Minnesota Community Schoolyards Prioritization Methods

Methods

All schools in Minnesota were prioritized based on health, equity, climate, and park need. This prioritization is used to determine where community schoolyard implementation can be most beneficial for students and the surrounding neighborhood.

<u>Schools data</u>

Public, private, tribal, and charter schools were considered in the analysis. Data from the Minnesota Department of Education were cross-referenced with school point location data from Minnesota Geospatial Commons. This totals 2,641 schools and facilities.

<u>Prioritization</u>

Fifteen metrics were combined to create a robust index for the prioritization of schools across Minnesota. These data were organized into four categories – Health, Equity, Climate/Environment, and Park Need. Health and equity metrics were further split into two categories each – school level information and community level information. This breakdown is displayed in table 1.

*Table 1: Metrics used in the prioritization analysis. *student level rates of physical activity and making friendships were inverted to give higher priority to schools with lower values.*

Health		Equity		Climate/ Environment	Park Need
Student Data	Community Data	Student Data	Community data		
Physical activity*	Physical activity	Free and reduced price lunch	People of color	Average heat in service area	Number of new people served
Asthma	Mental distress	Students of color	Low income	Pollution burden	
Friendship*			Less than HS education		
Depressed			Linguistic isolation		

1. **<u>Park Need</u>** - number of people living in a 10-minute walk (half-mile) of the school that do not otherwise have access to a park within a 10-minute walk of their home.

To calculate this metric, we compiled a complete parks dataset for the whole state. Within most cities and towns, parks and their 10-minute walk service areas came from ParkServe. Outside of cities and towns with ParkServe data, we used PADUS 2.1 protected lands that are publicly accessible and generated their 10-minute walk service areas. This walk service analysis identifies road networks and physical barriers such as highways, train tracks, and rivers without bridges and chooses routes without barriers. We also generated 10-minute walk service areas for all schools. The portion of the school service area that does not overlap with existing parks' service areas was intersected with Esri 2020 demographic forecast block groups to estimate population.

2. **Climate/environment** – average land surface temperature in a 10-minute walk of the school
    a. Heat: The Trust for Public Land developed a heat island raster surface for 14,000 cities and towns across the US (the extent of ParkServe). A version of this heat island dataset shows land surface temperatures for each 30x30 meter pixel as degrees above or below the city average. The average value was calculated for the 10-minute walk service area of each school (Figure 1). Some schools do not fall in ParkServe cities and towns, and therefore do not have land surface temperature data available (631 schools).
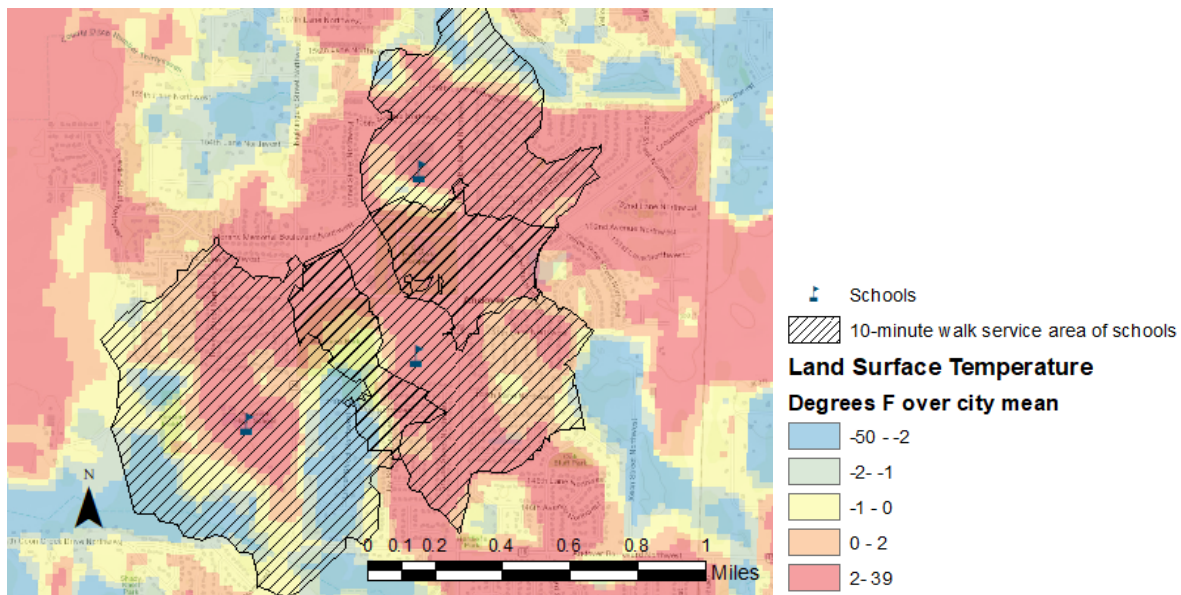
    b. Pollution burden: Each school was given the EPA National Scale Air Toxics Assessment Respiratory Hazard Index of the block group in which the school point is located.

3. **Equity** – the equity score was compiled from data on the students attending the school as well as the neighborhood in a 10-minute walk of each school. Some schools are missing student-level equity data (771 schools). These schools were only scored on their community-level equity scores.

a. Student data: a combined index of two metrics collected at the school level by [Minnesota Department of Health](#).
    i. Free and reduced price lunch
    ii. Students of color
b. Community data: a combined index of the demographics of the population living in a 10-minute walk of the school, based on EJScreen [metrics](#):
    i. People living in low income households
    ii. People of color
    iii. Adults without a high school education
    iv. People living in linguistically isolated households

4. **Health** – the health score was created based on student survey data and/or community level health outcome data. School that received fewer than 25 responses do not have enough data to be used in the analysis (657 schools do not have school-level survey data, 1,139 schools are missing the 'depressed' metric). For these schools, we used district level data where available. If no student level data were available, schools were scored only on their community level health score.
    a. Student data: Minnesota Department of Education implements a student [survey](#) every three years. We used responses to these four questions to prioritize schools:
        i. I build friendships with other people
        ii. During the last 7 days, on how many days were you physically active for a total of at least 60 minutes per day?
        iii. Over the past 2 weeks, how often have you been bothered by feeling down, depressed, or hopeless?
        iv. Has a doctor or nurse ever told you that you have asthma?
    b. Community data: a combined index of these two survey-derived metrics from the CDC PLACES [dataset](#). Schools were given the value for the census tract in which they are located.
        i. Mental health not good for >= 14 days among adults (>=18 yo)
        ii. No leisure-time physical activity among adults (>= 18 yo)

Prioritization analysis

Because each of the metrics listed above has a different range of values, we normalize the data to put everything on a 0 to 100 scale. After being normalized, the metrics were all combined hierarchically as displayed in table 1. Schools with a score closer to 100 have higher values reflecting where there is high priority to create a community schoolyard.