Engaged systems thinking for public health and the built environment

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Community-Based Participatory Research (CBPR)

CBPR is a collaborative approach to research that equitably involves, community members, organizational representatives, and researchers in all aspects of the research process.

*Israel, et al, 1998*
“Systems thinking is a framework for seeing interrelationships rather than things, for seeing patterns rather than static snapshots. It is a set of general principles spanning fields as diverse as physical and social sciences, engineering and management.”

*Peter Senge*
Nash & Edgecombe County

- The CVD mortality rates for Edgecombe and Nash counties are 1.23 and 1.13 times the overall rate of North Carolina.

- In community health assessments conducted in the last three years, CVD risk factors, such as obesity and hypertension, were among the top 10 health priorities in both counties.

Sources: Nash County Department of Health and Human Services. 2012-2016 NC Resident Race/Ethnicity and Sex-Specific Age-Adjusted Death Rates. & Nash County 2016 Community Health Assessment.
Meaningful
Active
Productive
Science in service to communities

MAPSCorps slides credit:
Nicole Robinson-Ezekwe, MA, MPH; UNC Center for Health Equity Research
**Origins:** The University Chicago, 2009

**Mission:** To train youth to produce high quality data about community assets that everyone can use to improve the human condition.¹

**Locations:** Chicago, New York City (Harlem and The Bronx), Niagara Falls and *Rocky Mount, NC*
Process

MAPSCorps Nash & Edgecombe partners with local community organizations in order to recruit high school students.
Process

MAPSCorps collects data using the MAPSCorps webpage on mobile phones.

Mappers physically walk to each address they’re assigned in order to classify them.
Process

At the end of the program, mappers use the data they collected to create and present community-based research projects at the Scientific Symposium.
Process

After data is cleaned, the data is uploaded and made accessible on mapscorps.org
Project #2: Awesome catchy program name
Training youth in systems thinking

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Training youth in systems thinking

Design the structure of a simulation model (4 sessions)

Design a study using a mobile app to gather data for the model (2 sessions)

Conduct the study & gather data

Use your simulation model to determine the most effective physical activity interventions

Advocate for interventions

Now through end of school year

Beginning of Fall Semester

Through end of next school year
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Schematic of empirical data collection for use in agent based simulation models

$t_1$ (week 1)

$t_2$ (week 2)

$t_{10}$ (week 10)

Smartphone tri-axial accelerometer data every 2 minutes for physical activity data

Bluetooth media access control identifiers of other participant smartphones for social interaction and network data

Short-message surveys (triggered when Bluetooth detected other participant smartphones) on social relationship and information on the context of interaction (same room, talking, touching, etc.)

Unique identifiers and signal strength of wireless internet routers for environmental exposure data

Data collected continuously from logs of sensor data using the iEthica smartphone app
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The types of questions we can ask:

- Who is optimal to target in social networks to effectively diffuse positive behavior change?
- What types of multi-level interventions most cost-effectively improve physical activity?

Simulation Modeling
Estimating policy, intervention impacts over time

Engaged Research
Policy, intervention planning

Implement and Evaluate
Empirical, quantitative effects