

The Physical Inactivity, Inactivity, and Built Environments

Current and Potential Sources of Measures for
Assessing Progress in Obesity Prevention

IOM Workshop on Measurement Strategies for Accelerating
Progress in Obesity Prevention

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Questions from IOM Committee

- What is it about measurement that is limiting progress in obesity prevention?
- What methods/measures are available now?
- What would a national survey/surveillance system to track physical activity/built-environment-related and policy changes look like?
- What environmental and/or policy measures, if any, are offered by national surveys (e.g., NHANES, BRFSS)?

Presentation Topics

- Surveillance
- National objectives related to physical activity environment and policies
- Current methods and gaps
- Analyzing, interpreting, and disseminating data
- Opportunities to learn from current initiatives
- Summary of recommendations

SURVEILLANCE

Uses of Public Health Surveillance

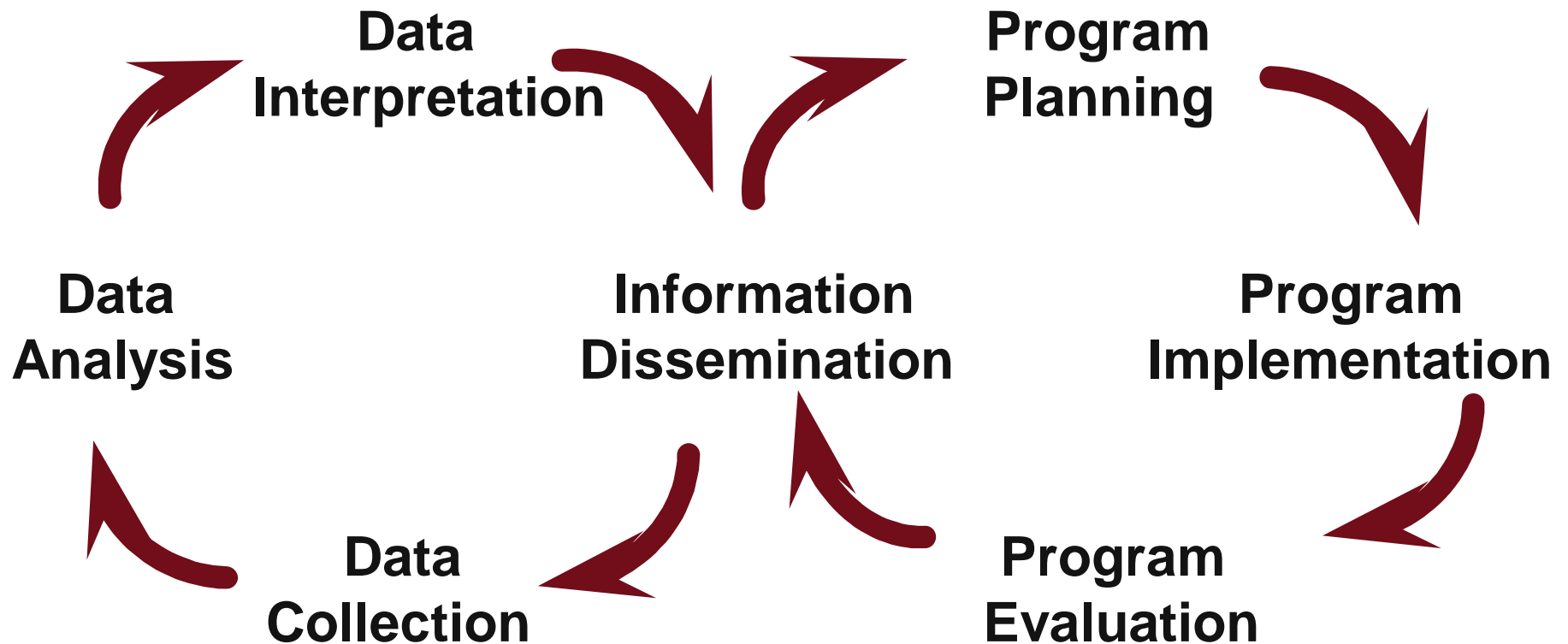
- Estimate magnitude of the problem
- Determine geographic distribution of health-related issue
- Define a problem
- Generate hypotheses, stimulate research
- Evaluate intervention strategies
- Monitor changes in health-related conditions
- Facilitate planning and policy development

“What gets measured, gets changed.”

– C.T. Orleans, G. Giovanni per J. Chriqui et al. *Journal of Law Medicine & Ethics* 2011

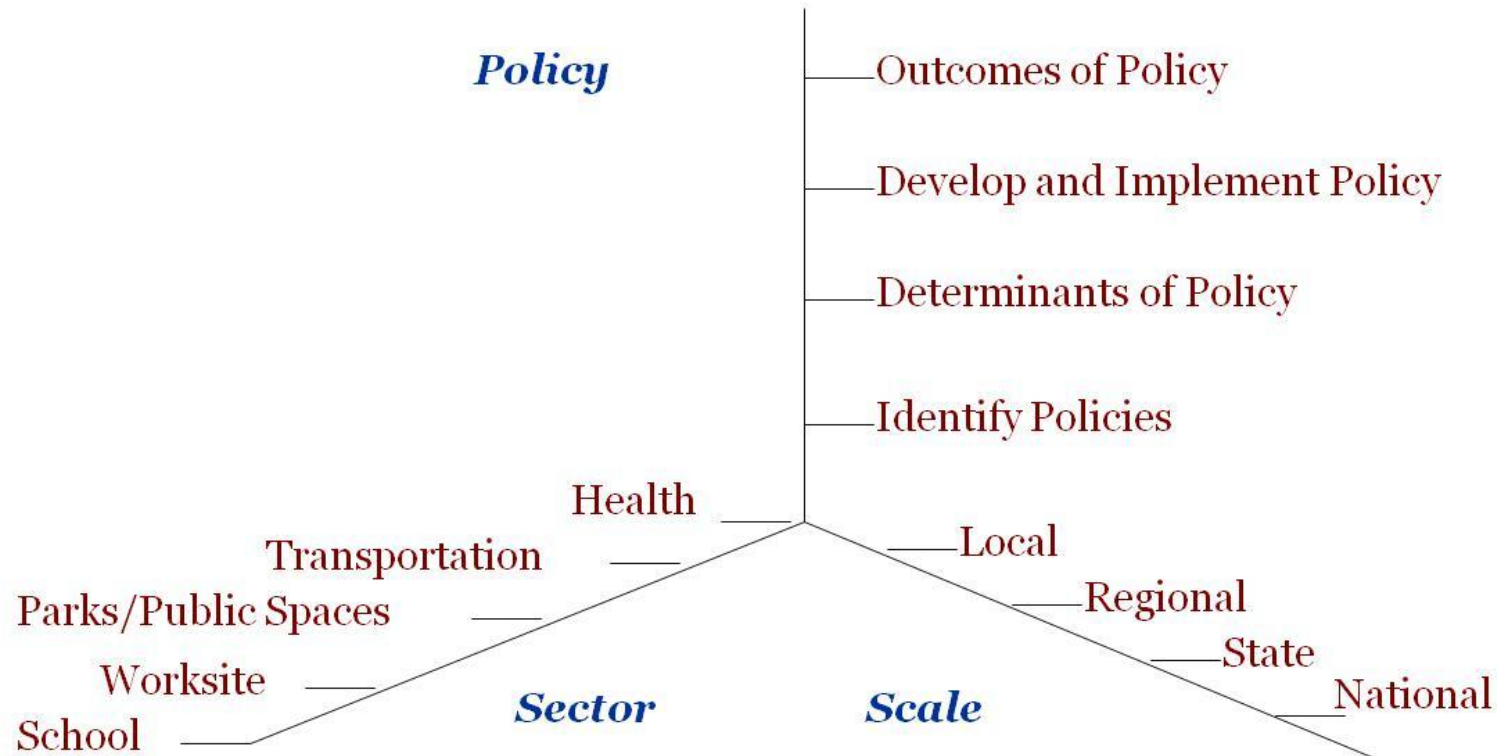
Are current measures accurate, reliable, feasible to collect, sensitive to change, associated with physical activity and useful?

Public Health Surveillance Loop



Source: Remington and Goodman; *Chronic Disease Surveillance*, 1999

Physical Activity Policy Framework



Schmid et al. *J Physical Activity Health* 2006

NATIONAL OBJECTIVES FOR PHYSICAL ACTIVITY ENVIRONMENTS AND POLICIES

National Physical Activity Plan

- Comprehensive set of policies, programs, and initiatives that aim to increase physical activity in all segments of the American population.
- Recommendations by 8 sectors
 - Business and industry
 - Education
 - Health care
 - Mass media
 - Park, recreation, fitness and sport
 - Public health
 - Transportation, land use, and community design
 - Volunteer and non-profit
- “Surveillance,” “monitoring,” “reporting,” “standardized measures” found in strategies or tactics across most sectors

Healthy People 2020 – Physical Activity

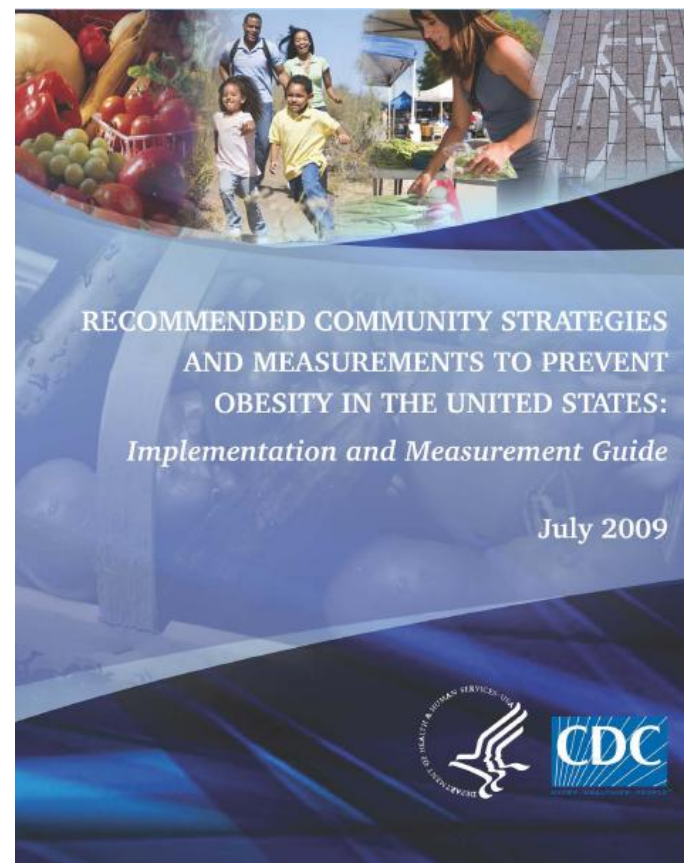
- Objectives on physical activity environment/policies
 1. Increase the proportion of the Nation's public and private schools that require daily physical education for all students
 2. Increase regularly scheduled elementary school recess in the US
 3. Increase the proportion of school districts that require or recommend elementary school recess for an appropriate period of time
 4. Increase the proportion of the Nation's public and private schools that provide access to their PA spaces and facilities for all persons outside of normal school hours
 5. Increase the number of States with licensing regulations for PA provided in child care
 6. (Developmental) Increase the proportion of employed adults who have access to and participate in employer-based exercise facilities and exercise programs
 7. (Developmental) Increase legislative policies for the built environment that enhance access to and availability of PA opportunities

www.healthypeople.gov

Recommended Community Strategies and Measurements to Prevent Obesity (CDC) – Physical Activity

- Strategies to Encourage Physical Activity or Limit Sedentary Activity Among Children and Youth
- Strategies to Create Safe Communities That Support Physical Activity
- Strategy to Encourage Communities to Organize for Change

Each category has specific strategies and suggested measurements



CURRENT METHODS AND GAPS

Methods

- Survey
- Existing data with Geographic Information Systems (GIS)
- Audit/observational tools
- Purposes:
 - Assess availability, accessibility, quality and use of settings for physical activity
 - Plan and evaluate interventions
 - Inform advocacy and policy-making efforts

Survey - Neighborhood

- Assess perceived access and barriers
 - Actual environment
 - There are sidewalk on most of the streets in my neighborhood. Would you say that you... (strongly disagree to strongly agree)
 - Perceptions of quality, safety, etc (opinions)
 - Overall, how would you rate your neighborhood as a place to walk? Would you say... (very pleasant to not at all pleasant)
- Administered by mail or telephone
- Used mostly for research
- Recent review included 19 existing surveys, ranging from 7 to 68 items (Brownson et al. *AJPM* 2009)

Survey - Neighborhood

Two survey instruments designed for surveillance

- Environmental Supports for Physical Activity
 - SIP 4-99 Research Group (2002, October). Environmental Supports for Physical Activity Questionnaire. Prevention Research Center, Norman J. Arnold School of Public Health, University of South Carolina
 - Short (5 items) and long (11 items) BRFSS modules
 - Some states have implemented in BRFSS but have used different sets of items in different years
- Physical Activity Neighborhood Environment Scale (PANES)
 - Sallis et al. *J Physical Activity Health* 2010;7:533-540
 - Core (7 items), recommended (4 items), and optional (6 items) sets of items
 - Implemented in US and internationally in research studies
 - Recommended for surveillance

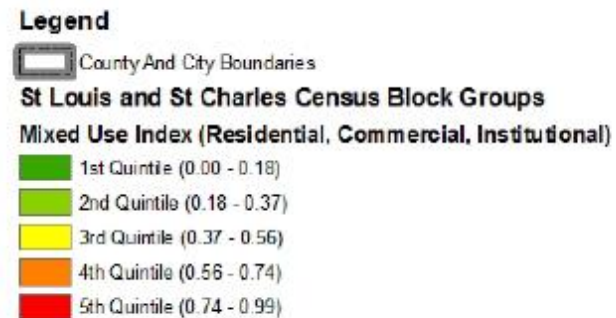
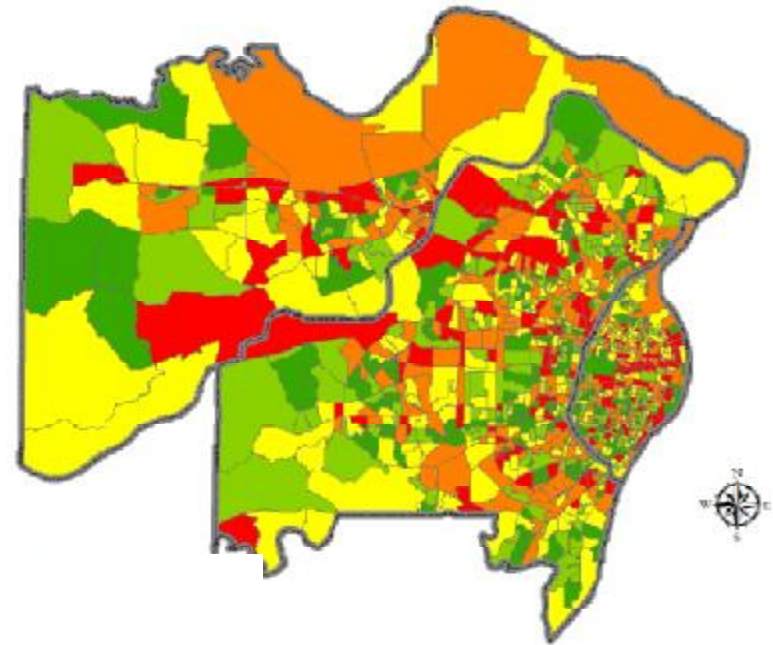
Survey - Neighborhood

- Agreement between perceived and objective measures tends to be low (kappa range, ~0-0.4)
 - Perceptions indirectly linked to objective characteristics
 - Different definitions of neighborhood / community
 - Measurement error
- Surveys provide information on prevalence of population with activity-friendly and unfriendly environments (problem and trends), not information for geographic targeting.

Brownson et al. *AJPM* 2009

GIS-based Data

- Measures of the built environment derived primarily from existing data sources that have some spatial reference
- Only feasible way to generate objective measures for large areas



Map by Larry Frank and Co. 2009

GIS-based Data

- Parks and open space
- Indoor recreation facilities
- Land use
- Streets and public transit
- Sidewalks and bike facilities
- Vegetation
- Crime
- Traffic accidents
- Neighborhood deprivation

All data are collected by the non-health sector

GIS-Based Data

Type	Source	Data Extent
Parks and open space	Park and recreation depts National/state parks	Local National/state
Indoor recreation facilities	Commercial databases (InfoUSA, Dun & Bradstreet)	National
Land use	Parcel databases	Local
Density	US Census / American Community Survey	National
Streets	Census TIGER ESRI Streetmap Transportation or planning agency	National National Local
Sidewalks & bike facilities	Transportation or planning agency	Local
Vegetation	USGS Landsat USDA National Agriculture Imagery Program	National
Crime	FBI Uniform Crime Reports (city/county) Local police departments	National Local
Traffic accidents	Motor vehicle accident reports	State or local
Neighborhood deprivation	US Census / American Community Survey Observations	National

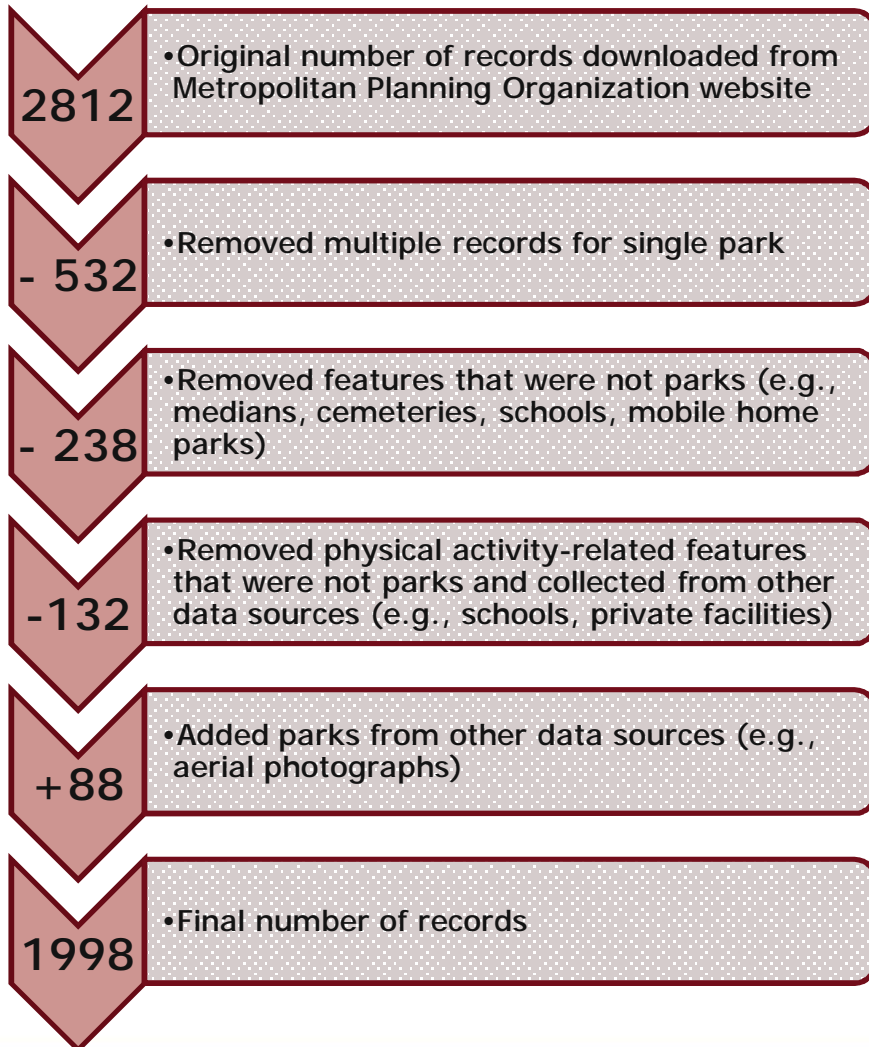
GIS-based Data

Challenges / Limitations

- Availability varies by type of data
- Availability varies by place
- Geographic scale varies
- Lack of standardization in inclusion criteria and attributes (e.g., parks, land uses)
- Lack of detail on attributes relevant for physical activity (e.g., park amenities, sidewalks, bike facilities)
- Quality and date of origin is sometimes unknown
- Can be costly

Example: Lack of standardization in defining a park

- Study using parks data in 11 counties of Dallas-Ft. Worth, TX



Hoehner & Marx, unpublished

Example: Errors in Commercial Databases

- Two U.S. studies assessing validation or concordance of commercial databases for assessing PA facilities
- Boone et al. *Annal Epi* 2008
 - 40 block groups
 - Compared commercial database and field census
 - % agreement (any type of facility) = 39% (nonurban), 46% (urban)
 - Kappa range, 0.14-0.76 for physical activity facility types
- Hoehner and Schootman *J Urban Health* 2010
 - 286 census tracts in St. Louis
 - Compared InfoUSA and Dun and Bradstreet databases
 - % agreement = 34%
 - Sensitivity of combined databases = 76%
- Exercise caution when using this data

GIS-based Area-Level Measures

Challenges / Limitations

- Lack of consensus on what measures to use
 - No gold standard
 - Measures often depend on availability and quality of spatial data
- Paucity of studies with measures of:
 - Sidewalks, crime, park qualities, vegetation
- Few studies have captured interactions between elements of the built and social environment
 - Crime, physical disorder, and park access

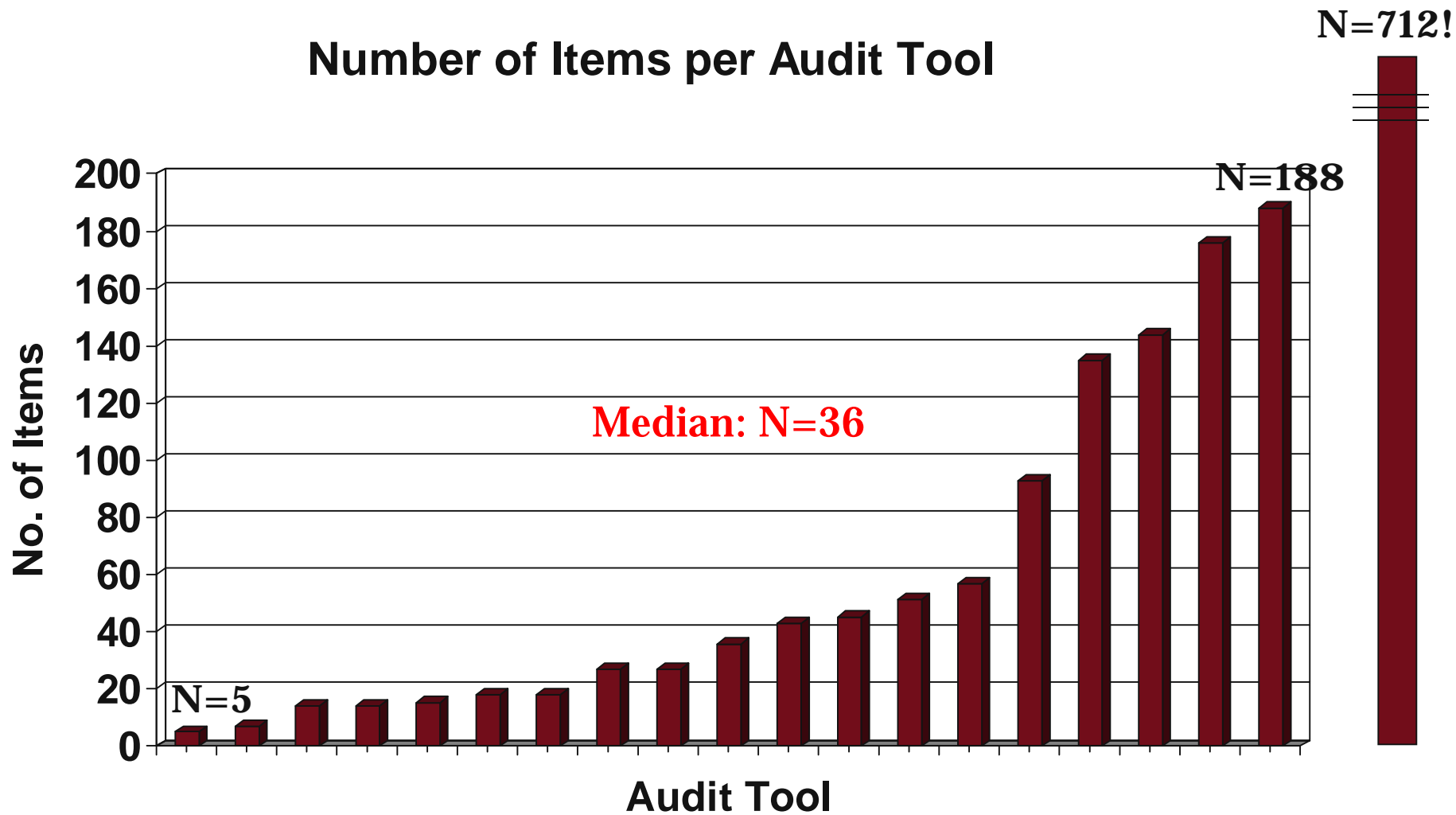


Audit/Observational Tools

- Purpose
 - Provide measures of urban design features not observable “remotely” (GIS, aerial photos) such as sidewalk quality, physical incivilities, lighting
 - More useful for local community assessment and advocacy than surveillance
- Tools
 - 20 audits tool identified in Brownson et al. *AJPM* 2009 review
 - 15 for community settings; 3 for parks/recreation facilities, 1 for trails, and 1 for workplaces



Number of Items per Audit Tool



Brownson et al. *AJPM* 2009

Audit/Observational Tools

- **Domains covered**
 - Most tools = land use, streets & traffic, sidewalks, bicycling facilities, public space/amenities, building characteristics, parking, maintenance, safety
 - Few tools = presence of dogs, noise levels, health promotion signage
- **Inter-rater reliability**
 - Often in the 0.6 – 0.8 range
 - High values for land use and transportation environments
 - Lower reliability for social and physical disorder

Brownson et al. *AJPM* 2009

Active Neighborhood Checklist

Date: _____ Segment ID: _____

Auditor ID: _____

Street Name: _____

Start Time: _____

How were the data collected?

Foot Auto, provide reason: _____

Is any building or section of the sidewalk or roadway under construction or being repaired?

Yes, specify: _____

No

A. What land uses are present?

1. Are residential and non-residential land uses present?

- All residential
 Both residential and non-residential
 All non-residential

2. What is the predominant land use?

Check one or two that apply.

- Residential buildings/yards
 Commercial, institutional, office or industrial building(s)
 School/school yards (elementary, middle, high school)
 Parking lots or garages
 Park with exercise/sport facilities or playground equipment
 Abandoned building or vacant lot
 Undeveloped land
 Designated green space (includes park with no exercise/play facilities)
 Other non-residential, specify: _____

3. What types of residential uses are present?

Select all that apply.

- None
 Abandoned homes
 Single family homes
 Multi-unit homes (2-4 units)

5. What *public* recreational facilities and equipment are present (including in the schoolyard if publicly accessible)?

Select all that apply.

- None
 Park with exercise/sport facilities or playground equipment
 Off-road walking/biking trail
 Sports/playing field
 Basketball/tennis/volleyball court
 Playground
 Outdoor pool
 Other: _____

6. (OPTIONAL) What types of non-residential uses are present?

Select all that apply.

- None
 Abandoned building or vacant lot

Specific types of destinations:

- Small grocery, convenience store (including in gas station), or pharmacy
 Supermarket
 Food establishment (restaurant, bakery, café, coffee shop, bar)
 Entertainment (e.g., movie theatre, arcade)
 Library or post office
 Bank
 Laundry/dry cleaner
 Indoor fitness facility

Educational facilities:

- School (elementary, middle, high school)
 College, technical school, or university

Large buildings housing 1+ businesses/services:

- High-rise building (>5 stories)
 Big box store (e.g., Walmart, Office Depot, Best Buy)
 Mall

B. Is public transportation available?

	No	Yes, one side	Yes, both sides
1. Any transit stop (bus, train, or other)?	go to C1		
1a. Bench or covered shelter at transit stop?			

Transit stop notes:

C. What street characteristics are visible?

	No	Yes
1. Enter posted speed limit (99 if none):		
2. Enter special speed zone (99 if none):		
3. Enter total # of lanes on street:		
4. Marked lanes?		
5. Median or pedestrian island?		
6. Turn lane?		
7. Stop sign or light for crossing this segment?		go to C8
7a. Any stoplight(s) without a walk signal?		
8. Crosswalk for crossing this segment?		
9. Traffic calming device (roundabout, speed bump, brick road, other)?		
If yes, specify type(s):		
10. Cul-de-sac (dead-end street)?	go to D1	
10a. Sidewalk cut-through in cul-de-sac?		

Street characteristic notes:

D. What is the quality of the environment?

	No	Yes
1. Any commercial buildings adjacent to the sidewalk? Enter "99" if not applicable.		
2. Any pedestrian amenities?		
2a. Bench (excluding at transit stop)?		
2b. Drinking fountain?		
2c. Pedestrian-scale lighting?		
2d. Other, Specify: _____		

E. Do you have a place to walk or bicycle?

	No	Yes, one side	Yes, both sides
SIDEWALKS			
1. Sidewalk present?	go to E10		
2. Any grassy or other buffer between curb and sidewalk <i>along most of the segment</i> ?	go to E3		

2a. Tree(s) in buffer?			
3. Sidewalk continuous within segment?			
4. Sidewalk continuous between segments at both ends?			
5. Width >3 ft for <i>most</i> of the sidewalk?			
6. Width <3 ft for <i>any part</i> of the sidewalk?			
7. Any missing curb cuts or ramps at intersections or driveways?			
8. Any major bumps, cracks, holes, or weeds in the sidewalk?			
9. Any permanent obstructions (trees, signs, tables) blocking the 3-ft walk area?			
10. If a sidewalk is not present on any part of the segment , do you have another safe place to walk, including:			
Street or shoulder (if safe)?			
Unpaved pathway?			
Other? Specify: _____			

Sidewalk notes:

SHOULDERS (OPTIONAL)

11. Designated bike route sign or marking or "Share the Road" sign?			
12. On-street, paved, and marked shoulder?	go to E16		
13. Width of marked shoulder \geq 4 ft?			
14. Shoulder continuous between			

Audit/Observational Tools - Sample Neighborhood Measures

- % of blocks with a sidewalk
- % of blocks with 0, 1, 2+ sidewalk problems
 - No buffer
 - Not continuous within the segment
 - Not continuous between segments
 - Width <3 ft for park for the sidewalks
 - Major bump, crack, holes, or weeds
 - Permanent obstruction
 - Missing curb cut
- Lack of pedestrian signals or crosswalk at a stop light
- % of blocks with 1+ signs of physical disorder (graffiti, broken/boarded window, abandoned building)

Audit/Observational Tools

- Many tools posted on the Active Living Research Website (Robert Wood Johnson Foundation)

www.activelivingresearch.org

- Challenges
 - Choosing a tool
 - Sampling segments within a study area
 - Analyzing detailed and complex data
 - Lack of scoring protocols
 - Subjective vs. objective assessments
 - Costs
 - Unknown whether audit data are sensitive in detecting change

ANALYZING, INTERPRETING, AND DISSEMINATING DATA

Analyzing, interpreting, and disseminating information?

- Who would be responsible?
 - CDC?
 - State/local health departments?
 - Non-sector?
 - Universities?
- Which geographic areas would be included?
- What resources would be required?
- What measures would be reported?
- How would the information be accessible and useful to advocacy groups and decision-makers?

OPPORTUNITIES TO LEARN FROM CURRENT INITIATIVES

Examples of Current Initiatives / Projects

- Communities Putting Prevention to Work (US HHS)
 - Use of CHANGE tool
- Bridging the Gap (RWJF)
- Healthy Kids, Healthy Communities (RWJF)
- Childhood Obesity GIS Database (RWJF)
- Registry of measures (NCCOR)

Snapshot of *CHANGE* Sector Excel File

5 Sectors Assessed

- Community-at-Large
- Community Institution/ Organization
- Health Care
- School
- Work Site

Community-At-Large: Physical Activity

Based on your team's knowledge or observations of the community, use the following Policy and Environment scales to indicate the most appropriate responses for each statement. Position the cursor over each rating option to see further explanation and an example (examples provided are for item #1).

In the two response columns, please indicate the appropriate number (#) from the scales below that best represents your answers for each item. Provide both a Policy Response # and Environment Response # for each statement in the appropriate column, with supporting documentation in the corresponding comment boxes. Response # 99 should be used only when the strategy is not applicable at the site (e.g., stair promotion not suitable in one-story building).

Response #	Policy	Environment
1	Not identified as problem	Elements not in place
2	Problem identification/gaining agenda status	Few elements in place
3	Policy formulation and adoption	Some elements are in place
4	Policy implementation	Most elements are in place
5	Policy evaluation and enforcement	All elements in place
99	Not applicable	Not applicable

8. Provide access to parks, <u>shared-use paths and trails</u> , or open spaces within <u>reasonable walking distance</u> of most homes?			
9. Institute <u>mixed land use</u> ?			
10. Require sidewalks to comply with the <u>Americans with Disabilities Act (ADA)</u> (i.e., all routes accessible for people with disabilities)?			
11. Provide access to <u>public recreation facilities</u> (e.g., parks, play areas, community and wellness centers) for people of all abilities?			
12. Enhance access to public transportation (e.g., bus stops, light rail stops, van pool services, subway stations) within <u>reasonable walking distance</u> ?			
13. Provide street <u>traffic calming measures</u> (e.g., road narrowing, central islands, roundabouts, speed bumps) to make areas (e.g., neighborhoods, major intersections) where people are or could be physically active (e.g., walk, bike) safer?			
14. Adopt <u>strategies</u> (e.g., neighborhood crime watch, lights) to enhance personal safety in areas (e.g., playgrounds, parks, <u>bike lanes</u> , walking paths, neighborhoods) where people are or could be physically active (e.g., walk, bike)?			
COLUMN TOTAL:	0	0	Please remember to answer every item. Do not leave any item blank.
PHYSICAL ACTIVITY SCORE:	0.00%	0.00%	

Demographic Information |
 Physical Activity |
 Nutrition |
 Tobacco |
 Chronic Disease Management |
 Leadership



Childhood Obesity GIS

The screenshot shows the Childhood Obesity GIS web application interface. At the top, there is a navigation bar with a globe icon, the title "Childhood Obesity GIS", and user information for "Christine Hoehner" with a "Logout" link. Below the navigation bar are links for "Home", "GIS Tools", "Library", and "Help".

The main content area is divided into several sections:

- Maps:** A section with a "1" icon, containing a navigation menu with "State", "County", "City", "Address Search", and "Grantee Area". Below this is a dropdown menu labeled "Select a State".
- Selected Data:** A section with a "2" icon, containing a list of data categories: Administrative Boundaries, Behavioral, Built Environment (selected), Health Genetics, Health Programs, Policies/Regulations, Socio-Economic Environment, and All Data.
- Built Environment:** A section with a "2" icon, containing a list of national data items with checkboxes and information icons:
 - Top 50 Bicycle Friendly Cities (2010,BM)
 - Subsidized Housing (2008,HUD)
 - Top 40 Most Walkable Cities (2008,Walkscore)
 - Most Walkable Neighborhoods (2010,Walkscore)
 - Percent of Children in Neighborhoods with Amenities (2007,NSCH)
 - Percent of Children in Safe Neighborhoods (2007,NSCH)
 - Percent of Children in Supportive Neighborhoods (2007,NSCH)
 - National Parks (2005,NTAD)
 - Major Roads, By Type (2008,NTAD)
 - Built Environment County Rankings-By State (2010,CHR)
 - Physical Environment County Rankings-By State (2010,CHR)
- Search Data:** A section with a "3" icon, containing a search input field and a magnifying glass icon.
- Your Map Area:** A section with a "3" icon, containing a text input field with the value "none".
- Your Map Data:** A section with a "3" icon, containing a text input field with the value "none".
- Buttons:** A section containing four buttons: "Make Map", "Add to Portfolio", "Reset", and "Help".

Developed by Center for Applied Research and Environmental Systems (CARES) at the University of Missouri with funding from RWJF

Will be publicized in Spring 2011

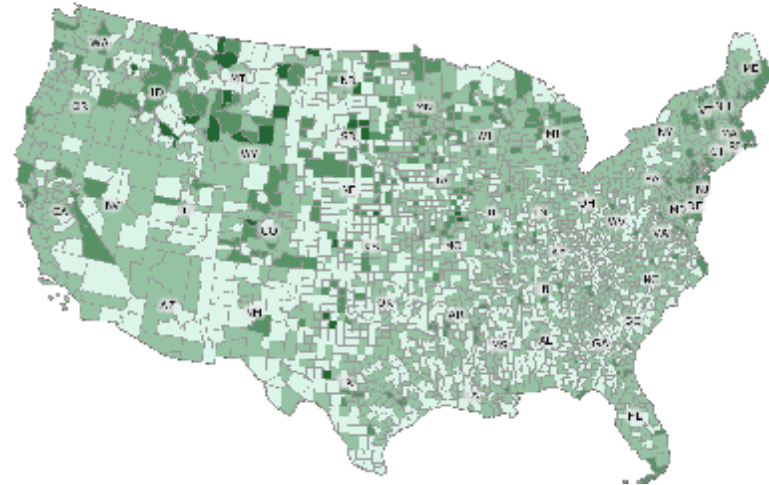
www.childhoodobesitygis.org

Childhood Obesity GIS – Sample Maps

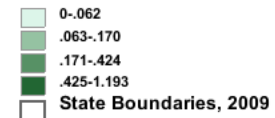
States with Complete Streets Laws



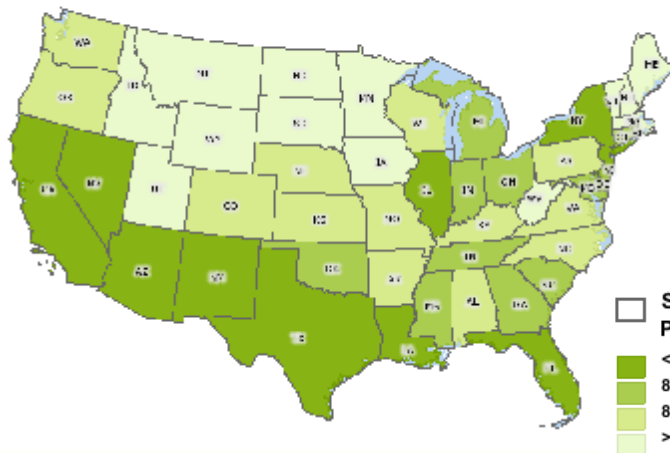
Recreation and Fitness Facilities per 1000 People



Recreation and Fitness Facilities per 1000 people



Percent of Children in Safe Neighborhoods



SUMMARY OF RECOMMENDATIONS

Summary of Recommendations

1. Prioritize national objectives and strategies
2. Identify and collect priority survey measures in BRFSS or other existing surveillance systems
3. Work with non-health sectors to collect and share relevant data in a standardized way in select areas (e.g., data available, high-risk) on routine basis
4. Simplify content and analysis of audit tools
5. Improve and collect measures on school environments, worksite environments/policies, and park quality and use
6. Use methods/measures that can be prepared quickly to inform policy development and to evaluate environmental/policy changes
7. Assess feasibility, capacity and needs of health departments or other sectors to collect, analyze, interpret, and disseminate information
8. Learn from challenges and successes of current initiatives

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