About the Measure	
Domain:	Social Determinants of Health
Measure:	Food Swamp
Definition:	"Food swamp" describes areas with a high density of establishments selling high-calorie fast food and junk food relative to healthier food options.
Purpose:	Food swamps have a statistically significant effect on increased adult obesity.
Essential PhenX Measures:	Current Address
Related PhenX Measures:	Healthy Food Environments
Measure Release Date:	

About the Protocol	
Protocol Release Date:	
PhenX Protocol Name:	Food Swamp
Keywords:	Retail Food Environment Index, RFEI, Social Determinants of Health
Protocol Name from Source:	Traditional Retail Food Environment Index
Description:	The presence of a food swamp is calculated using the traditional Retail Food Environment Index per county, which includes the number of fast food restaurants and convenience stores divided by the number of grocery stores and supermarkets. The number of grocery stores, fast food restaurants, and convenience stores is determined at a county level using data from the Food Environment Atlas.
Specific Instructions:	If current address (see PhenX Demographics domain, Current Address measure) has been collected for a study respondent, then it is possible to use geocoding to link the address of a study participant to his or her local neighborhood (a geographic area), typically by a census-defined unit, such as a census block group or a census tract or by ZIP Code.

Protocol:	**Traditional Retail Food Environment Index**
	Accessing Food Store Data at the County Level
	All county-level food-store data is sourced from the Food Environment Atlas found at https://www.ers.usda.gov/data-products/food-environment-atlas/data-access-and-documentation-downloads/. An excel file can be downloaded to further extract data at a county level.
	According to the U.S. Census Bureau, County Business Patterns, the following food environment variables are defined as:
	Grocery Stores - The number of supermarkets and grocery stores in the county. Grocery stores include establishments generally known as supermarkets and smaller grocery stores primarily engaged in retailing a general line of food, such as canned and frozen foods; fresh fruits and vegetables; and fresh and prepared meats, fish, and poultry.
	Fast Food Restaurants - The number of limited-service restaurants in the county. Limited-service restaurants include establishments primarily engaged in providing food services where patrons generally order or select items and pay before eating. Food and drink may be consumed on premises, taken out, or delivered to the customer's location.
	Convenience Stores/Food Marts - The number of convenience stores in the county. Establishments known as convenience stores or food marts are primarily engaged in retailing a limited line of goods that include soda, snack foods, etc.
	Calculating the Traditional Retail Food Environment Index
	After downloading the data for a given county, the traditional Retail Food Environment Index may then be calculated as follows:
	Traditional Retail Food Environment Index (RFEI) = (Fast Food / Limited Service Establishments + Convenience Stores) / (Grocery Stores / Super Markets)
	Additional information may be found in the related publication at: https://dx.doi.org/10.3390%2Fijerph14111366
	The RFEI can be categorized as following: 800 m buffer: below 3.0 3.0 – 4.9 5.0 and above
	1600 m buffer below 6.0 6.0 – 9.9 10.0 and above
	The number indicates the times greater of unhealthy food access (i.e. a RFEI of 3 indicates there are 3 times more unhealthy food retailers vs healthy food retailers in a

	given radius). A higher RFEI has been correlated with a higher obesity rate compared to a lower RFEI.
Selection Rationale:	The traditional Retail Food Environment Index is an objective measure of food swamps that is easy to calculate and has been shown to be correlated with county-level obesity rates.
Source:	Cooksey-Stowers, K., Schwartz, M. B., & Brownell, K. D. (2017). Food swamps predict obesity rates better than food deserts in the United States. *International Journal of Environmental Research and Public Health*, *14*(11), 1366.
Availability:	Publicly available
Life Stage:	Any Age
Language:	English
Participant:	Not applicable; derived from publicly available secondary data
Personnel and Training Required:	Knowledge of census data products and websites, such as the U.S. Census Bureau website (https://www.census.gov/programs-surveys/cbp.html) and the ability to use U.S. Department of Agriculture products and websites, such as the Food Environment Atlas (https://www.ers.usda.gov/data-products/food-environment-atlas/go-to-the-atlas) The extracted data will need to be manipulated, and the traditional RFEI needs to be calculated.
Equipment Needs:	Access to a desktop or laptop computer with Internet access to download data from the Food Environment Atlas (https://www.ers.usda.gov/data-products/food-environment-atlas/go-to-the-atlas). Optional statistical analysis can be executed using Stata/SE software.
General References:	California Center for Public Health Advocacy, PolicyLink, & the UCLA Center for Health Policy Research. (2008, April). *Designed for disease: The link between local food environments and obesity and diabetes*. Retrieved from https://escholarship.org/uc/item/9zc7p54b Cooksey-Stowers, K., Schwartz, M. B., & Brownell, K. D. (2017). Food swamps predict obesity rates better than food deserts in the United States. *International Journal of Environmental Research and Public Health, 14*(11), 1366. Economic Research Service (ERS), U.S. Department of Agriculture (USDA). (2019). *Data access and documentation downloads*. Retrieved from https://www.ers.usda.gov/data-products/food-environment-atlas/data-access-and-documentation-downloads/ Economic Research Service (ERS), U.S. Department of Agriculture (USDA). (2019). *Food Environment Atlas*. Retrieved from https://www.ers.usda.gov/data-products/food-environment-atlas/go-to-the-atlas/ McGuirt, J. T., Jilcott Pitts, S. B., & Gustafson, A. (2018). Association between spatial access to food outlets, frequency of grocery shopping, and objectively-assessed and self-reported fruit and vegetable consumption. *Nutrients, 10*(12), 1974. Murphy, M., Badland, H., Jordan, H., Koohsari, M. J., & Giles-Corti, B. (2018). Local food environments, suburban development, and BMI: A mixed methods study.

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Mode of Administration:	Secondary data analysis
Derived Variables:	None

Requirements:

Requirements Category	Required (Yes/No):
Major equipment	No
Specialized training	No
Specialized requirements for biospecimen collection	No
Average time of greater than 15 minutes in an unaffected individual	No

Annotations for Specific Conditions:	No annotations at this time
Process and Review:	Not applicable