in other categories (e.g., corner stores, gas stations). Additional stores were manually identified based on chain names from the list of SNAP retailers, the EHS database, and the Philadelphia Department of Public Health's Tobacco Retailer Database (PTRD) because most of them also sell tobacco.

Corner Stores - Corner stores were defined, generally, as retailers having less than 2,000 square feet, four or fewer aisles, 1 cash register, and food as its primary product. To identify corner stores, we started with the TD Linx data purchased from Nielsen-Trade Dimensions. Corner stores were identified by the trade channel "Grocery" and the sub-channel "Superette." The PTRD provided additional stores that had either a 2017 or 2018 tobacco permit and an outlet type of either: convenience, corner store, or bodega. Stores from the SNAP list that could not be classified into any other store type were included as corner stores.

Dollar Stores - Dollar store data for Philadelphia County for 2017 were purchased from Nielsen-Trade Dimensions using TD Linx. Dollar stores were identified by the trade channel "Mass Merchandiser" and the sub-channel "Dollar Store."

Gas Stations - To identify gas stations, we started with the TD Linx data purchased from Nielsen-Trade Dimensions. Gas stations were identified by the trade channel "Convenience" and the sub-channel "Gas Station/Kiosk." Additional stores were manually identified based on chain name or "gas" being in the name from the EHS database and SNAP list.

Newsstands - Newsstands are places, such as an outdoor stall, where newspapers are sold but that also carry food items like snacks and beverages. These stores were identified by querying the PTRD in September 2018 for establishments with a 2017 or 2018 tobacco permit and the outlet type "newsstand."

Pharmacies - Pharmacy data for Philadelphia County for 2017 were purchased from Nielsen-Trade Dimensions using TD Linx. Pharmacies were identified by the trade channel "Drug." All sub-channels, "Rx Only/Small Independents" and "Conventional," were included. Additional stores were identified from the SNAP list where "pharmacy" was in the name.

Demographics

Population – The total population was determined by census block groups, as per 2010 U.S. Census boundaries, based on 2013-2017 American Community Survey of the U.S. Census. The same definition was used for the 2014 food environment calculations, using the 2010-2014 American Community Survey. Note that the resident population was used for this analysis, which is different from the daytime population estimates that account for commuters (who may buy meals and shop for food traveling to and from work and other destinations).

Non-Residential Areas – Non-residential areas were defined as census block groups, as per the 2010 U.S. Census boundaries, with either a population of zero (based on the 2013-2017 American Community Survey of the U.S. Census) or an area of 2 square miles or more. The latter criteria allows for the exclusion of Fairmount Park, Wissahickon Valley Park, and Pennypack Park.

High Poverty Areas – High poverty areas were defined as Census block groups (as per 2010 U.S. Census boundaries) in which 20% or more of the population lived below 100% of the Federal Poverty Level (based on the 2013-2017 American Community Survey of the U.S. Census). The same definition was used for the 2014 food environment calculations, using the 2010-2014 American Community Survey.

Race and Ethnicity - Racial and ethnic group composition of census block groups, as per 2010 U.S. Census boundaries, were based on 2013-2017 American Community Survey of the U.S. Census. The "other" racial group includes all non-Hispanic races except for non-Hispanic White, non-Hispanic Black, and non-Hispanic Asian.

Methodology

Methodology Changes Since the 2014 Walkable Access to Healthy Food in Philadelphia Report

Based on new literature, this report methodology has changed substantially since the prior Walkable Access to Healthy Food in Philadelphia publications. Direct comparisons to previous reports are therefore inappropriate. To facilitate comparisons with the previous report, the 2014 data were rerun using the new methodology.

The revised methodology was constructed with the input of several expert food environment researchers as well as studies conducted by other U.S. cities. We are grateful to our expert panel, which included:

1) Jason Block, MD, MPH, Harvard University
2) Rickie Brawer, PhD, MPH, Thomas Jefferson University
3) Joel Gittelsohn, PhD, Johns Hopkins University
4) Kevin A. Henry; PhD, Temple University
5) Bill McKinney, PhD, The Food Trust
6) Michael Norton, PhD, Reinvestment Fund

Briefly, the methodological changes included:

1) The addition of new retailer types including, buying clubs, CSAs, dollar stores, gas stations, newsstands, and pharmacies.
2) The categorization of stores into either “stores with high-produce supply” or “stores with low-produce supply.”
3) The use of store counts and store counts per capita (density) as the primary metrics for estimating access instead of a “healthy score,” which required a number of assumptions that were difficult to make about store revenue and distances individuals would be willing to walk.

Methodology Overview

1) Several data sources were aggregated including data from Nielsen-Trade Dimensions TD Linx Data, the USDA’s SNAP list, the PTRD, and the EHS database. Duplicate records were removed to create a complete list of Philadelphia food retailers.
2) Stores were categorized into high-produce supply and low-produce supply and counted (i.e., weighted) as 1 or 0.25 based on availability and store hours. Store types were categorized according to the definitions above and additional verification of each list was conducted by cross-checking against all other store types and associated category (e.g., stores with high-produce or stores with low-produce) to ensure proper classification of stores.

3) A half mile was established as a reasonable distance to walk to a store within one's neighborhood, consistent withother studies.[1-4]
4) The total number of high-produce supply stores and low-produce supply stores within walking distance were calculated for each block group using GIS.
5) The number of high-produce supply stores and low-produce supply stores per 1,000 people were calculated for each block group.
6) Block groups were categorized into either no, low, or moderate or high walkable access to stores with a high-produce supply. Categories were based on the accessibility of store types and density.

Selection, Categorization, and Weighting of Store Types

A strength of the current study was the inclusion of various retailer types that contribute to the food environment. While most people do their grocery shopping at supermarkets, a considerable number also purchase food at other places, such as big box stores and other smaller stores.

All stores were categorized as having either a high-produce supply or low-produce supply as a way to measure the general healthfulness of a store's food. However, fruits and vegetables are not the only components of a healthy diet. Stores may sell other healthy products like fresh meats, fish, dairy, and whole grains. However, produce was chosen as the key marker for this analysis because it is easily measured, has been linked to health outcomes, and is supported by previous research.[5]

Stores with a high-produce supply are those that generally offer an abundant selection of fruits and vegetables, particularly fresh fruits and vegetables. Produce stores certainly fall into this category, as well as supermarkets and big box stores which have separate sections of the store devoted to produce. Stores from these three retailer types were given their full weight of one. In other words, each store counted as 1 store.

While the selection of products at farmers markets, buying clubs, CSAs, and mobile produce vendors include many fresh fruit and vegetable options, they are limited in other ways like size, hours of operation, and seasonality. These are also usually not brick and mortar stores like the other high-produce supply retailers. For these reasons, farmers markets, buying clubs, CSAs, and mobile produce vendors were counted as one quarter of a store (0.25).

Stores with a low-produce supply are those that offer either no fruits and vegetables or have a limited selection. For example, local data from Philadelphia corner stores using the Nutrition Environment

[1] Food Access Research Atlas. USDA ERS - Food Access Research Atlas. https://www.ers.usda.gov/data-products/food-access-research-atlas/. Published May 18, 2017.
[2] Smith R. Food access in D.C is deeply connected to poverty and transportation. D.C. Policy Center. https://www.dcpolicycenter.org/publications/food-access-dc-deeply-connected-poverty-transportation/. Published March 13, 2017.
[3] Wang MC, Kim S, Gonzalez AA, Macleod KE, Winkleby MA. Socioeconomic and food-related physical characteristics of the neighbourhood environment are associated with body mass index. *Journal of Epidemiology & Community Health*. 2007;61(6):491-498. doi:10.1136/jech.2006.051680.
[4] Zenk SN, Powell LM. US secondary schools and food outlets. *Health & Place*. 2008;14(2):336-346. doi:10.1016/j.healthplace.2007.08.003.
[5] Morland K, Filomena S. Disparities in the availability of fruits and vegetables between racially segregated urban neighbourhoods. *Public Health Nutrition*. 2007;10(12):1481-1489. doi:10.1017/s1368980007000079.

Measures Survey for Corner stores (NEMS-CS) shows that although 61% of stores carry any fruit and 79% of stores carry any vegetables, on average stores carry only 1.6 and 2.6 varieties, respectively (out of the ten types of fruits and vegetables assessed, each).[6] Conversely, almost all corner stores carry baked goods (92%), chips (95%), and soda (98%).

This is consistent with research from Baltimore showing that 59% convenience stores (including chain convenience stores, pharmacies, and dollar stores) carried 5 or fewer vegetables.[7]

In addition to corner stores, other store types that fall into the low-produce supply category include: chain convenience stores, dollar stores, pharmacies, gas stations, and newsstands. All stores with a low-produce supply were given a weight of one; each counted as 1 store.

It is important to note that stores were categorized based on the assigned store type category (typically taken from TD Linx data from Nielsen-Trade Dimensions). Certainly, some individual stores may be exceptions and atypical of their category (e.g., big box stores with limited produce or corner stores with a high-produce supply); however, it was not possible to ground-truth the entire food retailer environment containing approximately 2,750 stores.

Determination of Walking Distance to Stores

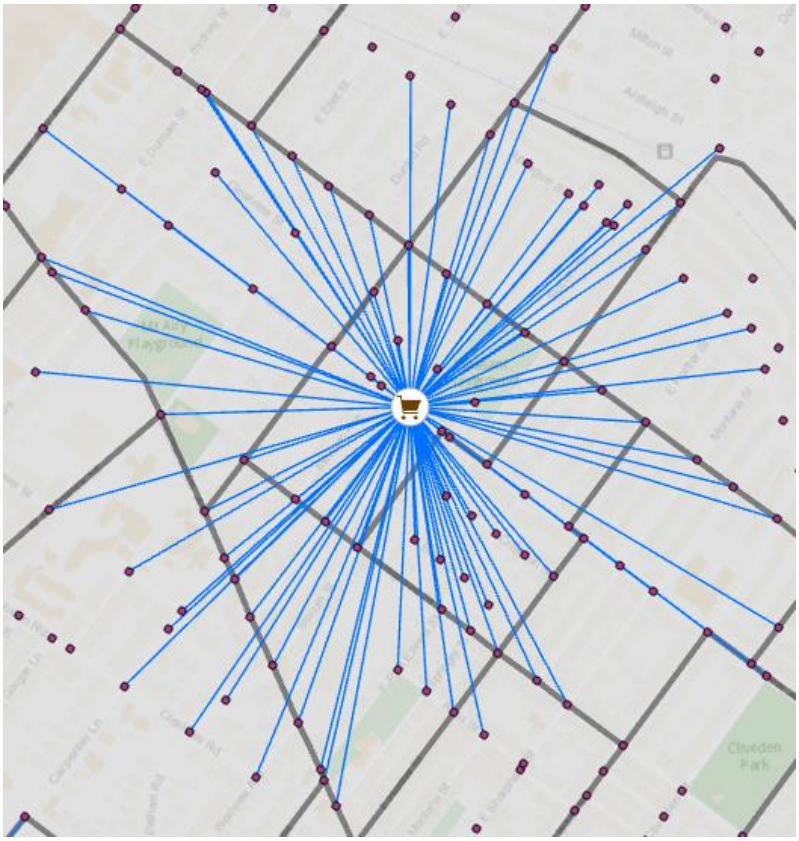
The focus of this report was on walkable access to food. That is, the emphasis was on understanding what was available in one's neighborhood within a reasonable walking distance from any block group. A reasonable walking distance was set as one-half mile, a distance corresponding to approximately 10 minutes walking and often utilized in other geospatial food access studies.[8] This distance is also thought to loosely correspond to some definitions of residents' interpretations of their "neighborhood". Survey data from Philadelphia suggest almost 50% of people said they would walk 5 or more blocks to buy healthy food[9], which corresponds to approximately 0.5 miles or 10 minutes.

This approach differs from prior PDPH food access reports where service areas were created based on largely arbitrary assumptions about the reasonable distances people would walk to shop at different types of retailers, ranging from 0.1 miles (for corner stores) to 0.5 miles (for supermarkets).

[6] Cavanaugh E, Mallya G, Brensinger C, Tierney A, Glanz K. Nutrition environments in corner stores in Philadelphia. *Preventive Medicine*. 2013;56(2):149-151. doi:10.1016/j.ypmed.2012.12.007.
[7] Smith M, JH Bloomberg School of Public Health. Baltimore City's Food Environment Report: 2018 Report. http://www.jhsph.edu/research/centers-and-institutes/johns-hopkins-center-for-a-livable-future/research/clf_publications/pub_rep_desc/baltimore-city-food-environment-report2018.html. Published February 5, 2018.
[8] Charreire H, Casey R, Salze P, et al. Measuring the food environment using geographical information systems: a methodological review. *Public Health Nutrition*. 2010;13(11):1773-1785. doi:10.1017/s1368980010000753.
[9] Brawer R, Jefferson University. Unpublished data.

Calculation of the Total Number of Stores for Each Block Group

The total number of stores within a half mile walking distance to each block group was calculated using a Geographic Information System (GIS) tool within the Network Analyst extension called OD Cost Matrix. This tool identified the least-cost paths along the street network from street nodes (the origins) to stores (the destinations) using half-mile walking distance. The example in Figure 1 illustrates this concept. Of note, the OD Cost Matrix solver does not output lines along the network, however, the network distance is stored in the attribute table; this allows for faster computation speed. The Identity tool informed which street nodes belonged to which block group(s), thus making the connection between a block group's street nodes and the stores accessible from them by walking half a mile. The Delete Identical tool was employed to ensure that a store was only counted once per block group. The total number of stores was calculated using Summary Statistics. Null values were converted to a value of 0, indicating that zero stores were returned.



To increase speed and efficiency, separate models (one for stores with high-produce and another for stores with low-produce) were created in Model Builder to automate the steps.

Figure 1. OD Cost Matrix lines output

Calculation of the Number of Stores per 1,000 People for Each Block Group

The number of stores per capita was calculated by dividing the total number of stores by the block group's population, multiplied by 1,000. This was done separately for both high-produce supply stores and low-produce supply stores.

Categorization of citywide high-produce supply store density into walkable access categories

- No Access areas are those with zero high-produce supply stores within a half mile walking distance.

- Low access areas are those with a high-produce supply store count less than or equal to one (but not zero) that does not include a supermarket. This would take the form of either:
    - 1 big box store but no supermarket
    - 1 produce store but no supermarket
    - 1- 4 limited access high-produce supply stores but no supermarket

  This category aims to capture places that do not have a supermarket within walking distance, but do have a high-produce supply store option or fair assortment of limited access high-produce supply stores as options.

- Moderate or high access areas are those with a supermarket within a half mile walking distance or a wider assortment of high-produce supply store options available that total a count greater than 1 (High-produce supply stores were weighted 1 and limited high-produce supply stores were weighted 0.25). This would take the form of either:
    - At least 1 supermarket
    - 2 or more high-produce supply stores (e.g.., A big box store and produce store)
    - 5 or more limited access high-produce supply stores (ex. Three mobile produce vendors, a CSA, and a farmers market)
    - Any combination of high-produce and limited access high-produce stores that total >1 (e.g., A big box store and a buying club).

  This category aims to capture places that have sufficient walkable access to healthy foods with either a supermarket as an option, or multiple other options available.

Limitations

Although the 2017-2018 Philadelphia Food Environment Report uses the best available data sources and the methodological decisions were made with input from an independent group of experts, there are still limitations to keep in mind.

First, no source of data is fully complete or 100% accurate. This means the data used could have left out some stores, included some closed stores, misclassified stores, or included other possible mistakes. The report uses a variety of sources that were triangulated and de-duplicated offering our best possible estimate of the complete food retail landscape in Philadelphia at the time of the report.

Second, there were insufficient data to completely accurately classify store types as high versus low-produce supply. For example, while it is true that most supermarkets have a high-produce supply and most corner stores have a low-produce supply, there are certainly exceptions for each category distinction. Resources were not available to inspect each store to inform classification decisions so some misclassification is likely to have occurred. However, the store classification decisions were reasonable and consistent with available evidence on produce availability in difference store types. For example, a study of urban areas in southern Louisiana and Los Angeles determined only 5-10% of convenience and drug stores sold any fresh fruits and vegetables, while all supermarkets carried fresh produce. Additionally, supermarkets devoted far more shelf space to these products; approximately 30 times that

of convenience stores.[10] Another study that looked at the availability of food items in New York City food stores showed a greater proportion of supermarkets carried all types of fruits and vegetables compared to corner stores and delis, regardless of the neighborhood's racial composition.[5]

Third, a number of important factors influencing the food environment were not able to be included. This includes data related to quality and cost of produce as well as data related to how many customers they routinely serve or total store revenues. These factors are of interest, but no suitable dataset was available to allow for their inclusion across all food retailer types.

Report Formatting Notes

- All map legends use whole numbers for simplicity and visual clarity. In cases where values with decimals are present, the greatest number in the symbol range is the cutoff. Any values between the cutoff and the next highest symbol category are assigned into the higher category. For example, a count of 5.25 stores is included in the 6-10 symbol bucket of the legend, and a count of 10.0 stores is included in the 6-10 symbol bucket of the legend.
- For the summaries of planning districts and council districts, block groups were assigned to the district where more people lived when a block group overlapped multiple districts.

[10] Farley TA, Rice J, Bodor JN, Cohen DA, Bluthenthal RN, Rose D. Measuring the Food Environment: Shelf Space of Fruits, Vegetables, and Snack Foods in Stores. *Journal of Urban Health*. 2009;86(5):672-682. doi:10.1007/s11524-009-9390-3.