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.”

Are current measures accurate, reliable, feasible to collect, sensitive to change, associated with physical activity and *useful*?
Public Health Surveillance Loop

Data Interpretation → Program Planning
Data Collection → Information Dissemination
Data Analysis → Program Implementation

Source: Remington and Goodman; *Chronic Disease Surveillance*, 1999
Physical Activity Policy Framework

Policy

- Outcomes of Policy
- Develop and Implement Policy
- Determinants of Policy
- Identify Policies

Sector

- Health
- Transportation
- Parks/Public Spaces
- Worksite
- School

Scale

- Local
- Regional
- State
- National

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

Kettel Khan MMWR 2009
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
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

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

<table>
<thead>
<tr>
<th>Original number of records downloaded from Metropolitan Planning Organization website</th>
<th>2812</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removed multiple records for single park</td>
<td>- 532</td>
</tr>
<tr>
<td>Removed features that were not parks (e.g., medians, cemeteries, schools, mobile home parks)</td>
<td>- 238</td>
</tr>
<tr>
<td>Removed physical activity-related features that were not parks and collected from other data sources (e.g., schools, private facilities)</td>
<td>- 132</td>
</tr>
<tr>
<td>Added parks from other data sources (e.g., aerial photographs)</td>
<td>+ 88</td>
</tr>
<tr>
<td>Final number of records</td>
<td>1998</td>
</tr>
</tbody>
</table>

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. *Annals of Epidemiology* 2008
  - 40 block groups
  - Compared commercial database and field census
  - Percentage 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
  - Percentage 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

- N=5
- N=36
- N=188
- N=712!

Median: N=36

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?
   - [ ] 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?
   - [ ] 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)?
   - [ ] 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?
   - [ ] 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?

1. Any transit stop (bus, train, or other)?
   - No
   - Yes, one side
   - Yes, both sides

   1a. Bench or covered shelter at transit stop?

   1c. Transit stop notes:

C. What street characteristics are visible?

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?
   - 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)?
10a. Sidewalk cut-through in cul-de-sac?

   Street characteristic notes:

D. What is the quality of the environment?

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?

SIDEWALKS
1. Sidewalk present?
2. Any grassy or other buffer between curb and sidewalk along most of the segment?
   - 2a. Trees in buffer?
3. Sidewalk continuous within segment?
4. Sidewalk continuous between segments at both ends?
5. Width >3 ft for most of the sidewalk?
6. Width <3 ft for any part 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?
13. Width of marked shoulder ≥ 4 ft?
14. Shoulders 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 (1-10) 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).

<table>
<thead>
<tr>
<th>Response</th>
<th>Policy</th>
<th>Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Not identified as problem</td>
<td>Elements not in place</td>
</tr>
<tr>
<td>2</td>
<td>Problem identification/gaining agenda status</td>
<td>Few elements in place</td>
</tr>
<tr>
<td>3</td>
<td>Policy formulation and adoption</td>
<td>Some elements in place</td>
</tr>
<tr>
<td>4</td>
<td>Policy implementation</td>
<td>Most elements in place</td>
</tr>
<tr>
<td>5</td>
<td>Policy evaluation and enforcement</td>
<td>All elements in place</td>
</tr>
<tr>
<td>99</td>
<td>Not applicable</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

8. Provide access to parks, shared-use paths and trails, or open spaces within reasonable walking distance of most homes?

9. Institute mixed land use?

10. Require sidewalks to comply with the Americans with Disabilities Act (ADA) (i.e., all routes accessible for people with disabilities)?

11. Provide access to public recreation facilities (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 reasonable walking distance?

13. Provide street traffic calming measures (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 strategies (e.g., neighborhood crime watch, lights) to enhance personal safety in areas (e.g., playgrounds, parks, bike lanes, walking paths, neighborhoods) where people are or could be physically active (e.g., walk, bike)?

**COLUMN TOTAL:** 0 0

**PHYSICAL ACTIVITY SCORE:** 0.00% 0.00%

*Please remember to answer every item. Do not leave any item blank.*
Childhood Obesity GIS

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

Percent of Children in Safe Neighborhoods

State Boundaries, 2009
Percent of Children in Safe Neighborhoods
- <35% Children in Safe Neighborhoods
- 35-85% Children in Safe Neighborhoods
- 85-95% Children in Safe Neighborhoods
- >95% Children in Safe Neighborhoods

Recreation and Fitness Facilities per 1000 people
- 0-0.62
- 0.63-1.70
- 1.71-4.24
- 4.25-1.193
- State Boundaries, 2009
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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