How to Identify Food Deserts: Measuring Physical and Economic Access to Supermarkets in King County, Washington

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The researchers are interested in how food deserts are identified

Objectives. We explored new ways to identify food deserts.

Methods. We estimated physical and economic access to supermarkets for 5 low-income groups in Seattle–King County, Washington. We used geographic information system data to measure physical access: service areas around each supermarket were delineated by ability to walk, bicycle, ride transit, or drive within 10 minutes. We assessed economic access by stratifying supermarkets into low, medium, and high cost. Combining income and access criteria generated multiple ways to estimate food deserts.

Results. The 5 low-income group definitions yielded total vulnerable populations ranging from 4% to 33% of the county's population. Almost all of the vulnerable populations lived within a 10-minute drive or bus ride of a low- or medium-cost supermarket. Yet at most 34% of the vulnerable populations could walk to any supermarket, and as few as 3% could walk to a low-cost supermarket.

Conclusions. The criteria used to define low-income status and access to supermarkets greatly affect estimates of populations living in food deserts. Measures of access to food must include travel duration and mode and supermarket food costs. (*Am J Public Health*. 2012;102:e32–e39. doi:10.2105/AJPH.2012.300675)

They discovered that travel must also be taken into consideration

Inequitable access to healthy, affordable foods in some US communities may be one reason for the observed social disparities in health.[1–3] The term "food desert," originally coined in the United Kingdom,[4,5] describes low-income neighborhoods, both urban and rural, that have limited access to full-service supermarkets or grocery stores.[2,6] Because supermarkets generally offer a variety of healthy foods at reasonable cost, food access is defined by proximity to a supermarket or large grocery store.[2,7,8]

Eliminating food deserts has become a priority issue in national-level food and nutrition policies. Implementation of these policies requires accurate definition and identification of food deserts. The 2008 Farm Bill, Section 7527, defines a food desert as "an area . . . with limited access to affordable and nutritious food, particularly such an area composed of predominantly lower-income . . . communities."[9(p1031)] The Institute of Medicine and the National Research Council use a similar definition.[10]

Studies in public health and urban planning have applied both criteria—low-income status and low access to supermarkets—to identify food deserts.[2,7,11–13] Various geographic boundaries, such as zip codes,[14–16] census tracts,[7,17–22] and census block groups,[12,23,24] have also been used. A national study by the US Department of Agriculture relied on a 1-by-1-kilometer grid.[2] Measures to define a low-income area and its vulnerable population have included zip codes with a median household income at the bottom quintile of the national level (≤ 80% of the surrounding area),[19] census tracts with more than 20% of the population living below the poverty level,[22] and a 1-by-1-kilometer grid with more than 40% of its population at or below 2 times the poverty level.[2]

Food access has typically been measured as the physical distance between the centroids of spatial units of analysis (e.g., census tracts or the 1-km grid as the neighborhood), or between the centroids of spatial units housing the population and the closest supermarket or large grocery store. Various distance thresholds have been used for urban residents: 0.8 kilometers,[25] 1 kilometer,[18] 1 mile,[2,23] 2 kilometers,[22] and 2.5 kilometers.[8] In rural areas, 10 miles has been used.[2,15]

Methodological limitations of past studies included coarse levels of income data aggregation, such as zip codes or census tracts. Analyses based on census block groups, the finest unit for which income data are available, provide more accurate figures of economically challenged populations. Distances between places where people live and shop for food have often been measured as straight-line (Euclidian) distance. Some studies have employed the more realistic street network distance measure.[7,24,26–28] Most studies have focused on driving as the default transportation mode, although some investigated access to a supermarket by walking[2,25,26,29] or taking public transit.[26,29] Finally, with few exceptions,[30–32] most studies have not considered food cost differences among supermarket chains, assuming that all supermarkets offer the same variety of healthy foods at the same cost to consumers.

We sought to introduce an improved approach to measuring food deserts and to refine measures of access to supermarkets. In addition to income, we used 2 access criteria to determine food deserts at the census block group level in Seattle–King County, Washington. We evaluated physical access for different modes of travel. We measured economic access by stratifying supermarkets by food price, with the assumption that low-income populations need to access low-cost supermarkets. We added car ownership as a measure of population vulnerability.[27]

METHODS

Data on population, households, income, car ownership, and poverty rates came from the

They conducted a literature review to see how others had identified where the food deserts are.