

# A Community-Based GIS Approach for Promoting Physical Activity: Case Study in Hamtramck, Michigan

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## Abstract

Regular physical activities including walking are important and excellent to overall health. Adults who are regularly physically active will have lower risk of several diseases and it will also help maintaining or losing weight, improving sleep. Reports from recent research in health geography noted the significant association between neighborhood and community built environment, levels of physical activities, and body weight in study population.

Sponsored by CDC-REACH project, a community-based participatory GIS program has been established for promoting physical activity in a school district in southeast Michigan. A framework of the program will be elaborated and partners that are involved in the coalition have been identified.

A pilot study designed for year one Safe Route to School (SRTS) project will also be introduced. GIS has been applied as a platform to manage and organize multiple baseline data and provide an estimate for the built environment measure. Spatial analysis of the neighborhood walkability and accessibility will also be conducted to provide geographical insight for pilot SRTS site selection and identify the potential routes that have the greatest coverage of students. A variety of volunteered geographic information (VGI) will be collected from local residents to provide contextual information to the built environment, which will provide helpful input to the transportation and land use planning stakeholder.

## Background

**Physical Activity** is one of the best things people can do to improve their health. It is vital for healthy aging and can reduce the burden of chronic diseases and prevent early death.



## CDC REACH Program

Leading by PI Dr. Tsu-Yin Wu, "Evidence-Based Strategies to Empower Asian Americans in Reducing Health Disparities" is a five-year project (2018-2023) as an effort to improve health of all Americans through its Racial and Ethnic Approaches to Community Health (REACH) program funded by Centers for Disease Control and Prevention (CDC). Dr. Xining Yang takes the lead role in physical activity domain using geospatial technology and citizen science approach to promote active living community in Michigan, U.S.

## Safe Route to School Program

- Motivation:** Biking or walking to school is an easy way for children to incorporate physical activity into their day. But the number of kids walking or biking to school has dropped dramatically over the last four decades. SRTS programs and smart school siting can make neighborhoods better places for physical activity while encouraging kids to walk to school safely.
- The win-win Solution**
- For Parents & Community**
    - ✓ Less Traffic
    - ✓ Cost Savings
    - ✓ Reduced Pollution
    - ✓ Reduced gas consumption
    - ✓ More Pedestrians and Cyclists
  - For Students**
    - ✓ Lifelong habits
    - ✓ Healthier kids & adults
    - ✓ Increased physical activity
    - ✓ Improved academic achievement
    - ✓ Increased focus and concentration

## Method

### Community based research

- A joint effort that involves public health and community representatives in all phases of the program delivery process (i.e., planning, implementation, and evaluation).
- The joint effort engages community members, employs local knowledge in the understanding of health problems and the design of strategies, and invests community members in the processes and products of research.
- In addition, the collaborative is invested in the dissemination and use of research findings to improve community health and reduce health disparities.

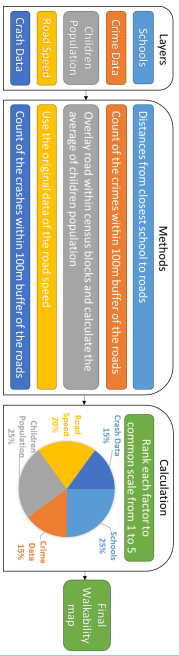
### Framework for GIS and Safe Routes to School

- Geographic information system (GIS) can be used by community and safe route to school programs in assessing the built environment, understanding the priority, therefore informing the action plans.
- In this initial phase, data on school locations, roads and bike lanes, children population, traffic crashes, and crime events data were collected. Spatial analysis was applied on the datasets to assess the walkability level for each street in city of Hamtramck.

### Forming a Multi-sector Team of SRTS using Community Based Approach



### Walkability assessment flow chart. The variables were synthesized in GIS to generate a final walkability map



## Results

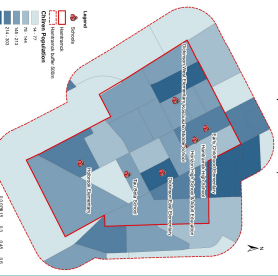
Map1: Hamtramck, Crash Density and Road Speed Limit



### Final Map: Hamtramck Walkability



Map3: Children Population



Map4: Hamtramck Crime Density



## Geographic Region

Hamtramck is a city in Wayne County in the U.S. state of Michigan. The population is 22,423 as of 2010 census. Hamtramck is known as an immigrant city and its city council became the first majority Muslim city council in the U.S. in 2015. As the most diverse city in the State of Michigan, Hamtramck has reason to not only celebrate, but promote diversity. The government of the city have adopted the saying, "The world in two square miles – and it truly is."

In 2011, Hamtramck is voted the "Most Walkable City" in Michigan. In Hamtramck, the residents, old and young alike, walk throughout the City daily and walking safely to and from school is a priority. The City is focused on making that walk safer and a little more pleasant by improving pedestrian travel.



## Findings and Future Directions

### Results

- The final map represents which areas are safe for children to use when going and from school, as well as to recreation sites. 41.1% of Hamtramck roads has fairly good walking environment. The map also gives insight as to which areas should be improved on.
- The low walkability can be associated with the multiple variables. For example, the street adjacent to Hamtramck High School and Horizon High School has low walkability due to the proximity to a cluster of crime events and crashes. Observation shows this location is next to two schools, however the importance associated with the safety variables outweighs that given to school location.

### Recommendations for future directions

- Almost 1/3<sup>rd</sup> of the total roads is considered as having a low walkability rating taking into consideration the multiple variables. These locations can be used to focus efforts for improvement in the infrastructure planning process.
- One potential use of the map could be targeted towards schools. The school can place a crossing guard in the low walkability areas to ensure that the kids have some supervision. In addition, the creation of walking school bus groups would ensure that children are safe while getting the physical activity needed.
- Street walking audits will be conducted by volunteers and VGI data will be collected to assess the condition, swale, width of sidewalk in year 2 of the project period, which will provide additional understanding of walkability and identify a safe route for children in Hamtramck.

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