Validity of Secondary Retail Food Outlet Data

A Systematic Review

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Appendix A

Evidence acquisition approach to identify studies examining evidence for validity of secondary retail food data

Search
• Literature search was conducted through December 31, 2012 • Searched for key words in the study's title or abstract[a] • Searched multiple databases and publication listings[b] • Examined references cited in each of the studies included
Screening
• Peer-reviewed • Research article • Study compared secondary retail food outlet data source (e.g., InfoUSA) to primary data sources (i.e., field observations) for accuracy of identifying the type and location of retail food outlets
Exclusion criteria
• Studies that used only multiple secondary sources in an effort to compile a comprehensive list, compared multiple secondary data sources to verify a list, or calculated percentage agreement between secondary data sources and did not include a comparison to primary data[c] • Studies that collected primary data and used secondary data but did not report evidence for validity for secondary data sources used[d] • Studies that focused only on accuracy of outlet classifications[e]
Included
• Gathered from each article: citation, secondary data sources examined, primary data–gathering approaches, retail food outlet examined, geographic and sociodemographic characteristics, analysis, outcomes, study costs, identified strengths and limitations of the study, and recommendations for research and practice • When needed for clarification purposes, study authors were contacted

[a] Key words searched were: *ground-truthing, field validation of food sources, validation, reproducibility of results, measurement, secondary data sources, intermediate data sources, food environment, local environment, neighborhood environment, food environment health, environmental health, food outlet, fast food, fast-food, fast food restaurant, fast food outlet, restaurant, quick service restaurant, full service restaurant, full-service restaurant, family restaurant, limited-service restaurant, grocery store, supermarket, supercenter, chain food store, corner store, convenience store, dollar stores, pharmacies, farmer's markets, farmers' market*

[b] PubMed (MEDLINE); Web of Science; ScienceDirect; CINAHL; Education Resources Information Center (ERIC); SPORTDiscus; Google Scholar; the U.S. National Cancer Institute's Food Environment Database (riskfactor.cancer.gov/mfe); and grants awarded and published papers listed on Active Living Research (www.activelivingresearch.org/) and Healthy Eating Research (www.healthyeatingresearch.org/), which are both national programs of the Robert Wood Johnson Foundation

[c] Examples of excluded studies:

Pearce J, Blakely T, Witten K, Bartie P. Neighborhood deprivation and access to fast-food retailing: a national study. Am J Prev Med 2007;32(5):375–82;

Maddock J. The relationship between obesity and the prevalence of fast food restaurants: state-level analysis. Am J Health Promot 2004;19(2):137–43;

Fraser L, Edwards K. The association between the geography of fast food outlets and childhood obesity rates in Leeds, UK. Health Place 2010;16(6):1124–8;

Pearce J, Hiscock R, Blakely T, Witten K. A national study of the association between neighbourhood access to fast-food outlets and the diet and weight of local residents. Health Place 2009;15:193–7;

Simon PA, Kwan D, Angelescu A, Shih M, et al. Proximity of fast food restaurants to schools: Do neighborhood income and type of school matter? Prev Med 2008;47:284–8;

Zenk S, Schulz A, Israel B, James S, Bao S, Wilson M. Neighborhood racial composition, neighborhood poverty, and the spatial accessibility of supermarkets in Metropolitan Detroit. Am J Public Health 2005;95:660–7;

Hoehner C, Schootman M. Concordance of commerical data sources for neighborhood-effects studies. J Urban Health 2010;87(4):713–25;

Jilcott S, McGuirt J, Imai S, Evenson K. Measuring the retail food environment in rural and urban North Carolina counties. J Public Health Manag Pract 2010;16(5):432–40; and

Wang M, Gonzalez A, Ritchie L, Winkleby M. The neighborhood food environment: sources of historical data on retail food stores. Int J Behav Nutr Phys Act 2006;3:15.

[d] Examples of excluded studies:

Hee Lee S, Rown M, Powell L, et al. Characteristics of prepared food sources in low-income neighborhoods of Baltimore City. Ecol Food Nutr 2010;49(6):409–30;

Lopez-Class M, Hosler A. Assessment of community food resources: a Latino neighborhood study in upstate New York. J Poverty 2010;14(4):369–81;

Franco M, Diez Roux A, Glass T, Caballero B, Brancati F. Neighborhood characteristics and availability of healthy foods in Baltimore. Am J Prev Med 2008;35(6):561–7;

Liese A, Weis K, Pluto D, Smith E, Lawson A. Food store types, availability, and cost of foods in a rural environment. J Am Diet Assoc 2007;107:1916–23;

Jilcott S, Wade S, McGuirt J, Wu Q, Lazorick S, Moore J. The association between the food environment and weight status among eastern North Carolina youth. Public Health Nutr 2011;14(9):1610–7; and

Block J, Christakis N, O'Malley A, Subramanian S. Proximity to food establishments and body mass index in the Framingham Heart Study offspring cohort over 30 years. Am J Epidemiol 2011;174(10):1108–14.

[e] Examples of excluded studies:

Kersten E, Laraia B, Kelly M, Adler M, Yen I. Small food stores and availability of nutritious foods: a comparison of database and in-store measures, Northern California, 2009. Prev Chronic Dis 2012;9:E127; and

Ohri-Vachaspati P, Martinez D, Yedidia M, Petlick N. Improving data accuracy of commercial food outlet databases. Am J Health Promot 2011;26(2):116–22.

Appendix B

Specific definitions and classification schemes used for retail food outlets examined (*n*=19)

Study	Retail food outlet definitions and classification schemes used
Own definition(s) or classification system	
Clarke (2010)[31]	Examined the food environment (e.g., supermarkets, fast food, restaurants, and liquor stores)
Cummins (2009)[27]	Included all national "multiple-owned" supermarkets and only a random sample of nonmultiple retail food outlets
Hosler (2010)[23]	Defined a food store as a retail outlet that sold at least one of the following items: milk; bread (not including doughnuts, bagels, or pastries); and fruits or vegetables that were fresh, frozen, or canned. A food store could be operated seasonally and be stationary or movable. Food stores located inside the access-restricted area of an office building were regarded as nonfood stores.
Lake (2010, 2012)[21,22]	Conducted a literature review and relied on classification systems used by commercial organizations such as the Yellow Pages and the classification system used by the local authority
McGuirt (2011)[20]	Classified fast-food restaurants on the basis of national or regional chain-name recognition and included all establishments that had designated drive-through windows or provide most of their business as take-out service or do both. Grocery stores and supermarkets were also included, if present, as were farmers' markets or produce stands.
Rossen (2012)[24]	Used government-created categories and created a separate category for corner stores within the outlets listed as grocery stores, defined as small-scale, independently owned stores that sell a limited selection of foods that are typically pre-packaged. Fast-food outlets were extracted that offered primarily counter service. Gas stations were coded separately. Full-service restaurants were excluded.
Rundle (2011)[32]	Included food and street vendors (e.g., licensed food carts)
Toft (2011)[17]	Defined retail food outlets as those serving primarily pizza; burgers; pommes frites (French fries); sausages; barbeque food; or shawarma/kebab AND having at least two of the following characteristics: take-away food, customers pay before eating, limited or no table service, and limited furnishing. Fast food served at gas stations was not included since the study was focused on fast food consumed for dinner (the evening meal).
North America Industry Classification System (NAICS) or Standard Industrial Classification (SIC) system, including modifications and those who did not list specific NAICS or SIC codes	
Powell (2011)[12]	Used the following store classifications (Dun & Bradstreet SIC codes and InfoUSA SIC/NAICS codes): convenience stores (541102, 55410000, 55419901, 55419903 and 541103, 554101, 554102, 554103); supermarket (541101 and 541101, 541102, 541104, 541105, 541106, 541107, 541108, 541108); grocery stores (54110, 541199, and same as supermarket); specialty food stores (5421, 5431, 5441, 5451, 5461, 5499, except for 54990103, 54990205, 54999905; and 5421, 5431, 5441, 5451, 5461, 5499, except for 549902, 549903, 549904, 549906, 549925); fast-food restaurants (581203, except for 58120304, including pizza 58120601, 58120602, and 722211, 581206, 581208, 581219, 581229 including 581222); full-serve restaurants (581200, 581201, 581204, 581205, 581206, 581207, 581208, 581209, except for 58129903, 58129906, and 722110); and specialty restaurants (581202, 58120304, and 722213, 581213, 581214, 581226, 581230, 581234). In the field, food store outlets were classified as follows: specialty food stores (bakeries, meat or fish stores, fruit or vegetable stores, candy or nut stores, coffee and tea stores); convenience stores (nonspecialty food stores with two or fewer cash registers, no fresh meat, and fewer than ten varieties of fresh fruits and vegetables); supermarkets (stores with a minimum of four cash registers, fresh meat, at least 20 varieties of fresh fruits or vegetables and at least two of the following three features: butcher, deli, or bakery); grocery stores (food stores that were not a specialty food store, convenience store, or supermarket); specialty restaurant (coffee shops, donut shops, ice cream parlors, pretzel shops, banquet halls, and bakeries); fast-food restaurants (restaurants where patrons ordered and paid for their food at the counter); and full-service restaurants (patrons did not order and pay at the counter) that were not specialty restaurants
Fleischhacker (2012)[18]	Included 445, 4451, 445110, 445120, 4452, 445210, 445220, 445230, 445291, 445292, 445299, 447, 447110, 72, 722, 7221, 722110, 7222, 722211, 722212, 722213, 4299, 452910, 452990, 452112, and 446110

Study	Retail food outlet definitions and classification schemes used
Liese (2010)[13]	Included 445110, 445120, 446110, 447190, 452112, 452910, 4452990, 445210, 445220, 4455230, 4455291, 445292, 453998, 722110, 722212, 722211, and 722213, and excluded 722410 and 445310
Bader (2010)[28]	Included 446110, 4453110, 722410, 445120, 447110, 722211, 722110, 722213, 311811, 445110, 445210, 445220, and 445230
Gustafson (2012)[30]	Used 452990, 445100, 446110, 447110, 722212, and 722213. Farmers' markets and produce stands were identified through departments' listings of such vendors.
Sharkey (2008)[14]	Explained that food stores retail a general line of food products and include supermarkets; full-line grocery stores; convenience stores or food marts (with and without gasoline pumps); discount stores (general merchandise and some perishable and nonperishable foods); beverage stores (with some perishable and nonperishable foods); pharmacies and drug stores (with some perishable and nonperishable foods); and specialty food stores (e.g., meat markets, fish and seafood markets, fruit and vegetable markets, and markets with bakeries not for immediate consumption) that are fixed or mobile.
Longacre (2011)[19]	Classified outlets as either food markets, consisting of six specific outlet categories (i.e., general store, convenience store, supermarket/grocery store, specialty food store, big box store, seasonal and year-round fixed location farm/produce stand) or eating establishments, consisting of two outlet categories (i.e., fast-food restaurants, defined as any food outlet where the patrons order food at a counter or window; and full-service restaurants). General stores are defined as local retailers with a broad selection of merchandise, including grocery items, hardware, and gardening supplies. Big box stores included warehouse membership clubs (e.g., BJ's, Sam's Club) and large retail supercenters, provided they contained packaged food/grocery sections. Specialty food stores included food outlets that exclusively sold a specific type of food, such as meat or fish markets. Food markets housing a fast-food business were counted as two distinct outlets if, based on in-store observations, the fast-food section had a separate name or logo, entryway, cash register, or employee.
Seliske (2012)[25]	Used NAICS to obtain multiple categories of food service places from the InfoCanada database, including full-service restaurants, limited-service restaurants, snack and non-alcoholic beverage bars, and convenience stores. For Yellow Pages, used the following keywords: restaurant, convenience store, ice-cream and frozen desserts, sandwiches, and donut-retail
Paquet (2008)[26]	Indicated the following subcategories were chosen for food store establishments: convenience stores (i.e., establishments selling food but no fresh fruits/vegetables); fruit and vegetable stores; specialty markets (e.g., butcher shops, cheese stores); pastry and bakery shops; grocery stores; megamarkets (i.e., very large food stores with large selections of food products); natural food and supplement stores; and small/ethnic markets. The study did not consider restaurants or cafes even when takeout was available, or retail stores selling food (e.g., Walmart or Dollar Stores).
Nutrition Environment Measures Survey (NEMS), including modifications	
Fleischhacker (2012)[18]	Used NAICS codes for two commercial data sources in addition to a modified NEMS approach for classifying food outlets gathered from both secondary and primary data sources. Classifications included: store cannot determine specifically its type, member-only supercenter, supercenter, grocery store, convenience store, convenience store with gas, mass merchant, dollar store, pharmacy, alcoholic beverage store with food, specialty market, flea market, farmers' market, food bank or soup kitchen, other, smaller grocery store, restaurant cannot determine specifically its type, general/mixed/American, burgers, chicken, sandwiches, pizza, bagels plus, biscuits, donut shops, bakery/pastry shops/sweets, coffee or tea outlets plus, ice cream/frozen yogurt/smoothies, seafood, BBQ, steakhouse, bars/pubs, Asian, Chinese, Thai, Japanese, Mexican, Italian, French, Indian, Greek/Middle Eastern, soul food, Ethiopian, vegetarian, Spanish, hot dog stand, or other.

Appendix C

Study geographic characteristics and analyses reported (*n*=19)

	n (% of total)	References
Country		
Canada	2 (10)	25,26
Denmark	2 (10)	17,29
Scotland	1 (5)	27
United Kingdom	2 (10)	21,22
U.S.	12 (63)	12–14,18–20,23,24,28,30–32
Urbanization		
Rural	3 (16)	U.S.14,19,30
Urban	9 (47)	Canada[26]; Denmark[17,29]; Scotland[27]; United Kingdom[22]; U.S.[23,24,28,31,32]
Various Levels	7 (37)	Canada[25]; Denmark[17]; United Kingdom[21]; U.S.[12,13,18,20]
Urbanization measures		
Commission for Rural Communities Classification Framework[a]	2 (10)	United Kingdom[21,22]
Located in urban areas	7 (37)	Canada[26]; Denmark[17,29]; Scotland[27]; U.S.[23,31,32]
Rural–urban commuting areas	3 (16)	U.S.[23,31,32]
Population density[b]	4 (21)	U.S.[12,14,20,28]
Population size (Canada and U.S.)	3 (16)	Canada[25]; U.S.[19,24]
Geographic unit of analysis		
Canadian census tracts	1 (5)	26
School districts/buffer around schools	2 (10)	Canada[25]; Denmark[29]
Danish grid cell system (250 x 250 m)	1 (5)	17
United Kingdom, Lower Super Outlet areas	2 (10)	21,22
United Kingdom, city	1 (5)	27
U.S. city blocks or block segments	3 (16)	28,31,32
U.S. Census block groups	2 (10)	14,20
U.S. Census tracts	3 (16)	12,24,30
U.S. ZIP codes	1 (5)	23
U.S. Census state-designated tribal statistical areas	1 (5)	18
U.S. towns	1 (5)	19
U.S. counties	1 (5)	13

[a]Lake et al.[21] defined rural as small towns, villages, and hamlets with <10,000 residents using the Commission for Rural Communities Classification Framework.

[b]Sharkey et al.[9,14] defined population density as people/km^2, and an area with a low population density was an indicator of a high degree of rurality. Powell et al.[12] defined urbanized areas as areas with a densely populated area with ≥50,000 people and ≥1000 people per square mile; suburban areas were located inside of an urban cluster with >2500 but <50,000 people; and rural areas were not an urbanized area or urban cluster. McGuirt et al.[20] defined urban as having core census-block groups with a population density of ≥1000 people per square mile, and surrounding census-block groups with an overall density of ≥500 people per square mile; rural was defined as areas outside of urban areas.

Appendix D

Study sociodemographic characteristics and analyses reported (*n*=19)

	n (% of total)	References
SES		
Various levels	11 (58)	Canada[26]; Scotland[27]; United Kingdom[21]; U.S.[12,14,20,23,24,28,30,32]
SES measures		
Carstairs–Morris DEPCAT (deprivation category; United Kingdom)[a]	1 (5)	27
Disadvantage scale (U.S.)[b]	1 (5)	28
Federal poverty level (U.S.)	1 (5)	32
Index of Multiple Deprivation (United Kingdom)[c]	1 (5)	21
Median household income (U.S.)	3 (16)	12,20,23
Neighborhood Deprivation Index (U.S.)[d]	2 (10)	14,30
Neighborhood SES variables (U.S.)[e]	1 (5)	24
Socioeconomic Index (Canada)[f]	1 (5)	32
Race/ethnicity		
American Indian	1 (5)	18
Various race/ethnicities	6 (32)	Canada[26]; U.S.[12,14,23,24,28]
Race/ethnicity measures		
Minority composition (U.S. Census data)[g]	5 (26)	12,14,23,24,28
Official household language (Canada)	1 (5)	26
U.S. Census state-designated tribal statistical areas	1 (5)	18

[a]Sevenfold measure of social deprivation derived from four variables in the British Census: percentage overcrowding, percentage male unemployment, percentage low social class, and percentage no car

[b]Took the mean of the *z*-score values of the following variables: percentage of households with annual incomes <$15,000, percentage of households with annual incomes of ≤$50,000, percentage of families living in poverty, percentage of households receiving public assistance, percentage unemployed, percentage of female-headed households, percentage of never-married people, and percentage of owner-occupied households

[c]Compound measure of SES, combining aspects of employment, health, crime, living environment, education, housing, and income at the Lower Super Outlet area in England

[d]Sharkey et al.[9,14] constructed an index using neighborhood unemployment (those aged ≥16 years in the labor force who were unemployed and actively seeking work); poverty (those with incomes below the federal poverty level); low education attainment (those aged ≥25 years, with a <10th-grade education); household crowding (occupied households with more than one person per room); public assistance (households receiving public assistance); vehicle availability (occupied housing with no vehicle available); and telephone service (occupied housing with no telephone service). Gustafson et al.[30] created an index based on eight U.S. Census variables collected from American Community Survey 5-year estimates 2005–2009: percentage of individuals with income in 2009 below poverty level; percentage of families with female-headed households with no husband present and children aged <18 years; percentage of households with incomes <$30,000/year; percentage of households with public assistance income; percentage of people aged ≥16 years in civilian labor force currently unemployed; percentage of men in management; percentage of people aged ≥25 years with a <high school degree; and percentage of households with more than one person per room.

[e]Percentage below the federal poverty level, percentage with a high school degree or lower, median household income, and number of vacant housing units

[f]Based on 36 sociodemographic variables from the Canadian Census and utilized in a principal component analysis for which the first three factors were retained: (1) income (e.g., median income and percentage of residents below low-income cut-off); (2) ethnic composition (e.g., official language spoken within households [French or English]); and (3) education (e.g., percentage of residents with a university degree).

[g]Rossen et al.[24] focused on percentage who were non-Hispanic black; Bader et al. used percentage non-Hispanic white and a Hispanic/foreign-born scale, which is the mean of the *z*-score values of the percentage of Hispanics and percentage foreign born.

Appendix E

By secondary data source examined, evidence for validity of secondary retail food data reported (*n*=19) [a]

	Convenience stores[b]	General merchandise stores[c]	Grocery stores[d]	Specialty markets and shops[e]	Restaurants[f]
Commercial sources (*n*=9 studies)[12,13,18,20,25,26,28–30]					
Percentage agreement[g]	Substantial to almost perfect 0.67[20,h] 0.69[30] 0.72[25] 0.76[12,i] 0.77[26,j] 0.79[18,i] 0.82[13,i] 0.86[29,i,j] 0.92[28]	Slight to almost perfect 0.20[30] 0.44[13,i] 0.86[29i,j] 0.91[18,i]	Moderate to almost perfect 0.49[30] 0.76[12,i] 0.77[26,j] 0.82[28] 0.86[29,i,j] 0.92[13,i] 0.94[18,i] 1.00[20,h]	Moderate to almost perfect 0.43[13,i] 0.62[18,i] 0.71[12,i] 0.77[26,j] 0.86[29,i,j]	Moderate to almost perfect 0.46[20,h] 0.69[13,i] 0.76[25] 0.83[12,i] 0.86[29,i,j] 0.87[28] 0.88[18,i] 0.93[30]
Sensitivity	Moderate to almost perfect 0.55[12,i] 0.59[18,i] 0.72[13,i] 0.84[26,j] 0.90[29,i,j] 0.99[30]	Slight to almost perfect 0.20[30] 0.37[13,i] 0.90[18,i] 0.90[29,i,j]	Substantial to almost perfect 0.69[12,i] 0.74[13,i] 0.84[26,j] 0.88[18,i] 0.90[29i,j] 0.99[30]	Fair to almost perfect 0.39[13,i] 0.42[18,i] 0.50[12,i] 0.84[26,j] 0.90[29,i*]	Moderate to almost perfect 0.58[13,i] 0.60[12,i] 0.64[18,i] 0.88[30] 0.90[29,i,j] 0.98[30]
Positive predictive value	Moderate to almost perfect 0.44[18,i] 0.60[12,i] 0.65[30] 0.74[13,i] 0.90[26,j] 0.94[29,i,j]	Substantial to almost perfect 0.78[18,i] 0.92[13,i] 0.94[29,i,j] 1.00[30]	Moderate to almost perfect 0.59[12,i] 0.75[30] 0.81[13,i] 0.90[26,j] 0.94[29,i,j]	Fair to almost perfect 0.39[12,i] 0.80[18,i] 0.90[13,i] 0.90[26,j] 0.94[29,i,j]	Moderate to almost perfect 0.50[18,i] 0.72[12,i] 0.84[13,i] 0.88[30] 0.94[29,i,j]
Cohen's Kappa coefficient	Fair 0.36[18,i] 0.39[28]	Moderate 0.44[18,i]	Slight to Moderate 0.12[18,i] 0.44[28]	Fair 0.30[18,i]	Moderate to substantial 0.42[18,i] 0.70[28]
Concordance	Fair to almost perfect 0.36[18,i] 0.44[12,i] 0.94[29,i,j]	Substantial to almost perfect 0.75[18,i] 0.94[29,i,j]	Moderate to almost perfect 0.54[12,i] 0.78[18,i] 0.94[29,i,j]	Slight to almost perfect 0.14[18,i] 0.32[12,i] 0.94[29,i,j]	Moderate to almost perfect 0.46[18,i] 0.50[12,i] 0.94[29,i,j]
Government sources (*n*=12)[13,14,17,18,20–24,27,29,30,k]					
Percentage agreement[g]	Moderate to almost perfect 0.47[13] 0.64[14,j] 0.64[29,j] 0.70[21,j] 0.80[18,i] 0.85[24,j] 0.86[23,i,j]	Slight to almost perfect 0.05[13] 0.40[18,i] 0.64[14,j] 0.64[29,j] 0.70[21,j] 0.85[24,j] 0.86[23i,j]	Substantial to almost perfect 0.64[14,j] 0.64[29,j] 0.70[21,j] 0.76[13], 0.85[24,j] 0.86[23,i,j] 0.88[27] 0.98[18,i]	Moderate to almost perfect 0.50[13] 0.64[14,j] 0.64[29,j] 0.66[18,i] 0.70[21,j] 0.86[23i,j]	Substantial to almost perfect 0.64[29,j] 0.70[21,j] 0.76[17] 0.76[18,i] 0.85[24,j] 0.98[13]
Sensitivity	Fair to almost perfect 0.30[18,i] 0.46[23,i,j]	Moderate to almost perfect 0.46[23,i,j] 0.58[18,i]	Moderate to almost perfect 0.46[23,i,j] 0.73[13]	Fair to almost perfect 0.40[18,i] 0.44[13]	Moderate to almost perfect 0.47[18,i] 0.75[29,j]

	Convenience stores[b]	General merchandise stores[c]	Grocery stores[d]	Specialty markets and shops[e]	Restaurants[f]
	0.50[13] 0.75[29,j] 0.84[22,j] 0.85[24,j]	0.75[29,j] 0.84[22,j] 0.85[24,j]	0.75[29,j] 0.84[22,j] 0.85[24,j] 0.90[18,i]	0.46[23,i,j] 0.75[29,j] 0.84[22,j]	0.82[17] 0.84[22,j] 0.85[24,j] 0.86[13]
Positive predictive value	Fair to almost perfect 0.22[18,i] 0.81[29,j] 0.89[23,i,j] 0.91[13] 0.92[22,j]	Moderate to almost perfect 0.51[18,i] 0.81[29,j] 0.89[23,i,j] 0.92[22,j]	Substantial to almost perfect 0.80[18,i] 0.81[29,j] 0.89[13] 0.89[23,i,j] 0.92[22,j] 0.96[13]	Slight to almost perfect 0.20[18,i] 0.81[29,j] 0.89[13] 0.89[23,i,j] 0.92[22,j]	Fair to almost perfect 0.36[18,i] 0.81[29,j] 0.88[13] 0.92[17] 0.92[22,j]
Concordance[29,j]	Fair 0.23	Fair 0.23	Fair 0.23	Fair 0.23	Fair 0.23
Local directories sources (n=7)[14,18,19,22,25,26,29]					
Percentage agreement[g]	Fair to almost perfect 0.28[19,j] 0.64[14,j] 0.65[26,i,j] 0.71[29,j] 0.73[18] 0.86[25]	Fair to almost perfect 0.32[19,j] 0.64[14,j] 0.71[29,j] 0.82[18]	Moderate to almost perfect 0.49[19,j] 0.64[14,j] 0.65[26,i,j] 0.71[29,j] 1.00[18]	Fair to substantial 0.22[19,j] 0.53[18] 0.64[14,j] 0.65[26,i,j] 0.71[29,j]	Moderate to almost perfect 0.43[19,j] 0.71[29,j] 0.81[18] 0.88[25]
Sensitivity	Moderate to substantial 0.48[18] 0.52[22,i,j] 0.66[26,i*] 0.74[29,j]	Fair to substantial 0.21[18] 0.52[22,i,j] 0.74[29,j]	Moderate to substantial 0.52[22,i,j] 0.66[26,i,j] 0.69[18] 0.74[29,j]	Moderate to substantial 0.52[22,i,j] 0.59[18] 0.66[26,i,j] 0.74[29,j]	Moderate to substantial 0.52[22,i,j] 0.61[18] 0.74[29,j]
Positive predictive value	Fair to almost perfect 0.36[18] 0.81[22,i,j] 0.95[29,j] 0.98[26,i,j]	Slight to almost perfect 0.18[18] 0.81[22,i,j] 0.95[29,j]	Substantial to almost perfect 0.61[18] 0.81[22,i,j] 0.95[29,j] 0.98[26,i,j]	Fair to almost perfect 0.29[18] 0.81[22,i,j] 0.95[29,i] 0.98[26,i,j]	Moderate to almost perfect 0.47[18] 0.81[22,i,j] 0.95[29,j]
Concordance[29,j]	Fair 0.27	Fair 0.27	Fair 0.27	Fair 0.27	Fair 0.27
Omnidirectional sources (n=6)[18,19,24,29,31,32]					
Percentage agreement[g]	Fair to almost perfect 0.28[19,j] 0.69[24,j] 0.78[29,j] 0.92[31]	Fair to substantial 0.32[19,j] 0.69[24,j] 0.78[29,j]	Moderate to almost perfect 0.49[19,j] 0.69[24,j] 0.78[29,j] 0.94[31]	Fair to substantial 0.22[19,j] 0.78[29,j]	Fair to almost perfect 0.36[32] 0.43[19,j] 0.69[24,j] 0.78[29,j] 0.91[31]
Sensitivity[29,j]	Almost perfect 0.81	Almost perfect 0.81	Almost perfect 0.81	Almost perfect 0.81	Almost perfect 0.81
Positive predictive value[29,j]	Almost perfect 0.95	Almost perfect 0.95	Almost perfect 0.95	Almost perfect 0.95	Almost perfect 0.95
Cohen's Kappa coefficient[31]	Slight 0.06		Slight 0.10		Fair 0.34
Concordance[29,j]	Almost perfect 0.87	Almost perfect 0.87	Almost perfect 0.87	Almost perfect 0.87	Almost perfect 0.87

[a]Levels of agreement for all evidence for validity findings reported were interpreted using the Landis and Koch criteria (<0.00 poor, 0.00–0.20 slight, 0.21–0.40 fair, 0.41–0.60 moderate, 0.61–0.80 substantial, and 0.81–1.00 almost perfect). *See* Appendix F for evidence for validity by specific secondary data source examined (e.g., InfoUSA).
[b]Includes convenience stores with and without gas stations and pharmacies
[c]Includes dollar stores and discount department stores that do not have a full grocery section, such as Kmart, Target, and Walmart
[d]Includes grocery stores, supercenters, and supermarkets
[e]Includes meat markets, produce stands, donut shops, and ice cream shops
[f]Includes fast food, fast-casual, full-service, pizza parlors, and coffee shops
[g]Frequencies or dispositions percentages, when necessary, were used to calculate a percentage agreement
[h]Comparisons were made between results generated using primary versus secondary data for fast-food density and proximity, convenience store proximity, and food deserts.
[i]Average findings reported across a combination of data sources (e.g., ReferenceUSA and Dun & Bradstreet or multiple government sources)
[j]Not all studies reported evidence for validity by specific data source (e.g., Sharkey[14] grouped local/area telephone directories, Internet telephone directories, and a list of Current Food Establishment Group Firms from the Texas Department of Agriculture) or by food outlet type, so the total evidence reported was used for each data source examined and food outlet examined.
[k]Gustafson et al.[30] used only a government source to identify farmers' markets and produce stands.

Appendix F

By specific secondary data source examined, evidence for validity of secondary retail food data sources reported (*n*=19)[a]

	Convenience stores[b]	General merchandise stores[c]	Grocery stores[d]	Specialty markets and shops[e]	Restaurants[f]
Commercial source: Dun & Bradstreet (U.S.; *n*=3 studies)[12,13,18]					
Percentage agreement[g]	Substantial 0.71[12] 0.78[18] 0.78[13]	Almost perfect 0.82[13] 0.95[18]	Substantial to almost perfect 0.65[12] 0.93[18] 0.98[13]	Moderate to substantial 0.44[13] 0.60[18] 0.72[12]	Substantial to almost perfect 0.63[13] 0.83[12] 0.89[18]
Sensitivity	Fair to substantial 0.32[18] 0.50[12] 0.69[13]	Substantial to almost perfect 0.68[13] 0.86[18]	Substantial to almost perfect 0.63[12] 0.76[13] 0.81[18]	Slight to Moderate 0.19[18] 0.39[13] 0.43[12]	Fair to Moderate 0.38[18] 0.50[13] 0.55[12]
Positive predictive value	Fair to substantial 0.24[18] 0.53[12] 0.71[13]	Substantial to almost perfect 0.74[18] 0.83[13]	Moderate to substantial 0.52[12] 0.72[18] 0.78[13]	Slight to almost perfect 0.09[18] 0.31[12] 0.87[13]	Fair to substantial 0.29[18] 0.66[12] 0.79[13]
Cohen's Kappa Coefficient[18]	Slight 0.17	Moderate 0.54	Fair 0.31	Slight 0.15	Slight 0.19
Concordance	Slight to Fair 0.20[18] 0.38[12]	Substantial 0.71[18]	Moderate to substantial 0.49[12] 0.70[18]	Slight to Fair 0.06[18] 0.25[12]	Fair to Moderate 0.27[18] 0.43[12]
Commercial source: InfoUSA or ReferenceUSA (*n*=6)[12,13,18,20,28,30]					
Percentage agreement[g]	Substantial to almost perfect 0.67[20h] 0.69[30] 0.80[18] 0.81[12] 0.87[13] 0.92[28]	Slight to almost perfect 0.06[13] 0.20[30] 0.87[18]	Moderate to almost perfect 0.49[30] 0.82[28] 0.85[13] 0.86[12] 0.94[18] 1.00[20,h]	Moderate to substantial 0.42[13] 0.64[18] 0.70[12]	Moderate to almost perfect 0.46[20,h] 0.75[13] 0.83[12] 0.87[28] 0.88[18] 0.93[30]
Sensitivity	Moderate to almost perfect 0.60[12] 0.75[13] 0.86[18] 0.99[30]	Slight to almost perfect 0.06[13] 0.20[30] 0.95[18]	Substantial to almost perfect 0.71[13] 0.75[12] 0.94[18] 0.99[30]	Fair to substantial 0.39[13] 0.58[12] 0.66[18]	Substantial to almost perfect 0.65[12] 0.67[13] 0.91[18] 0.98[30]
Positive predictive value	Substantial 0.64[18] 0.65[30] 0.68[12] 0.76[13]	Almost perfect 0.82[18] 1.00[13] 1.00[30]	Substantial to almost perfect 0.66[12] 0.75[30] 0.84[13] 0.89[18]	Fair to almost perfect 0.32[18] 0.46[12] 0.93[13]	Substantial to almost perfect 0.71[18] 0.79[12] 0.88[30] 0.90[13]
Cohen's Kappa coefficient	Fair to moderate 0.38[28] 0.56[18]	Fair 0.35[18]	Poor to Moderate –0.07[18] 0.44[28]	Moderate 0.46[18]	Substantial 0.64[18] 0.70[28]
Concordance	Moderate 0.50[12] 0.51[18]	Substantial 0.79[18]	Moderate to almost perfect 0.60[12] 0.87[18]	Fair 0.22[18] 0.39[12]	Moderate to substantial 0.56[12] 0.64[18]
Commercial source: Info Canada (*n*=1)[25,g]					
Percentage	Substantial				Substantial

	Convenience stores[b]	General merchandise stores[c]	Grocery stores[d]	Specialty markets and shops[e]	Restaurants[f]
agreement	0.72				0.76
Commercial source: Krak Denmark (web-based search engine; *n*=1)[29,i]					
Percentage agreement[g]	Substantial 0.80	Substantial 0.80	Substantial 0.80	Substantial 0.80	Substantial 0.80
Sensitivity	Almost perfect 0.88	Almost perfect 0.88	Almost perfect 0.88	Almost perfect 0.88	Almost perfect 0.88
Positive predictive value	Almost perfect 0.90	Almost perfect 0.90	Almost perfect 0.90	Almost perfect 0.90	Almost perfect 0.90
Concordance	Almost perfect 0.89	Almost perfect 0.89	Almost perfect 0.89	Almost perfect 0.89	Almost perfect 0.89
Commercial source: Stockman Company (Denmark retail food chains; *n*=1)[29,i]					
Percentage agreement[g]	Almost perfect 0.91	Almost perfect 0.91	Almost perfect 0.91	Almost perfect 0.91	Almost perfect 0.91
Sensitivity	Almost perfect 0.93	Almost perfect 0.93	Almost perfect 0.93	Almost perfect 0.93	Almost perfect 0.93
Positive predictive value	Almost perfect 0.98	Almost perfect 0.98	Almost perfect 0.98	Almost perfect 0.98	Almost perfect 0.98
Cohen's Kappa concordance	Almost perfect 0.98	Almost perfect 0.98	Almost perfect 0.98	Almost perfect 0.98	Almost perfect 0.98
Commercial source: Tamec Inc. (Canada; *n*=1)[26,i]					
Percentage agreement[g]	Substantial 0.77		Substantial 0.77	Substantial 0.77	
Sensitivity	Almost perfect 0.84		Almost perfect 0.84	Almost perfect 0.84	
Positive predictive value	Almost perfect 0.90		Almost perfect 0.90	Almost perfect 0.90	
Government source: City Health Department[j] (*n*=4), Scotland,[27] UK,[21,22] U.S.[24]					
Percentage agreement[g]	Fair to almost perfect 0.34[22] 0.70[21] 0.85[24]	Fair to almost perfect 0.34[22] 0.70[21] 0.85[24]	Fair to almost perfect 0.34[22] 0.70[21] 0.85[24] 0.88[27]	Fair to substantial 0.34[22] 0.70[21]	Fair to almost perfect 0.34[22] 0.70[21] 0.85[24]
Sensitivity	Almost perfect 0.84[21] 0.84[22] 0.85[24]	Almost perfect 0.84[21] 0.84[22] 0.85[24]	Almost perfect 0.84[21] 0.84[22] 0.85[24]	Almost perfect 0.84[21] 0.84[22]	Almost perfect 0.84[21] 0.84[22] 0.85[24]
Positive predictive value	Almost perfect 0.82[21] 0.92[22]	Almost perfect 0.82[21] 0.92[22]	Almost perfect 0.82[21] 0.92[22]	Almost perfect 0.82[21] 0.92[22]	Almost perfect 0.82[21] 0.92[22]
Government source: County Health Department (U.S.; *n*=1)[18]					
Percentage agreement[g]	Almost perfect 0.81	Slight 0.00	Almost perfect 0.97	Almost perfect 0.83	Almost perfect 0.85
Sensitivity	Fair 0.35	Almost perfect 0.98	Almost perfect 0.91	Moderate 0.47	Almost perfect 0.91
Positive predictive value	Fair 0.26	Almost perfect 0.86	Almost perfect 0.81	Fair 0.23	Substantial 0.70
Cohen's Kappa coefficient	Slight 0.20	Poor –0.04	Moderate 0.60	Moderate 0.47	Moderate 0.56
Concordance	Fair 0.21	Almost perfect 0.83	Substantial 0.78	Slight 0.16	Substantial 0.64
Government source: State Department of Agriculture (U.S.; *n*=5) [14,18,20,23,30k]					
Percentage agreement[g]	Substantial to almost perfect 0.64[14,i] 0.79[18] 0.87[23,i,j]	Substantial 0.64[14,i] 0.80[18] 0.87[23,i,j]	Almost perfect 0.64[14,i] 0.87[23,i,j] 1.00[18]	Moderate to almost perfect 0.50[18] 0.64[14,i] 0.87[23,i,j]	Substantial 0.67[18]
Sensitivity	Fair 0.26	Slight to Fair 0.19[18]	Fair to almost perfect	Fair 0.33[23,i,j]	Slight 0.03[18]

	Convenience stores[b]	General merchandise stores[c]	Grocery stores[d]	Specialty markets and shops[e]	Restaurants[f]
	0.33[j]	0.33[23,i,j]	0.33[23,i,j] 0.88[18]	0.34[18]	
Positive predictive value	Slight to almost perfect 0.19[18] 0.87[23i,j]	Slight to almost perfect 0.16[18] 0.87[23,i,j]	Substantial to almost perfect 0.78[18] 0.87[23,i,j]	Slight to almost perfect 0.17[18] 0.87[23,i,j]	Slight 0.02[18]
Cohen's Kappa coefficient[18]	Slight 0.14	Poor –0.01	Poor –0.14	Slight 0.18	Slight 0.00
Concordance[18]	Slight 0.15	Slight 0.15	Substantial 0.76	Slight 0.12	Slight 0.02
Government source: state-authorized WIC retailers (U.S.; *n*=1)[23,i]					
Percentage agreement[g]	Almost perfect 1.00	Almost perfect 1.00	Almost perfect 1.00	Almost perfect 1.00	
Sensitivity	Slight 0.06	Slight 0.06	Slight 0.06	Slight 0.06	
Positive predictive value	Almost perfect 1.00	Almost perfect 1.00	Almost perfect 1.00	Almost perfect 1.00	
Government source: State Department of Taxation and Finance (U.S.; *n*=1)[23,i]					
Percentage agreement[g]	Substantial 0.78	Substantial 0.78	Substantial 0.78	Substantial 0.78	
Sensitivity	Substantial 0.76	Substantial 0.76	Substantial 0.76	Substantial 0.76	
Positive predictive value	Substantial 0.78	Substantial 0.78	Substantial 0.78	Substantial 0.78	
Government source: State Department of Health (U.S.; *n*=1)[13]					
Percentage agreement[g]	Moderate 0.47	Slight 0.05	Substantial 0.76	Moderate 0.50	Almost perfect 0.98
Sensitivity	Moderate 0.50		Substantial 0.73	Moderate 0.44	Almost perfect 0.86
Positive predictive value	Almost perfect 0.91		Almost perfect 0.96	Almost perfect 0.89	Almost perfect 0.88
Government source: State Liquor Authority (U.S.; *n*=1)[23,i]					
Percentage agreement[g]	Almost perfect 0.96	Almost perfect 0.96	Almost perfect 0.96	Almost perfect 0.96	
Sensitivity	Moderate 0.58	Moderate 0.58	Moderate 0.58	Moderate 0.58	
Positive predictive value	Almost perfect 0.96	Almost perfect 0.96	Almost perfect 0.96	Almost perfect 0.96	
Government source: State-authorized lottery ticket retailers (U.S.; *n*=1)[23,i]					
Percentage agreement[g]	Almost perfect 0.81	Almost perfect 0.81	Almost perfect 0.81	Almost perfect 0.81	
Sensitivity	Moderate 0.51	Moderate 0.51	Moderate 0.51	Moderate 0.51	
Positive predictive value	Almost perfect 0.81	Almost perfect 0.81	Almost perfect 0.81	Almost perfect 0.81	
Government source: USDA- authorized Supplemental Nutrition Assistance Program (SNAP) retailers (*n*=1)[23,i]					
Percentage agreement[g]	Almost perfect 0.98	Almost perfect 0.98	Almost perfect 0.98	Almost perfect 0.98	
Sensitivity	Substantial 0.73	Substantial 0.73	Substantial 0.73	Substantial 0.73	
Positive predictive value	Almost perfect 0.98	Almost perfect 0.98	Almost perfect 0.98	Almost perfect 0.98	
Government source: Country Food Administration (Denmark; *n*=1)[17]					
Percentage agreement[g]					Substantial 0.76
Sensitivity					Almost perfect 0.82

	Convenience stores[b]	General merchandise stores[c]	Grocery stores[d]	Specialty markets and shops[e]	Restaurants[f]
Positive predictive value					Almost perfect 0.92
Government source: National Tax Registry (Denmark; *n*=1)[29,i]					
Percentage agreement[g]	Substantial 0.64	Substantial 0.64	Substantial 0.64	Substantial 0.64	Substantial 0.64
Sensitivity	Substantial 0.75	Substantial 0.75	Substantial 0.75	Substantial 0.75	Substantial 0.75
Positive predictive value	Almost perfect 0.81	Almost perfect 0.81	Almost perfect 0.81	Almost perfect 0.81	Almost perfect 0.81
Concordance	Fair 0.23	Fair 0.23	Fair 0.23	Fair 0.23	Fair 0.23
Local directories sources: online (*n*=6)[14,18,19,22,25,26]; Canada411 (Canada)[43]; Google (Canada)[43]; Montrealplus (Canada)[43]; Pagesjaunes (Canada)[43]; Toutmontreal.com (Canada)[43]; unidentified Internet telephone directories (U.S.)[14]; Yahoo! Yellow Pages (U.S.)[36]; and Yellow Pages (Canada,[42] United Kingdom,[39] U.S.[35])					
Percentage agreement[g]	Fair to almost perfect 0.28[19,i] 0.59[22,i] 0.64[14,i] 0.65[26,i,j] 0.73[18] 0.86[25]	Fair to almost perfect 0.32[19,i] 0.59[22,i] 0.64[14,i] 0.82[18]	Moderate to almost perfect 0.49[19,i] 0.59[22,i] 0.64[14,i] 0.65[26,i,j] 1.00[18]	Fair to substantial 0.22[19,i] 0.53[18] 0.59[22,i] 0.64[14,i] 0.65[26,i,j]	Moderate to almost perfect 0.43[19,i] 0.59[22,i] 0.81[18] 0.88[25]
Sensitivity	Moderate to substantial 0.48[18] 0.51[22,i] 0.66[26,i,j]	Fair to moderate 0.21[18] 0.51[22,i]	Moderate to substantial 0.51[22,i] 0.66[26,i,j] 0.69[18]	Moderate to substantial 0.51[22,i] 0.59[18] 0.66[26,i,j]	Moderate to substantial 0.51[22,i] 0.61[18]
Positive predictive value	Fair to almost perfect 0.36 0.79[,i] 0.98[,i,j]	Slight to substantial 0.18[18] 0.79[22,i]	Substantial to almost perfect 0.61[18] 0.79[22,i] 0.98[26,i,j]	Fair to almost perfect 0.29[18] 0.79[22,i] 0.98[26,i,j]	Moderate to substantial 0.47[18] 0.79[22,i]
Cohen's Kappa coefficient[18]	Fair 0.21	Slight 0.00	Poor –0.22	Fair 0.33	Fair 0.23
Concordance[18]	Fair 0.29	Slight 0.17	Moderate 0.60	Slight 0.20	Moderate 0.43
Local directories sources: telephone Book(s); *n*=3)[14,22,29]; Teledanmark (Denmark Telephone Company)[46]; unidentified local/area telephone directories (U.S.)[14]; and Yellow Pages (United Kingdom)[39]					
Percentage agreement[g]	Moderate to substantial 0.49[22,i] 0.64[14,i] 0.71[29,i]	Moderate to substantial 0.49[22,i] 0.64[14,i] 0.71[29,i]	Moderate to substantial 0.49[22,i] 0.64[14,i] 0.71[29,i]	Moderate to substantial 0.49[22,i] 0.64[14i] 0.71[29,i]	Moderate to substantial 0.49[22,i] 0.71[29,i]
Sensitivity	Moderate to substantial 0.52[22,i] 0.74[29,i]	Moderate to substantial 0.52[22,i] 0.74[29,i]	Moderate to substantial 0.52[22,i] 0.74[29,i]	Moderate to substantial 0.52[22,i] 0.74[29,i]	Moderate to substantial 0.52[22,i] 0.74[29,i]
Positive predictive value	Almost perfect 0.82[22,i] 0.95[29,i]	Almost perfect 0.82[22,i] 0.95[29,i]	Almost perfect 0.82[22,i] 0.95[29,i]	Almost perfect 0.82[22,i] 0.95[29,i]	Almost perfect 0.82[22,i] 0.95[29,i]
Concordance[29,i]	Fair 0.27	Fair 0.27	Fair 0.27	Fair 0.27	Fair 0.27
Omnidirectional source: Google Earth (U.S.; *n*=2)[19,31]					
Percentage agreement[g]	Fair to almost perfect 0.28[19,i] 0.92[31]	Fair 0.32[19,i]	Moderate to almost perfect 0.49[19,i] 0.94[31]	Fair 0.22[19,i]	Moderate to almost perfect 0.43[19,i] 0.91[31]
Cohen's Kappa	Slight		Slight		Fair

	Convenience stores[b]	General merchandise stores[c]	Grocery stores[d]	Specialty markets and shops[e]	Restaurants[f]
coefficient[31]	0.06		0.10		0.34
Omnidirectional source: Google Street View (U.S.; *n*=3)[18,24,32]					
Percentage agreement[g]	Substantial 0.69[24,i]	Substantial 0.69[24,i]	Substantial 0.69[24,i]		Fair to substantial 0.36[32] 0.69[24,i]
Omnidirectional Source: Google Maps Denmark (*n*=1)[29,i]					
Percentage agreement[g]	Substantial 0.78	Substantial 0.78	Substantial 0.78	Substantial 0.78	Substantial 0.78
Sensitivity	Almost perfect 0.81	Almost perfect 0.81	Almost perfect 0.81	Almost perfect 0.81	Almost perfect 0.81
Positive predictive value	Almost perfect 0.95	Almost perfect 0.95	Almost perfect 0.95	Almost perfect 0.95	Almost perfect 0.95
Concordance	Almost perfect 0.87	Almost perfect 0.87	Almost perfect 0.87	Almost perfect 0.87	Almost perfect 0.87

[a]Levels of agreement for all evidence for validity findings reported were interpreted using the Landis and Koch criteria (<0.00 poor, 0.00–0.20 slight, 0.21–0.40 fair, 0.41–0.60 moderate, 0.610.80 substantial, and 0.81–1.00 almost perfect).
[b]Includes convenience stores with and without gas stations and pharmacies
[c]Includes dollar stores and discount department stores that do not have a full grocery section, such as Kmart, Target, and Walmart
[d]Includes grocery stores, supercenters, and supermarkets
[e]Includes meat markets, produce stands, donut shops, and ice cream shops
[f]Includes fast food, fast-casual, full-service, pizza parlors, and coffee shops
[g]Frequencies or dispositions percentages, when necessary, were used to calculate a percentage agreement.
[i]Comparisons were made between results generated using primary versus secondary data for fast-food density and proximity, convenience store proximity, and food deserts.
[i]Not all studies reported evidence for validity by specific data source (e.g., Sharkey[14] grouped local/area telephone directories, Internet telephone directories, and a list of Current Food Establishment Group Firms from the Texas Department of Agriculture) so the total evidence reported was used for each data source examined.
[j]Average findings reported across a combination of data sources (e.g., ReferenceUSA and Dun & Bradstreet or multiple government sources)
[k]Gustafson et al.[30] used only a government source to identify farmers' markets and produce stands.

USDA, U.S. Department of Agriculture; WIC, U.S. Department of Agriculture's Special Supplemental Nutrition Program for Women, Infants, and Children

Appendix G

By levels of urbanization, evidence for validity of secondary retail food data reported (*n*=19)[a]

	Commerical sources[b]	Government sources[c]	Local directories[d]	Omnidirectional sources[e]
Rural (*n*=9)[12–14,18–21,25,30]				
Percentage agreement	Substantial 0.72[30] 0.77[25,i]	Moderate to almost perfect 0.50[30] 0.64[14,h] 1.00[20g]	Fair to almost perfect 0.37[19,h] 0.64[14,h] 0.88[25,i]	Fair 0.37[19,h]
Sensitivity	Substantial to almost perfect 0.66[18,f] 0.80[13,f] 0.96[30]	Moderate to substantial 0.42[18,f] 0.50[30] 0.64[13] 0.79[21]	Substantial 0.69[18]	
Positive predictive value	Moderate to substantial 0.48[18,f] 0.70[30] 0.73[13,f]	Fair to almost perfect 0.30[18,f] 0.82[21] 0.85[13] 1.00[30]	Moderate 0.49[18]	
Cohen's Kappa coefficient[18]	Moderate 0.46[f]	Fair 0.24[f]	Fair 0.38	
Concordance	Fair 0.28[12,f] 0.40[18,f]	Fair 0.26[18,f]	Moderate 0.42[18]	
Urban (*n*=15)[12,13,18,20–29,31,32]				
Percentage agreement	Substantial to almost perfect 0.77[25,i] 0.77[26] 0.86[29,f] 0.88[28]	Fair to almost perfect 0.34[22] 0.64[29] 0.75[20,f] 0.76[17] 0.85[24] 0.86[23,f] 0.88[27]	Moderate to almost perfect 0.54[22,f] 0.65[26,f] 0.71[29] 0.88[25,i]	Fair to almost perfect 0.36[32] 0.69[24] 0.78[29] 0.92[31]
Sensitivity	Moderate to almost perfect 0.50[18,f] 0.80[13,f] 0.84[26] 0.90[29,f]	Fair to almost perfect 0.32[18,f] 0.46[23,f] 0.62[13] 0.75[29] 0.82[17] 0.84[22] 0.85[24] 0.88[21]	Slight to substantial 0.12[18] 0.52[22,f] 0.66[26,f] 0.74[29]	Almost perfect 0.81[29]
Positive predictive value	Fair to almost perfect 0.36[18,f] 0.83[13,f] 0.90[26] 0.94[29,f]	Fair to almost perfect 0.22[18,f] 0.81[29] 0.83[21] 0.89[23,f] 0.92[22] 0.92[17] 0.92[13]	Slight to almost perfect 0.09[18] 0.81[22,f] 0.95[29] 0.98[26,f]	Almost perfect 0.95[29]
Cohen's Kappa coefficient	Poor to moderate –0.48[18,f] 0.48[28]	Slight 0.05[18,f]	Poor –0.91[18]	Fair 0.21[31]

	Commerical sources[b]	Government sources[c]	Local directories[d]	Omnidirectional sources[e]
Concordance	Fair to almost perfect 0.34[18,f] 0.44[12,f] 0.94[29,f]	Fair 0.21[18,f] 0.23[29]	Slight to fair 0.08[18] 0.27[29]	Almost perfect 0.87[29]
Suburban (*n*=3)[12,13,18]				
Sensitivity	Substantial 0.61[18,f] 0.65[13,f]	Fair to substantial 0.40[18,f] 0.74[13]	Moderate 0.52[18]	
Positive predictive value	Moderate to substantial 0.50[18,f] 0.80[13,f]	Fair to almost perfect 0.32[18,f] 0.92[13]	Moderate 0.42[18]	
Cohen's Kappa coefficient	Slight 0.06[18,f]	Fair 0.27[18c]	Fair 0.22[18]	
Concordance	Moderate 0.42[18,f] 0.46[12,f]	Fair 0.27[18,f]	Fair 0.35[18]	
Large Town (*n*=2)[13,18]				
Sensitivity	Substantial 0.66[18,f] 0.80[13,f]	Moderate to substantial 0.42[18,f] 0.64[13]	Moderate 0.46[18]	
Positive predictive value	Moderate to substantial 0.50[18,f] 0.79[13,f]	Fair to almost perfect 0.32[18,f] 0.90[13]	Fair 0.35[18]	
Cohen's Kappa coefficient	Fair 0.40[18,f]	Fair 0.23[18]	Slight 0.15[18]	
Concordance	Moderate 0.44[18,f]	Fair 0.28[18,f]	Fair 0.30[18]	

[a]Seven studies examined various levels of urbanization and where possible their rural and urban evidence for validity was distinguished.[12,13,17,18,20,21,25] Levels of agreement for all evidence for validity findings reported were interpreted using the Landis and Koch criteria (<0.00 poor, 0.00–0.20 slight, 0.21–0.40 fair, 0.41–0.60 moderate, 0.61–0.80 substantial, and 0.81–1.00 almost perfect).

[b]Findings for averages reported on data from Dun & Bradstreet (U.S.); InfoUSA or ReferenceUSA; InfoCanada; Krak Denmark (web-based search engine); Stockman Company (chain food addresses); and Tamec, Inc.

[c]Findings for averages reported on data from City Health Department (United Kingdom and U.S.); County Health Department (U.S.); State Department of Agriculture (U.S.); State Department of Health–authorized WIC retailers (U.S.); State Department of Taxation and Finance (U.S.); State Department of Health (U.S.); State Liquor Authority (U.S.); state-authorized lottery ticket retailers (U.S.); U.S. Department of Agriculture–authorized Supplemental Nutrition Assistance Program (SNAP) retailers; Country Food Administration (Denmark); and National Tax Registry.

[d]Findings for averages reported on data from the variety of online and local telephone directories examined

[e]Findings for averages reported on data from Google Earth (U.S.); Google Street View (U.S.); and Google Maps Denmark

[f]Findings for averages reported from data across a combination of sources (e.g., ReferenceUSA and Dun & Bradstreet or multiple government sources)

[g]Findings for averages reported for only farmers' markets and produce stands

[h]Not all studies reported evidence for validity by specific data source (e.g., Sharkey[14] grouped local/area telephone directories, Internet telephone directories, and a list of Current Food Establishment Group Firms from the Texas Department of Agriculture), so the total evidence reported was used for each data source examined.

[i]Includes overall findings for non-urban (<10,000 people) and urban areas (>10,000 people)

WIC, U.S. Department of Agriculture's Special Supplemental Nutrition Program for Women, Infants, and Children

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