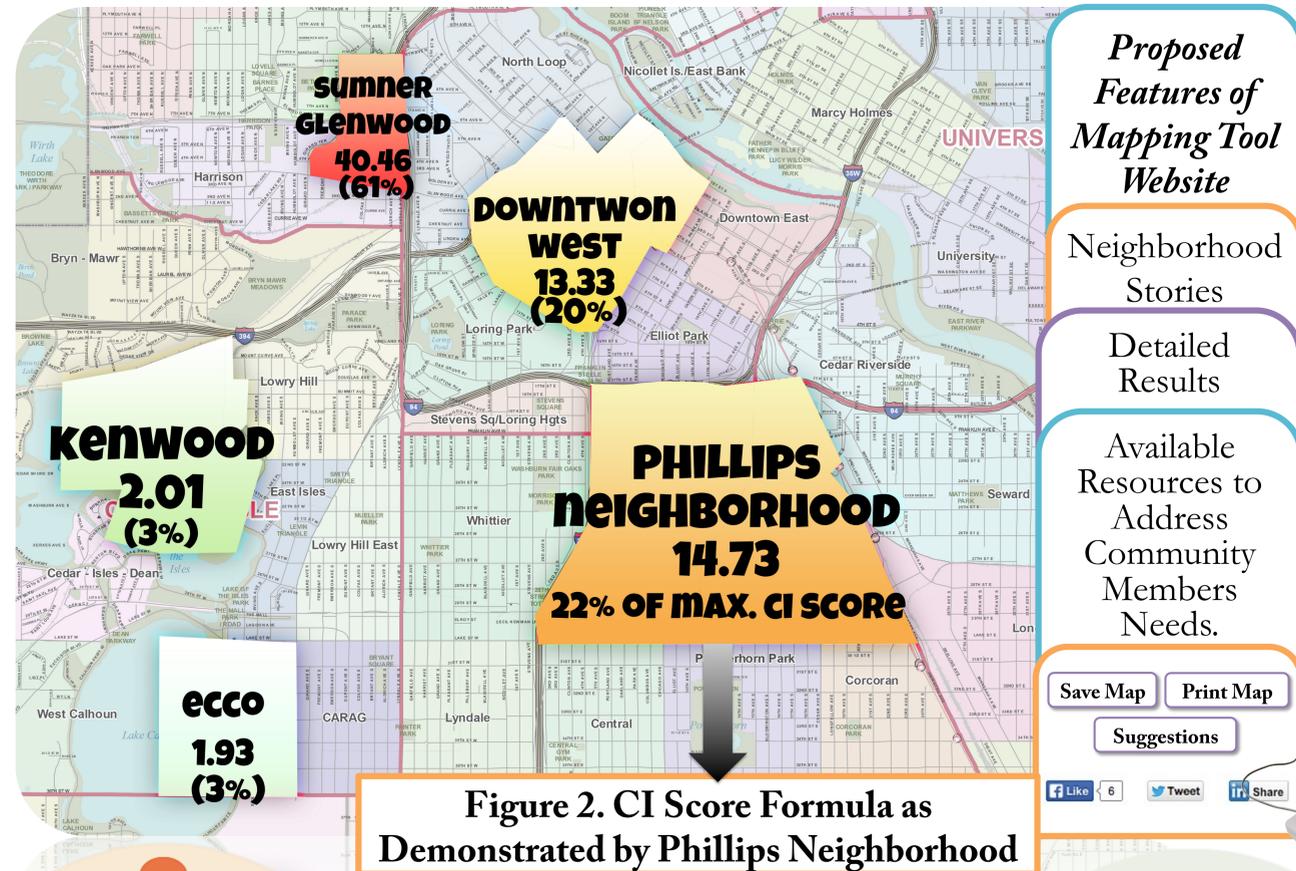


Identifying Environmentally Overburdened Neighborhoods in Minneapolis Through A Cumulative Impact Approach

Chendan Yan, CSBSJU Environmental Studies Department
Faculty Advisors: Dr. Troy Knight and Dr. Jean Lavigne

INTRODUCTION

Environmental hazards and pollutants are distributed unevenly across space. In urban areas, such as Minneapolis, historical patterns of settlement and development tend to concentrate at risk populations near pollution sources. However, these populations with low socioeconomic status have limited capacity to mitigate the burden of negative environmental and health impacts, one example being air toxics from highways increasing respiratory risks. Existing mapping tools provide information on pollution and population characteristics separately, but none of them adapt a cumulative approach realistically presenting a neighborhood's burden. **This paper develops a cumulative mapping tool to calculate a neighborhood's Cumulative Impact (CI) score.** Five neighborhoods are selected for comparison. This tool will allow policy makers to identify and allocate resources to the most burdened neighborhoods and help them combat negative environmental impacts. It will also inform and empower community members to advocate for change.



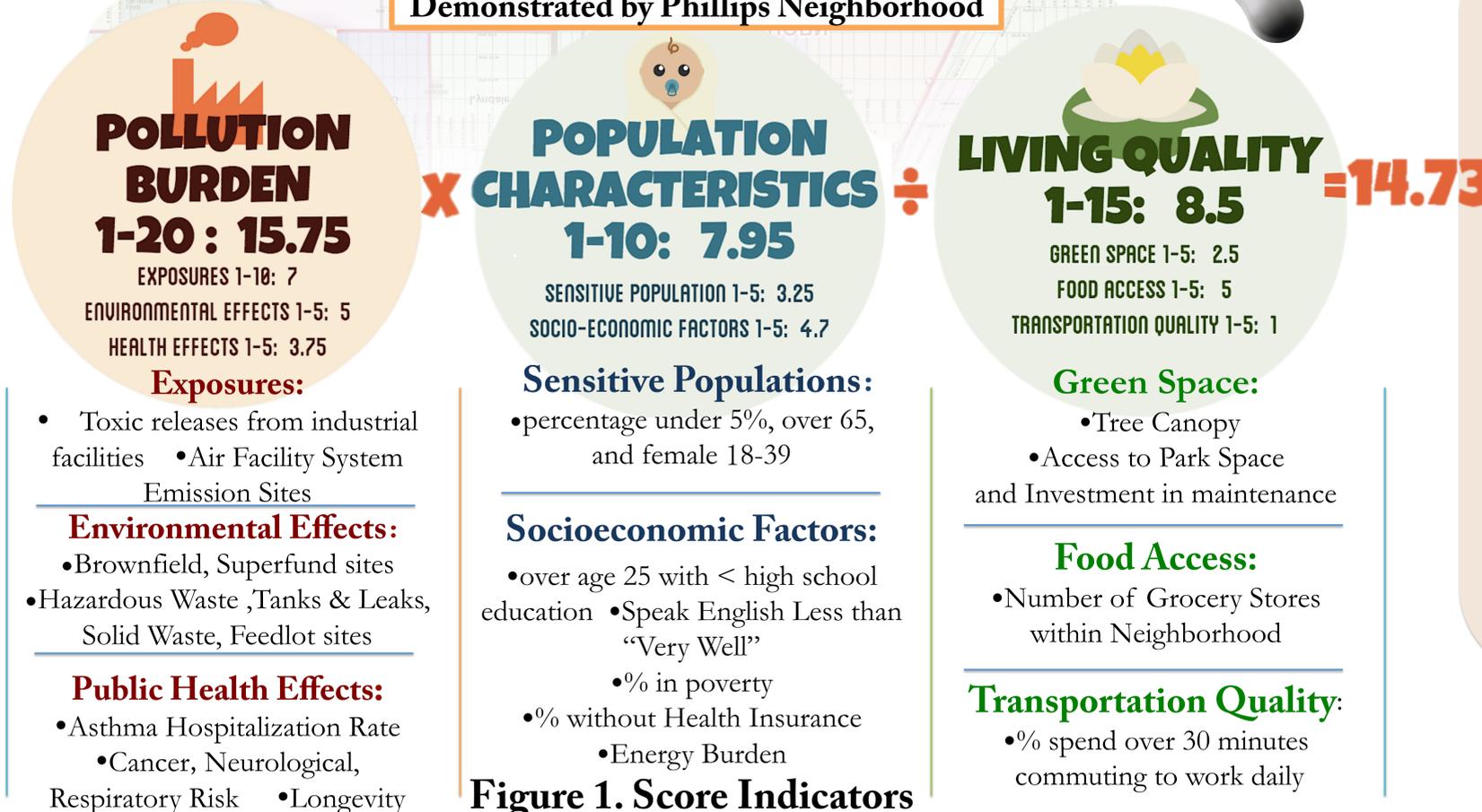
NEIGHBORHOOD SUBCATEGORY SCORE

Name	Pollution Burden	Population Characteristics	Living Quality	CI Score (% Max Score)
Low Income				
Sumner-Glenwood	9.75	8.3	2	40.46 (61%)
Phillips	15.75	7.95	8.5	14.73 (22%)
Downtown West	13.25	4.025	4	13.33 (20%)
Ecco	4.8	3.65	8.5	1.93 (3%)
Kenwood	4.25	3.8	8	2.01 (3%)
High Income				

METHODS

This mapping tool is based on the relative ranking method from the study *Cumulative Impacts: Building a Scientific Foundation*. It calculates CI scores of five neighborhoods selected along a gradient of median household income, Sumner-Glenwood, Phillips Neighborhood, Downtown West, Ecco, and Kenwood (from the lowest to the highest).

- The tool takes account of **three main components** with **eight subcategories**.
- Each subcategory is assigned a score scale based on its importance in determining the impact of hazards and pollutants.
- Several indicators are chosen under each subcategory. Available databases are used to determine the score for each indicator (figure 1).
- A score is assigned to the indicator based on the subcategory's scale and standard deviation of the same indicator scores of all five neighborhoods.
- The indicator scores under the same subcategory are averaged for the score of the subcategory, which are then added together for the composite score of the main component.
- To calculate the CI score, the product of composite scores for Pollution Burden and Population Characteristic is divided by Living Quality (figure 2), considered as external factors that can mitigate the cumulative impact of pollution burden and vulnerable population characteristics.



CONCLUSION

The stark contrast between the CI scores of five neighborhoods demonstrates the presence of environmental injustice in Minneapolis. Neighborhoods with higher CI scores not only have more exposure to environmental and health hazards but also have limited capacity to cope with these negative impacts. The Green Zone Initiative is a great start for greening the most burdened areas by steering resources to those most in need. This mapping tool is a simple guide to understanding neighborhood burdens through a cumulative approach. It is the hope of community members and environmental justice organizations that Minnesota Pollution Control Agency will take the lead and develop a comprehensive scientific mapping tool for Minnesota. Such a tool will not only help policy makers attend to the needs of the most impacted but also inform, educate, and empower community members to better their living environments, eventually fostering civic engagement, democracy and justice.

REFERENCES

- Adams, Linda S., and Joan E. Denton. "Cumulative Impacts: Building a Scientific Foundation." Sacramento, CA, USA: Office of Environmental Health Hazard Assessment, California Environmental Protection Agency, 2010.
- Morello-Frosch, Rachel, Miriam Zuk, Michael Jerrett, Bhavna Shamasunder, and Amy D Kyle. "Understanding the Cumulative Impacts of Inequalities in Environmental Health: Implications for Policy." *Health affairs* 30, no. 5 (2011): 879-87.