INTERVENTION TABLE 9

Neighborhood Availability of Restaurants

Source	Intervention Components	Study Design and Execution	Reach	Adoption, Implementation and Process Evaluation	Enforcement/ Sustainability	Impacts and Outcomes
United States						
Li, Harmer (2009); Li, Harmer (2008); Li, Harmer (2009) Oregon	Density of neighborhood fast food outlets ***OTHER INTERVENTION COMPONENTS:*** *Multi-component:* 1. Land-use mix in the neighborhood 2. Neighborhood street connectivity 3. Density of public transit stations *Complex:* Not reported	***DESIGN:*** Prospective cohort and cross-sectional studies ***DURATION:*** Not applicable ***SAMPLE SIZE:*** Total=1221 adults aged 50-75 residing within Portland's Growth Management Boundary; random selection of households from 120 neighborhoods; block groups represented a variety of urban forms, in ethnically and socioeconomically diverse populations. ***PRIMARY OUTCOME:*** Overweight/obesity and physical activity ***MEASURES:*** 1. In-person interview (individual level measures: BMI [height and weight]; eating out behavior [frequency fast-food / buffets]; eating self-efficacy for fruit and vegetable consumption [adapted from Resincow et. al.]; fried food consumption; fruit and vegetable consumption; physical activity [assessed with BRFSS questions]; sociodemographics), 2. Geographic Information System (GIS) data (fast food outlet locations and density), 3. Existing geographic databases managed by the Portland Regional Land Information System (land use mix [formula developed by Frank, et al], residential density [no. people per residential acre in each block group], density of street connectivity, density of public transit stations, green spaces). ***DATA COLLECTION:*** An in-person interview was completed at baseline (2006-2007) and one year follow-up (2007-2008). Fast-food restaurant information was purchased, compiled, spatially geocoded and integrated within GIS using ArcView software. Land use mix data were generated using existing geographic databases managed by the Portland Regional Land Information System and land use mix index was generated. ***LIMITATIONS:*** Cross-sectional design precludes causality conclusions - observing change in built environment requires long periods of time, which is a challenge in the study of interaction effects of individual and environmental food outlet factors on obesity; factors related to the built environment surrounding participants' places of work or homes, such as absence of sidewalks and neighborhood environment features such as automobile dependent or live and work suburban style environments, were not measured; participants self-reported measures of fast food restaurant visits; because the exact location of each restaurant visit was not recorded, researchers could not verify visits were within the study area	Adults aged 50-75 27% lower- income 92% White 57% male (evaluation sample) ***ELIGIBILITY:*** Between 50 and 75 years of age, English speaking, independently ambulatory, and no history of major mental deficits ***EXPOSURE/ PARTICIPATION:*** Not applicable	***LEAD AGENCY:*** The research team (Oregon Research Institute, Willamette University, Oregon State University, and Metro Regional Services, Portland, OR) ***THEORY/ FRAMEWORK:*** Not reported ***EVIDENCE-BASED:*** Not reported ***REPLICATION/ ADAPTATION:*** Not applicable ***ADOPTION:*** Not applicable ***IMPLEMENTATION:*** Not applicable ***FORMATIVE EVALUATION:*** Not reported ***PROCESS EVALUATION:*** Not reported	***RESOURCES:*** Not applicable ***FUNDING:*** The evaluation was supported by a research grant from the National Institute of Environmental Health Sciences. ***STRATEGIES:*** Not applicable	***OVERWEIGHT/OBESITY:*** 1. (cross-sectional data) Residents living in high density fast food outlet neighborhoods who visited fast food or buffet restaurants 1 or 2 times weekly or more, were 1.878 (95% CI: 1.063, 3.496; p<0.05) times more likely to be obese than those who lived in low density fast food outlet neighborhoods. 2. (cross-sectional data) Similar results for high density fast food outlet neighborhoods compared to low density fast food outlet neighborhoods were found for residents who did not meet recommended levels of physical activity, OR=1.792 (95% CI:1.006, 3.190, p<0.05); reported low self efficacy in eating healthy food; OR=1.212 (95% CI:1.057, 1.391, p<0.005) or were non-Hispanic black residents, OR=8.057 (95% CI:1.705, 38.086, p<0.005) 3. (N=1145) Multi-level analyses show that after adjustment for neighborhood- and resident-level socio-demographic characteristics a high density of fast-food outlets was associated with an increase of 3.09 pounds in weight and 0.81 inches in waist circumference among residents who frequently ate at fast-food restaurants (p<0.05). 4. (N=1145) Multi-level analyses show that after adjustment for neighborhood- and resident-level socio-demographic characteristics high walkability was associated with a decrease in 2.65 pounds in weight and 0.62 inches in waist circumference among residents who increased their levels of vigorous physical activity (p<0.05). 5. (cross-sectional data) Using Poisson regression model analyses, a 10% increase in the even distribution of square footage across all land uses (i.e., residential, public [offices and institutions], commercial) was associated with a 25% reduction in prevalence of overweight/obesity (p<0.01). 6. (cross-sectional data) A one standard deviation increase in the density of fast-food outlets was associated with a 7% increase in the prevalence of overweight/obesity (p<0.01). ***PHYSICAL ACTIVITY:*** *Cross-sectional Data* 7. A one unit increase in mixed land use was associated with a 5.76 times increase in walking for transportation (p<0.001), a 4.066 times increase in neighborhood walking (p<0.001), 1.495 increase in walking for errands (p<0.047) and 1.463 times increase in meeting physical activity recommendations (p=0.025). *(continued next page)*

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						8. A one standard deviation increase in street connectivity increased walking prevalence by 16% for neighborhood walking (p=0.034), 20% for transportation (p=0.004) and 11% for errands (p=0.025). 9. The density of public transit stations was associated with more walking for transportation (estimated prevalence = 1.147, p=0.011) and meeting physical activity guidelines (estimated prevalence = 1.069, p=0.03); green and open spaces for recreation was also associated with more neighborhood walking (estimated prevalence = 1.119, p=0.032) and meeting physical activity requirements (estimated prevalence = 1.065, p<0.001).

Source	Intervention Components	Study Design and Execution	Reach	Adoption, Implementation and Process Evaluation	Enforcement/ Sustainability	Impacts and Outcomes
Mehta, Chang (2008) United States	Restaurant mix (fast-food, full-service) and density ***OTHER INTERVENTION COMPONENTS:*** *Multi-component:* Not reported *Complex:* Not reported	***DESIGN:*** Cross-sectional study ***DURATION:*** Not applicable ***SAMPLE SIZE:*** 714,054 adults from the 2002-2006 Behavioral Risk Factor Surveillance System (BRFSS) survey who live in counties with 2002 U.S. Economic Census county-level restaurant data ***PRIMARY OUTCOME:*** Overweight/obesity ***MEASURES:*** 1. 2002-2006 BRFSS data (weight, height, income, age, gender, race/ethnicity, education, smoking status, other household demographics), 2. 2002 US Economic Census data (restaurants), 3. Restaurant environment included classifications as "full-service" or "fast-food" and density calculations as outlets per 10,000 populations. ***DATA COLLECTION:*** A sample was taken from the BRFSS survey, living in counties with restaurant density data from the 2002 US Economic Census. Restaurants were classified as fast-food or full-service. BMI and obese status (BMI ≥ 30) were determined. Household income data were divided into quartiles. Other individual variables from BRFSS data and restaurant density data were placed into two regression models and analyzed. Two-level hierarchic regression models were used to predict Body Mass Index based on characteristics of individual and county and difference in weight status between 25th and 75th percentiles of restaurant environment. ***LIMITATIONS:*** Self-reported weight status; data on supermarkets and grocery stores were not measured; negative relationship between total restaurant density and weight status cannot be completely explained (possibility of a reverse causal process, where latent eating and weight-status preferences of individuals determine the distribution of restaurant availability)	Adults 49% Female 67% Non-Hispanic White, 11% Non-Hispanic Black, 15% Hispanic (all races), 7% Other race/ethnicity (evaluation sample) ***ELIGIBILITY:*** Participants were non-institutionalized adults aged ≥ 18 years from the BRFSS telephone survey. Participants were excluded from analysis if they were pregnant (1%), had an unavailable weight or height measurement (5%), were missing data on income (12%), or missing data on some other variable (1%). ***EXPOSURE/ PARTICIPATION:*** Not applicable	***LEAD AGENCY:*** Research team (from University of Pennsylvania) ***THEORY/ FRAMEWORK:*** Not reported ***EVIDENCE-BASED:*** Not reported ***REPLICATION/ ADAPTATION:*** Not applicable ***ADOPTION:*** Not applicable ***IMPLEMENTATION:*** Not applicable ***FORMATIVE EVALUATION:*** Not reported ***PROCESS EVALUATION:*** Not reported	***RESOURCES:*** Not applicable ***FUNDING:*** National Institutes of Health ***STRATEGIES:*** Not applicable	***OVERWEIGHT/OBESITY:*** 1. Higher total restaurant density is significantly associated with lower weight status. The BMI difference between the 25th and 75th percentiles of total restaurant density is -0.22 kg/m^2 (95% CI= -0.30, -0.14). Results from the logistic regression model indicate a 6% decrease in the odds of being obese between the 25th and 75th percentiles of total restaurant density (p<0.001). 2. Higher full-service restaurant density is significantly associated with lower weight status. The BMI difference between the 25th and 75th percentiles of full-service restaurant density is -0.32 kg/m^2 (95% CI= -0.40, -0.24). Results from the logistic regression model indicate an 11% decrease in the odds of being obese between the 25th and 75th percentiles of full-service restaurant density (p<0.001). 3. Higher fast-food restaurant density is significantly associated with higher weight status. The BMI difference between the 25th and 75th percentiles of fast-food restaurant density is 0.09 kg/m^2 (95% CI= 0.02, 0.16). Results from the logistic regression model indicate a 5% increase in the odds of being obese between the 25th and 75th percentiles of fast-food restaurant density (p<0.01). 4. BMI difference between 25th and 75th percentiles of fast-food/full-service ratio distribution is 0.20 kg/m^2 (p<.001). Results from the logistic regression model show an 8% increase (p<.001) in the odds of being obese between the 25th and 75th percentiles of the fast/full ratio distribution, and a 21% increase between the 5th and 95th percentile of distribution.

Source	Intervention Components	Study Design and Execution	Reach	Adoption, Implementation and Process Evaluation	Enforcement/ Sustainability	Impacts and Outcomes
Davis, Carpenter (2009) California	Availability of fast-food restaurants near schools ***OTHER INTERVENTION COMPONENTS:*** *Multi-component:* Not reported *Complex:* Not reported	***DESIGN:*** Cross-sectional study ***DURATION:*** Not applicable ***SAMPLE SIZE:*** 529,367 students throughout California, with 68% being high school students and 32% middle school students. ***PRIMARY OUTCOME:*** Overweight/obesity and dietary consumption ***MEASURES:*** 1. BMI (above the 85th percentile considered overweight and above the 95th percentile was obese) 2. Food consumption in the last 24 hours (servings and type of food) 3. Proximity of fast food outlets to schools ***DATA COLLECTION:*** Information from individual-level student responses was used from the 2002-2005 California Healthy Kids Survey (CHKS). To determine fast food outlet proximity, data were collected from 1) database of latitude-longitude coordinates for middle/high schools from CA Dept. of Ed., 2) 2003 database of restaurants with coordinates from Microsoft Streets and Trips, and 3) list of restaurant brands classified as "top limited-service restaurants" by Technomic, Inc. ***LIMITATIONS:*** BMI was self reported; although it is unlikely that missing data would affect findings, concerns remain about generalizability and external validity; one of the measures for unhealthful consumption was soda intake, which did not account for whether the soda was sugar based or diet soda and therefore could contribute to measurement error; other dimensions of the school environment that were not observed could be important like whether students were allowed to leave school for lunch; socioeconomic status and other demographic variables were controlled at the school level but not at the individual level	11-18 year olds 34% Lower-income 31% White, 10% Asian, 4% Black, 2% Hawaiian, 31% Hispanic, 1% American Indian, 14% Multiple, 7% Other (sample representative at school district level) ***ELIGIBILITY:*** The CHKS is compulsory for all California middle and high schools. Students were excluded if: the parent did not provide consent, the student was absent on the day the survey was administered, or the student had dropped out of school by the day of the survey ***EXPOSURE/ PARTICIPATION:*** Not applicable	***LEAD AGENCY:*** The research team ***THEORY/ FRAMEWORK:*** Not reported ***EVIDENCE-BASED:*** Not reported ***REPLICATION/ ADAPTATION:*** Not applicable ***ADOPTION:*** Not applicable ***IMPLEMENTATION:*** Not applicable ***FORMATIVE EVALUATION:*** Not reported ***PROCESS EVALUATION:*** Not reported	***RESOURCES:*** Not applicable ***FUNDING:*** Funding for the original California Healthy Kids Study was not reported. The Paul Merage School of Business provided financial support to purchase data for the association study. ***STRATEGIES:*** Not applicable	***OVERWEIGHT/OBESITY:*** 1. Youth who attended schools located near fast food restaurants (at least 1 outlet within _ mi.) were heavier than students with similar observable characteristics who attended schools not located near fast food restaurants. Models predicting youths' overweight and obesity show that a youth had 1.06 times the odds of being overweight (95% CI= 1.02, 1.10) and 1.07 times the odds of being obese (95% CI= 1.02, 1.12) if the youth's school was near a fast food establishment. 2. Attending a school within one half mile of a fast food establishment was associated with a 0.10 unit increase in BMI (95% CI=0.03, 0.16) compared with youth whose schools were not near a fast food restaurant. A 0.10 unit increase in BMI translates to 0.56 lb. for a 5'3" 110 lb 14 year old. 3. Attending schools that have a fast food restaurant within 1/4 mile (b=0.12, 95% CI: 0.04, 0.20; p<0.01) and between 1/4 and 1/2 mile (b= 0.14 95% CI: 0.06, 0.23; p<0.01) also showed a statistically significant association with weight status. The distance "within 1/2 mile to 3/4 mile" was not statistically associated with youth's weight status. 4. Among black students, but not other race/ethnic populations, the associations between being near a fast food restaurant and BMI were larger than were baseline associations representing all students (b=0.20; 95% CI=0.04, 0.36). 5. The associations between proximity of a fast food restaurant & weight status for students at urban schools (b=0.16; 95% CI=0.06, 0.25) were larger than were baseline associations representing all students. 6. There was no statistically significant relationship between the number (4 vs.3) of fast-food restaurants within _ mile of school and a students' BMI, suggesting that the density of fast food restaurants near schools may not be relevant to youth's obesity. 7. Attending a school located near a fast-food restaurant was associated with a 0.13 unit increase (95% CI: 0.05, 0.20) in BMI after controlling for the presence of nearby gas stations, motels and grocery stores. *(continued next page)*

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						NUTRITION: 8. Youth attending schools located near a fast food restaurant had significantly lower odds of reporting that they consumed vegetables (adjusted OR = 0.97, CI=0.93, 1.00) or juice (adjusted OR = 0.97, CI=0.94, 1.00) on the day prior to the survey than did other youth. 9. Attending a school near a fast food restaurant was associated with significantly higher odds of reporting soda consumption on the day before the survey (adjusted OR=1.05, CI=1.00, 1.11). 10. When the analysis was restricted to limited service restaurants that were classified as "burger" establishments, a significant higher likelihood of reporting fried potato consumption was reported (OR= 1.02; 95% CI= 1.00, 1.04).

Source	Intervention Components	Study Design and Execution	Reach	Adoption, Implementation and Process Evaluation	Enforcement/ Sustainability	Impacts and Outcomes
Burdette, Whitaker (2004) Ohio	Residential proximity to nearest fast food restaurant ***OTHER INTERVENTION COMPONENT:*** *Multi-component:* 1. Residential proximity to nearest playground 2. Neighborhood safety *Complex:* Not reported	***DESIGN:*** Cross-sectional study ***DURATION:*** Not applicable ***SAMPLE SIZE:*** 7,020 three to four year-old children enrolled in the WIC program and residing in one of the 46 (of 52) Cincinnati neighborhoods for which crime statistics were available from the city police department. ***PRIMARY OUTCOME:*** Overweight/obesity ***MEASURES:*** 1. BMI (2000 CDC growth reference; "overweight" defined as a BMI ≥ 95th %) 2. Distance from child's home to nearest playground and fast food location 3. Neighborhood safety (number of serious crimes [murder, rape, robbery, burglary, aggravated assault, larceny, and auto theft] and number of 911 police calls) 4. Poverty ratio (dividing child's family income by poverty guideline for year and family size) ***DATA COLLECTION:*** The research team used the Ohio WIC database for child demographics and used measured height and weight from most recent WIC visit to calculate BMI; data were collected from the Hamilton County Health Department playground inventory database containing 394 playgrounds for the city and surrounding county. Researchers identified 8 fast food chains using criteria: a) had franchises nationwide or multiple states, b) had more than one franchise in Cincinnati, c) served complete meals ordered without the assistance of waiters or waitresses, and d) provided facilities for consumption of meals on site. Using yellow pages from the internet and phone book (spring 2001) the research team identified the addresses of 151 fast food franchises. Crime statistics were obtained from the Cincinnati Police Department's website to develop neighborhood safety rates. ArcView GIS was used to spatially locate home residences, playgrounds, and fast food residences and to calculate street travel distances. ***LIMITATIONS:*** Study did not account for any variation in playground quality (e.g., cleanliness or equipment disrepair), nor for availability of yard space at the child's residence; there is no consensus definition for a fast food restaurant that has been applied in research; the study didn't use parental perception of safety which may primarily determine if parents bring their children to a playground; there was a lack of variation in environmental exposure variables - more variation might be required to detect a relationship between exposure and overweight; categorizing exposures at the neighborhood level might not lead to the most accurate classification of the exposure; the mobility of the study population may have limited the accurate assessment of all 3 of the environmental exposures used in this study	Three to four year-olds,100% lower-income, 76% Black, 23% White (evaluation sample) ***ELIGIBILITY:*** Eligible children: 1) made at least one WIC clinic visit between 1/1/98 and 6/30/01, 2) resided in the city of Cincinnati, and 3) were between 36 and 59 months of age at their visit. ***EXPOSURE/ PARTICIPATION:*** Not applicable	***LEAD AGENCY:*** The research team ***THEORY/ FRAMEWORK:*** Not reported ***EVIDENCE-BASED:*** Not reported ***REPLICATION/ ADAPTATION:*** Not applicable ***ADOPTION:*** Not applicable ***IMPLEMENTATION:*** Not applicable ***FORMATIVE EVALUATION:*** Not reported ***PROCESS EVALUATION:*** Not reported	***RESOURCES:*** Not applicable ***FUNDING:*** The evaluation was funded by the US Department of Agriculture, Economic Research Service. ***STRATEGIES:*** Not applicable	***OVERWEIGHT/OBESITY:*** 1. There was no difference in mean distance to the nearest playground or fast food restaurant when comparing children with a BMI ≥95th percentile to those with a BMI<95th percentile (playground: t=0.31 both, p=0.77; fast food: t=0.70 and 0.69, respectively, p=0.91) and when comparing children with a BMI ≥ 85th % to those with a BMI < 85th % (playground: t=0.31 both, p=0.32, fast food: t=0.69 and 0.70, respectively, p=0.43). 2. There was no significant correlation between children's BMI z scores and distance to the nearest playground or fast food restaurant. 3. When comparing overweight and non-overweight children, there was no difference in the percentage living in neighborhoods without playgrounds (3.3% vs. 4.1%, p=0.29) nor in the percentage living in neighborhoods without fast food restaurants (44.0% vs. 44.5%, p=0.84). 4. The prevalence of children with BMI ≥ 95th percentile and BMI ≥ 85th percentile did not differ statistically across the quintiles of neighborhood crime rate, but did differ significantly for 911 call rate. % BMI ≥95th percentile ranged from 10.7% in the lowest quintile to 9.4% in the highest quintile (p=0.04). %BMI ≥85th percentile ranged from 22.7% in the lowest quintile of call rate to 22.1% in the highest quintile (p=0.02). There was no clear trend suggesting that lower levels of neighborhood safety were associated with a higher prevalence of overweight. 5. After controlling for poverty ratio (as a measure of SES), child race, and child sex, the 3 environmental predictor variables (playground proximity, fast food restaurant proximity and neighborhood safety) were still not significantly associated with childhood overweight.

Source	Intervention Components	Study Design and Execution	Reach	Adoption, Implementation and Process Evaluation	Enforcement/ Sustainability	Impacts and Outcomes
Maddock (2004) United States	Proximity to fast food restaurants ***OTHER INTERVENTION COMPONENTS:*** *Multi-component:* Not reported *Complex:* Not reported	***DESIGN:*** Cross-sectional study ***DURATION:*** Not applicable ***SAMPLE SIZE:*** Unit of analysis was states (N=50). 2002 BRFSS data were used; # of individuals participating was not reported. ***PRIMARY OUTCOME:*** Overweight/obesity ***MEASURES:*** 1. Obesity rates (BMI> 30 as obese) 2. Fast food outlets (square miles per fast food restaurant and residents per fast food restaurant) 3. Physical inactivity prevalence (% of population who reported no leisure-time physical activity in past 30 days) 4. Fruit and vegetable (F&V) consumption (% of the population who ate at least 5 servings a day of F&V in past 30 days). ***DATA COLLECTION:*** State level obesity rates, physical inactivity prevalence, and F&V consumption were obtained from the 2002 Behavioral Risk Factor Surveillance System (BRFSS) data collected by the Centers for Disease Control and Prevention. BRFSS participants are recruited through a multistage cluster sampling design by random-digit dialing procedures and constitute a representative sample of each state's non-institutionalized civilian residents age 18 and older. The 2000 U.S. Census was used to assess state population, land size, the proportion of each state's population that is African-American and Hispanic, the number of males per 100 females, and the percentage of the adult population who is aged 18-34, 35-54, and 55+. Median income by state was available for the 2000-02 three year averages. Fast-food data were collected from the 2002 U.S. Yellow Pages by state for the 2 largest fast food hamburger chains in the U.S. (chosen because of their high market share and existence in all 50 states). No. of restaurants was calculated by adding together the no. of outlets for each of the 2 chains for each state. ***LIMITATIONS:*** Obesity, physical inactivity, and F&V consumption are based on self-reported data; use of secondary data from multiple sources which are difficult to use for small-area analysis; sample size was not large enough to conduct county-level analysis, which would be more specific; it was impossible to detangle urban and rural environments in analysis; cross-sectional design limits any inference of causality – e.g. it is possible that restaurants are opening in areas of high demand and are a proxy for obesity instead of a cause or for another variable such as urban development, communities with low rates of walking or other factors	Adults General population ***ELIGIBILITY:*** All states eligible. Alaska was removed from analysis because its large size and low population density made it an outlier for most variables. District of Columbia was added. For BRFSS, sample included households with a working telephone, non-institutionalized residents 18 and older. ***EXPOSURE/ PARTICIPATION:*** Not applicable	***LEAD AGENCY:*** The research team ***THEORY/ FRAMEWORK:*** Not reported ***EVIDENCE-BASED:*** Not reported ***REPLICATION/ ADAPTATION:*** Not applicable ***ADOPTION:*** Not applicable ***IMPLEMENTATION:*** Not applicable ***FORMATIVE EVALUATION:*** Not reported ***PROCESS EVALUATION:*** Not reported	***RESOURCES:*** Not applicable ***FUNDING:*** Funding source for association research not reported ***STRATEGIES:*** Not applicable	***OVERWEIGHT/OBESITY:*** 1. The correlation between residents per fast food restaurant and obesity was r=-0.53, p<0.001. In general, states that ranked low in obesity tended to have more residents per fast-food restaurant. 2. The correlation between square miles per restaurant and obesity was r=-0.20, p=0.16. States that ranked low in obesity tended to have more square miles per restaurant, but this finding was not significant. 3. Among the covariates, income (-0.55), physical inactivity (0.62), F&V consumption (-0.39), percentage of African-Americans (0.39), and males per 100 females (-0.29) all had significant bivariate correlations with obesity (p<0.01 for all). 4. In the multilevel analyses, only median income and males per 100 females were significant predictors of obesity. Multicolinearity among the variables reduced prediction for the individual variables. 5. However, the addition of the square miles per fast food restaurant and residents per fast food restaurant accounted for 6% of the variance in state obesity rates after controlling for population density, ethnicity, age, gender, physical inactivity, and F&V intake (F[11, 49]=8.0, p<0.001, R^2=0.70 [adjusted R^2=0.61]).

Source	Intervention Components	Study Design and Execution	Reach	Adoption, Implementation and Process Evaluation	Enforcement/ Sustainability	Impacts and Outcomes
Jeffery, Baxter (2006) Minnesota	Proximity of residences and workplaces to fast food restaurants ***OTHER INTERVENTION COMPONENTS:*** *Multi-component:* Not reported *Complex:* Not reported	***DESIGN:*** Cross-sectional study ***DURATION:*** Not applicable ***SAMPLE SIZE:*** 1033 adult Minnesota residents ***PRIMARY OUTCOME:*** Overweight/obesity and dietary consumption ***MEASURES:*** 1. Telephone survey (self reported height and weight, patterns of eating away from home [# of times eaten at fast-food / non fast-food restaurants per week], and dietary intake / quality [allowed fat score calculation]) 2. Fast food /other restaurant outlet density within several radii of home / work. ***DATA COLLECTION:*** Participants identified in 15 minute random digit-dial survey furnished demographics, dietary intake, height / weight, eating habits, and home and work addresses. Eating places were identified from public databases using SIC codes and further classified into 19 subcategories with proprietary data available to a contractor to distinguish fast food outlets and other restaurants. These data and participant home and work addresses were geocoded using GIS; food outlet densities within 0.5, 1.0, and 2.0 mile circles around work and home addresses were determined. ***LIMITATIONS:*** Availability of fast food outlets may be relatively homogeneous across the U.S. or all areas in country may have "enough" access, suggesting international comparisons are needed to provide wider range of exposure; imprecision in the definition of "fast food" restaurant and the definition of 'exposure' to it; which of the elements of a fast-food restaurant are key (such as limited menu, paying for meal before receiving it, no wait staff, etc) is unknown and a wide range of variations are common; linear distance may be too simplistic; exposure may be better defined as access at particular points in time and space when a person is in particular need for something to eat (like en route to a child's sporting event); database for mapping of food outlets may be out of date or otherwise error prone	Adults ***ELIGIBILITY:*** All adults over 18 yrs old were eligible. ***EXPOSURE/ PARTICIPATION:*** Not applicable	***LEAD AGENCY:*** The research team ***THEORY/ FRAMEWORK:*** Not reported ***EVIDENCE-BASED:*** Not reported ***REPLICATION/ ADAPTATION:*** Not applicable ***ADOPTION:*** Not applicable ***IMPLEMENTATION:*** Not applicable ***FORMATIVE EVALUATION:*** Not reported ***PROCESS EVALUATION:*** Not reported	***RESOURCES:*** Not applicable ***FUNDING:*** Research supported by a grant from National Institute of Diabetes and Digestive and Kidney Diseases. ***STRATEGIES:*** Not applicable	***OVERWEIGHT/OBESITY:*** 1. There was a significant positive association between BMI and frequency of reported eating at "fast food" restaurants (Beta=0.301; p=0.02). 2. There was no association between BMI and frequency of reported eating at "non-fast food" restaurants (Beta=-0.034; p=0.71). 3. There was no relationship between BMI and restaurant proximity to home addresses for either men or women. 4. For men only, a significant inverse relationship between BMI and workplace restaurant proximity was found for both "fast" and "non-fast" food (Beta=-0.029; p=0.008 and Beta=-0.022; p=0.01, respectively). Men with more restaurants close to their places of work were leaner. ***NUTRITION:*** 5. Having children in the home (OR=1.875, 95% CI: 1.36-2.59; p=0.001), working outside the home (OR=1.319, 95% CI: 0.97-1.79; p=0.08), and reporting a higher fat intake (OR=1.128, 95%CI: 1.09-1.16; p=0.001) were associated with significantly higher rates of reported eating at "fast food" restaurants. 6. Vegetable intake (OR=0.837, 95% CI: 0.75-0.93; p=0.001) and frequency of participating in physical activity (OR=0.916, 95% CI: 0.85-0.99; p=0.03) were inversely related to frequency of reported "fast food" restaurant use. 7. Proximity (< 2 miles) of "fast-food" restaurants to people's homes was not significantly related to the frequency with which they reported eating at these restaurants. 8. Proximity of "non fast-food" restaurants to people's homes was positively associated to the frequency with which they reported eating at these restaurants (Beta=-0.034, p=0.71).

Source	Intervention Components	Study Design and Execution	Reach	Adoption, Implementation and Process Evaluation	Enforcement/ Sustainability	Impacts and Outcomes
Powell, Auld (2006) United States	Restaurant outlet density ***OTHER INTERVENTION COMPONENTS:*** *Multi-component:* 1. Access to food and food pricing *Complex:* Not reported	***DESIGN:*** Cross-sectional study ***DURATION:*** Not reported ***SAMPLE SIZE:*** Repeated cross sections from the Monitoring the Future Survey (MTF) conducted 1997-2003 yielded 72,854 observations from 8th & 10th grade students; 47,675 observations included food consumption data ***PRIMARY OUTCOME:*** Dietary consumption, overweight/ obesity (body mass index) and probability of overweight ***MEASURES:*** 1. Monitoring the Future (MTF) survey (demographics, food consumption, physical activity, F&V consumption, height and weight, geographic identifiers at zip code level for school); 2. CDC growth chart for BMI; 3. Dun and Bradstreet density measures (restaurants, fast food outlets); 4. American Chamber of Commerce Researchers Association (ACCRA) Cost of Living reports (price data for F&V and fast food). ***DATA COLLECTION:*** The MTF survey consisted of 4 different forms administered to students in ordered sequence in classrooms. The research team in the current study, using Dun & Bradstreet software, pulled information on number of restaurant outlets by zip code for 1997-2003 at the 4-digit SIC code level and for fast food restaurant outlets at the 6-digit SIC code level. The outlet density data was linked to the individual-level data by student's school's zip code. Price data were drawn from quarters 1 and 2 of the ACCRA Cost of Living Index, and 2 price indices were created (F& V price index and fast food price index) which were deflated by the Bureau of Labor Statistics Consumer Price Index. The research team then conducted all data analyses. ***LIMITATIONS:*** Height and weight were self-reported; children may live in a different zip code from their school & school zip codes were used to link to food outlet density; control variables may not capture variation in income and therefore results may be subject to omitted variables bias; the researchers identified the effects of prices and densities using variation across geographic regions within years such that unobserved determinants of weight outcomes and eating habits across regions may bias the results	12-17 year olds (nationally representative) ***ELIGIBILITY:*** 8th or 10th grade students randomly selected at one of approx. 280 schools selected through MTF sampling procedures. ***EXPOSURE/ PARTICIPATION:*** Not reported	***LEAD AGENCY:*** Research team (University of Illinois-Chicago and University of Michigan) ***THEORY/ FRAMEWORK:*** The rational choice framework (individuals choose food intake and physical activity to achieve ends) ***EVIDENCE-BASED:*** Not reported ***ADOPTION:*** Not applicable ***REPLICATION/ ADAPTATION:*** Not applicable ***IMPLEMENTATION:*** Not applicable ***FORMATIVE EVALUATION:*** Not reported ***PROCESS EVALUATION:*** Not reported	***RESOURCES:*** Not applicable ***FUNDING:*** National Institute on Drug Abuse (MTF survey) and the Robert Wood Johnson Foundation (evaluation) ***STRATEGIES:*** Not applicable	***OVERWEIGHT/OBESITY:*** 1. When year effects are not considered, fast food and F&V prices both statistically significantly impact BMI (p=0.01). BMI is lower when fast food prices are higher and when F&V prices are lower. 2. When year effects are included, the magnitude of the F&V price effect on BMI drops by more than half and loses statistical significance. The estimated effect on BMI of a $1 change in the price of a fast food meal falls by almost half to 0.31 m/kg^2, but remains statistically significant (p=0.05). 3. BMI is higher when there are fewer full service restaurants, more fast food restaurants, or higher F & V prices, but none of the results are statistically significant. 4. Controlling for year effects, a $1 increase in fast food reduces prevalence of overweight by 2.2 percentage points (p=0.05). 5. A 10% increase in the price of a fast food meal leads to a 0.4% decrease in BMI and a 5.9% decrease in prevalence of overweight. ***NUTRITION:*** 6. A $1 increase in the price of fast food is statistically significantly associated with a reduction in frequent consumption of F&V, by 7.3 percentage points when year effects are not included (p=0.01) and by 6.7 % points when year effects are included (p=0.01). 7. A $1 increase in the price of F&V is estimated to decrease F & V consumption by 6.3 percentage points (z=2.05, p=0.05), but loses some statistical significance when year effects are included (z=1.79, p=0.10). 8. Increased availability of full service restaurants has a statistically signification relationship with frequent F&V consumption. Ten more full service restaurants per capita in the region were associated with a 1.9 percentage point increase in the probability of frequent consumption (p=0.01).

Source	Intervention Components	Study Design and Execution	Reach	Adoption, Implementation and Process Evaluation	Enforcement/ Sustainability	Impacts and Outcomes
Wen, Zhang (2009) Illinois	Access to restaurants and bars ***OTHER INTERVENTION COMPONENTS:*** *Multi-component:* 1. Residential density, land-use mix, neighborhood amenities (access to health and human services) *Complex:* 1. Social environment (trust, social capital, norms of reciprocity)	***DESIGN:*** Cross-sectional study ***DURATION:*** Not applicable ***SAMPLE SIZE:*** 3530 respondents from the MCIS-MS in 266 Chicago neighborhoods ***PRIMARY OUTCOME:*** Physical Activity (PA) ***MEASURES:*** 1. Metropolitan Chicago Information Center-Metro Survey [MCIC-MS] (physical activity; weekly work-out and exercise [1996 data included exercise for the year]) 2. 2000 community indices from Metropolitan Chicago Information Center [MCIC] (built environment), 2000 City of Chicago Public Data/2003 Chicago Area Transportation data (pedestrian injury rate, residential density, distance to subway and parks, land-use mix, access to neighborhood amenities, neighborhood buffers) 3. 1995 Project on Human Development in Chicago Neighborhoods-Community Survey [PHDCN-CS] (social capital; neighborhood trust, norms of reciprocity, perceived violence) 4. 1990 US Census Data (neighborhood socioeconomic status; affluence, poverty, education, % female head of household, % of households using public assistance) ***DATA COLLECTION:*** Results presented were from secondary data analyses of existing survey data that was merged with publicly accessible administrative data and Census data on individual and neighborhood characteristics. On 8 SES and social capital variables, a composite scale of neighborhood social environment was constructed with excellent internal reliability (alpha=0.92). Neighborhood clusters were used as the unit of analysis and were composed of geographically contiguous census tracts (typically 2 or 3) and should have been homogeneous on key census indicators. During the 1996 MCIC-MS respondents were asked if during the past year individuals improved their fitness and exercised regularly. Questions from the self-reported measures have been validated. ***LIMITATIONS:*** Data was self-reported; exercise measures do not distinguish purpose; the sample is geographically limited; causal inferences cannot be made using cross-sectional studies; environmental measures were objective; both of the exercise measures were not subjected to psychometric testing; this research does not look at spatial dependency between adjacent neighborhoods; there was a time lag between individual-level data used and social and environmental data	Adults, General Population, 56.29% non-white respondents (MCIC-MS 1995, 1996, 1997, 1999) [evaluation sample] ***ELIGIBILITY:*** Not reported ***EXPOSURE/ PARTICIPATION:*** Not applicable	***LEAD AGENCY:*** Researchers were from University of Utah and the Academy of Family Physicians, Washington DC. ***THEORY/ FRAMEWORK:*** Not reported ***EVIDENCE-BASED:*** Not reported ***REPLICATION/ ADAPTATION:*** Not applicable ***ADOPTION:*** Not applicable ***IMPLEMENTATION:*** Not applicable ***FORMATIVE EVALUATION:*** Not reported ***PROCESS EVALUATION:*** Not reported	***RESOURCES:*** Not applicable ***FUNDING:*** This work was supported by a grant from the National Institute of Child Health and Human Development (NICHD). ***STRATEGIES:*** Not applicable	***PHYSICAL ACTIVITY:*** 1. Respondents who lived in neighborhoods that had more access to restaurants and bars were more likely to report one to three times of weekly workout/exercise (OR=1.08; 95% CI; 0.99-1.19; p<0.01) and four times or more weekly workout/exercise (OR=1.14; 95% CI; 1.03-1.26; p<0.05) compared with those who lived in neighborhoods that had less access to restaurants and bars. 2. Access to restaurants and bars (OR=1.24; 95% CI; 1.05-1.46; p<0.01) and neighborhood social environment (OR=1.37; 95% CI; 1.11-1.69; p<0.05) both were significantly associated with the likelihood of reporting regular exercise in the past year. ***ENVIRONMENT:*** 3. Correlation analyses (data not shown) suggested that an advantaged neighborhood social environment was positively correlated with access to neighborhood amenities, such as restaurants, bars, libraries, and museums, and to lower pedestrian injury rates, whereas it was negatively correlated with mixed land use, access to subway stations and parks, and access to services. Meanwhile, neighborhoods with more mixed land use had better access to subway and amenities but also had higher pedestrian injury rates. ***OTHER:*** 4. The beneficial effect of neighborhood social environment was significantly stronger for women (data not shown).

Source	Intervention Components	Study Design and Execution	Reach	Adoption, Implementation and Process Evaluation	Enforcement/ Sustainability	Impacts and Outcomes
International						
Pearce, Hiscock (2008) New Zealand	Neighborhood access (proximity) to multinational and locally-operated fast food outlets ***OTHER INTERVENTION COMPONENTS:*** *Multi-component:* Not reported *Complex:* Not reported	***DESIGN:*** Cross-sectional study ***DURATION:*** Not applicable ***SAMPLE SIZE:*** 12,529 adults, aged 15+; participants were distributed across 1,178 mesh block neighborhoods (each mesh block has approximately 100 residents) with 1- 83 respondents per neighborhood. ***PRIMARY OUTCOME:*** Overweight and dietary consumption ***MEASURES:*** 1. Geographic Information System data (network functionality used to determine fast-food outlet proximity: travel distance along road network to nearest multinational and locally operated fast food outlets from each mesh neighborhood) 2. New Zealand Health Survey (daily servings of fruit and vegetables; socioeconomic variables; height and weight) ***DATA COLLECTION:*** Secondary Data from the 2002/2003 New Zealand Health Survey (collected by the New Zealand Ministry of Health) were used, including dietary intake and height and weight measurements. Height and weight measurements were used to calculate BMI. The research team from the University of Canterbury collected geographic data on fast-food outlets and individuals' residences. Information on the addresses of each fast-food outlet was collected from all 74 Territorial Authorities across New Zealand during 2005. Fast food street address and name were verified using the online telephone directory. The data were coded into 2 groups: multinational fast-food outlets and locally operated fast-food outlets. A total of 2,930 fast-food outlets were registered of which 474 were multinational outlets. Outlets were geocoded in GIS. The research team also conducted the evaluation. ***LIMITATIONS:*** By using secondary data, the researchers may have incorporated measurement error of the neighborhood exposure; access measures were only of access to fast-food outlets, not to outlets that sell high quality healthy food; neighborhood-level confounding may be occurring – multinationals may select outlet locations using more precise socio-demographic information on neighborhood composition, lifestyle and consumption patterns than that available to local operators; it may be that geographic access to fast-food outlets is also correlated with other health promoting/damaging characteristics and behaviors that could not be included in the researchers' model such as urban design	15 years and older (Evaluation sample was nationally representative of New Zealand) ***ELIGIBILITY:*** Individuals who participated in the New Zealand Health Survey (This study involved secondary data analysis of data from that survey). ***EXPOSURE/ PARTICIPATION:*** Not applicable	***LEAD AGENCY:*** The research team from University of Canterbury ***THEORY/ FRAMEWORK:*** Not reported ***EVIDENCE-BASED:*** Not reported ***REPLICATION/ ADAPTATION:*** Not applicable ***ADOPTION:*** Not applicable ***IMPLEMENTATION:*** Not applicable ***FORMATIVE EVALUATION:*** Not reported ***PROCESS EVALUATION:*** Not reported	***RESOURCES:*** Not applicable ***FUNDING:*** The evaluation was funded by the New Zealand Health Research Council, as part of the Neighborhoods and Health project within the Health Inequalities Research Program. The New Zealand Health Survey was funded by the New Zealand Ministry of Health. ***STRATEGIES:*** Not applicable	***OVERWEIGHT:*** 1. Contrary to expectations, the odds ratio of being overweight was greater in neighborhoods with poorer access to multinational fast-food outlets (OR=1.17, 95% CI: 1.03-1.32) compared to neighborhoods with the closest access. [Adjusted model]. 2. There was no association between access to the closest locally operated fast-food outlet, with the most accessible neighborhoods having an OR of being overweight close to the null & CI's that included 1.0. ***NUTRITION:*** 3. Consumption of the recommended daily intake of fruit was not associated with neighborhood access to multinational or locally operated fast-food outlets (OR=1.05 and OR=1.02 respectively, 95% CI's included 1.0). 4. Consumption of the recommended daily intake of vegetables was associated with access to multinational fast-food outlets. After adjustment for individual SES, neighborhood deprivation and type, neighborhoods with poorer access to multinational fast-food outlets than the national median had a 17% higher odds of eating the recommended vegetable intake compared to neighborhoods with the best access (OR=1.17, 95% CI: 1.00-1.37). 5. There was no association between neighborhood access to locally operated fast-food outlets and vegetable consumption (OR=0.98, 95% CI: 0.85-1.14).

Source	Intervention Components	Study Design and Execution	Reach	Adoption, Implementation and Process Evaluation	Enforcement/ Sustainability	Impacts and Outcomes
Simmons, McKenzie (2005) Australia	Access to take-out and dine-in restaurant foods ***OTHER INTERVENTION COMPONENTS:*** *Multi-component:* Not reported *Complex:* Not reported	***DESIGN:*** Cross-sectional study ***DURATION:*** Not applicable ***SAMPLE SIZE:*** 1454 adults living in 6 shire capitals and a regional center in Australia ***PRIMARY OUTCOME:*** Overweight/obesity ***MEASURES:*** 1. Questionnaires (personal health) 2. Previously-validated questionnaires (socio-demographics, physical activity, fat item intake, TV and/or video watching, smoking, alcohol, vegetable, fruit, dairy food and take-out consumption) 3. Physical measurements (height, weight, waist circumference) 4. Direct observation and the local telephone directory (availability of take-out and dine-in restaurants) ***DATA COLLECTION:*** Researchers conducted face-to-face interviews with participants. Physical activity was assessed through self-reported frequency and duration during the previous week. Total physical activity time was calculated as the sum of the time spent walking or performing moderate physical activity plus double the time spent in vigorous physical activity (found valid and reliable). Participants were invited to attend a "clinic" where researchers collected physical measurements using a stadiometer, mechanical beam balance, and tape measure. To allow comparability with AusDiab (the Australian Diabetes, Obesity, and Lifestyle Study), equipment and at least one member of the AusDiab team were present during clinics. Body Mass Index (BMI) was calculated from physical measurements. Waist circumference was measured and recorded. The number of restaurants per 1000 population was calculated by dividing the number of outlets by the 2001 census population in each town. All analyses were conducted by the research team. ***LIMITATIONS:*** Study design makes interpretation of results more difficult; the number of nutritional items on the questionnaires was limited and did not include high calorie drinks	General population Adults ***ELIGIBILITY:*** Participants who went to the clinic and whose physical data was collected were included in study. ***EXPOSURE/ PARTICIPATION:*** Not applicable	***LEAD AGENCY:*** Research team ***THEORY/ FRAMEWORK:*** Not reported ***EVIDENCE-BASED:*** Not reported ***REPLICATION/ ADAPTATION:*** Not applicable ***ADOPTION:*** Not applicable ***IMPLEMENTATION:*** Not applicable ***FORMATIVE EVALUATION:*** Not reported ***PROCESS EVALUATION:*** Not reported	***RESOURCES:*** Not applicable ***FUNDING:*** International Diabetes Institute and the University of Melbourne ***STRATEGIES:*** Not applicable	***OVERWEIGHT/OBESITY:*** 1. There was no relationship between availability of restaurants and prevalence of obesity. A similar pattern was found when plotting with availability of eating places and using mean waist and BMI circumference and when dividing eating places into eat-in and take-away establishments. 2. BMI was not significantly related to takeaway consumption. 3. Waist circumference was significantly lower among those who never ate takeaways (p=0.0256), but was otherwise similar whether takeaways were eaten <1 time per month or ≥1 time per week.

Source	Intervention Components	Study Design and Execution	Reach	Adoption, Implementation and Process Evaluation	Enforcement/ Sustainability	Impacts and Outcomes
Crawford, Timperio (2008) Australia	Density of and proximity to fast food outlets ***OTHER INTERVENTION COMPONENTS:*** *Multi-component:* Not reported *Complex:* Not reported	***DESIGN:*** Cross-sectional study ***DURATION:*** Not applicable ***SAMPLE SIZE:*** 1064, including 137 children aged 8-9 years & 243 aged 13-15 years and their parents (322 fathers and 362 mothers) from Melbourne, Australia. ***PRIMARY OUTCOME:*** Body Mass Index (BMI) ***MEASURES:*** 1. Child height and weight (BMI calculated to establish child's weight status) 2. Accelerometer (child's moderate to vigorous physical activity [MVPA]) 3. Parent questionnaire (sociodemographic, height and weight and physical activity reported for self and spouse) 4. Geographic Information Systems data (neighborhood access to fast food outlets) ***DATA COLLECTION:*** Data were collected in a 2004 follow-up from 8-9 and 13-15 year old children and their parents/primary caregivers who participated in the 2001 Children Living in Active Neighborhoods (CLAN) study. Children's height & weight measurements were taken at school and physical activity was measured by accelerometers from Manufacturing and Technology, Inc. for eight days. Neighborhood fast food outlets were identified using on-line telephone directories and company websites. Using GIS and spatial data from the State Government of Victoria, researchers created a dataset containing road and road attributes, geocoded residences and fast food outlets, and created 2 km buffer around participants' homes. GIS was used to identify existence of fast food restaurants within the buffer, density of outlets, and distance via road network to nearest fast food outlet. Eight common fast food chains from which ready-to-eat meals could be purchased without table service were included. Researchers collected data and ran the analyses. ***LIMITATIONS:*** Findings are from a relatively well-educated sample; parents' height and weight was self- or partner-reported; although adjusted for children's physical activity levels, accelerometer cut-points may be lower than some published, crediting more physical activity than occurred; some fast-food outlets may have been recently established; study focused on only the 8 most common fast food chains and did not assess smaller fast food outlets, access, or children's preferences for fast food chains; researchers did not use spatial statistics to account for potential correlations between participants who lived close together and may share similar environments	Parents 8-9 year olds 13-15 year olds 35.8% Children (evaluation sample) ***ELIGIBILITY:*** Participation in 2001 CLAN study & 2004 follow-up; children and parents included in current evaluation if 2004 data on height and weight available and family lived at same residential address for 3 years from 2001-2004. ***EXPOSURE/ PARTICIPATION:*** Not applicable	***LEAD AGENCY:*** The research team ***THEORY/ FRAMEWORK:*** Not reported ***EVIDENCE-BASED:*** Not reported ***REPLICATION/ ADAPTATION:*** Not applicable ***ADOPTION:*** Not applicable ***IMPLEMENTATION:*** Not applicable ***FORMATIVE EVALUATION:*** Not reported ***PROCESS EVALUATION:*** Not reported	***RESOURCES:*** Not applicable ***FUNDING:*** The evaluation was supported by a grant from the Australian National Health and Medical Research Council with most of the authors being supported by grants from several foundations. The article did not specify the funding source for the original data collection. ***STRATEGIES:*** Not applicable	***OVERWEIGHT/OBESITY:*** 1. 26% of the younger boys and girls, 32% of the older boys and 27% of the older girls were classified as overweight or obese. Among the adults, 63% of fathers and 38% of mothers were overweight or obese. 2. Among older children, those with at least one fast food outlet within 2km had lower BMI z scores (boys B=-0.49 95% CI: -0.95,-0.03; girls B=-0.35 95% CI: -0.69,-0.02; $p<0.05$ for both). 3. Among fathers, the further they lived from a fast food outlet, the higher their BMI. (B=0.16 95% CI: 0.06, 0.27; $p<0.05$). 4. Among older girls, the likelihood of being overweight or obese was reduced by 81% if they had one or more fast food outlets within 2 km of their residential address (OR=0.19, 95% CI: 0.09, 0.41), and by 14% with each additional outlet within 2 km (OR=0.86 95% CI:0.74, 0.99). 5. Among fathers, the likelihood of being overweight or obese was reduced by 50% if they had one or more fast food outlet within 2 km of their residential address (OR=0.50, 95% CI: 0.31, 0.81), and increased by 13% for each additional kilometer to the nearest fast food outlet (OR=1.13 95% CI:1.06, 1.20).

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