# Cartographic Design and Geovisualization Final Portfolio

Jada Potter

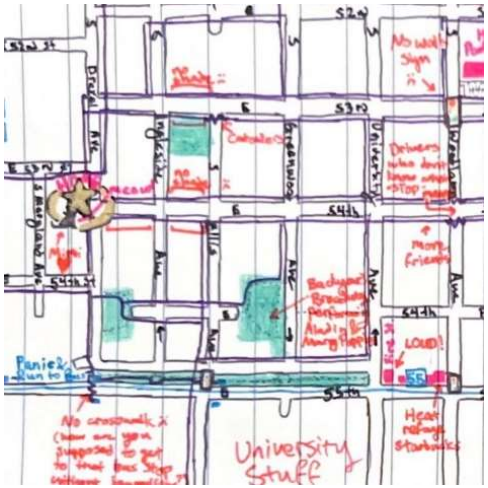
---

The maps and other media below showcase the work I have completed throughout this course, including revisions made based on peer feedback.

# Visual Table of Contents

## Static Maps

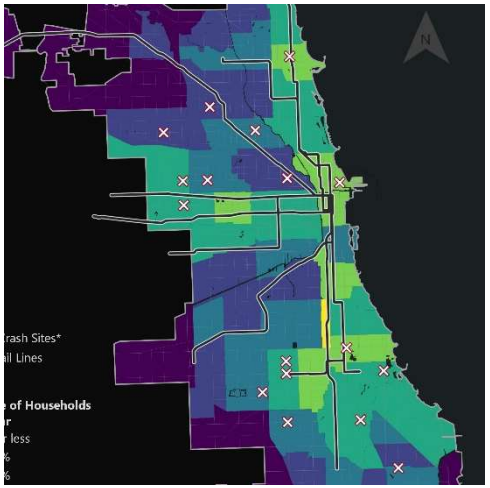
The maps below are traditional, static maps made either on paper on digitally. These maps showcase the various design principals learned throughout the course in order to describe various areas that are of great personal significance to me.




*A map of My Summer in Hyde Park*

A hand-drawn representation of my memories from a summer spent in the Hyde Park neighborhood of Chicago. This is not a literal reference map of the area, but a representation of the "image" I created of it.

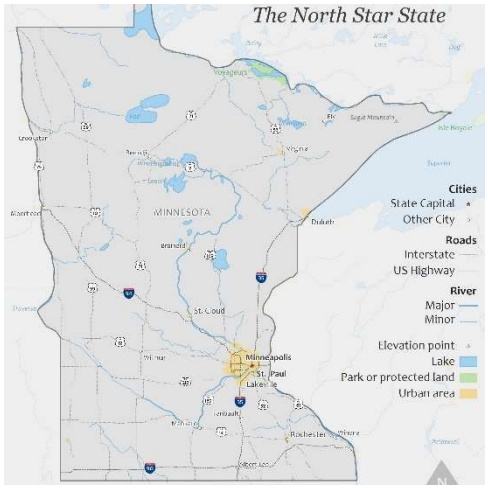
More on page 5.



*Methods of Transport and the Distribution of High Crash Sites*

A choropleth map of car ownership, with High Crash Sites, roads, and CTA rail lines layered over it. This map demonstrates the use of color and symbology to convey an important point about the social geography of a city.

More on page 6.



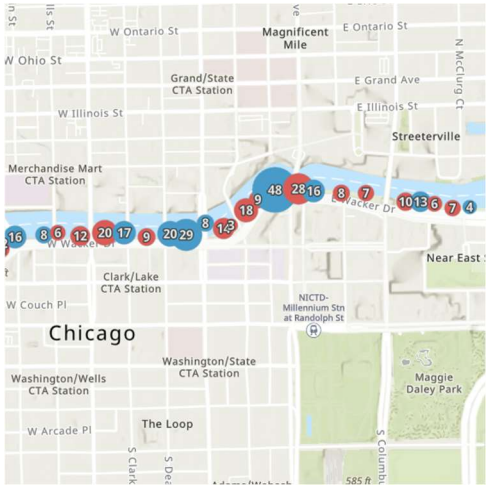

*A Reference Map of Minnesota*

A reference map of my home state, Minnesota. The design is intended to mimic the type of map one might find in a general reference atlas. This required advanced use of symbology, including importing custom images for certain symbols such as highway shields.

More on page 7.

# Interactive Visualizations

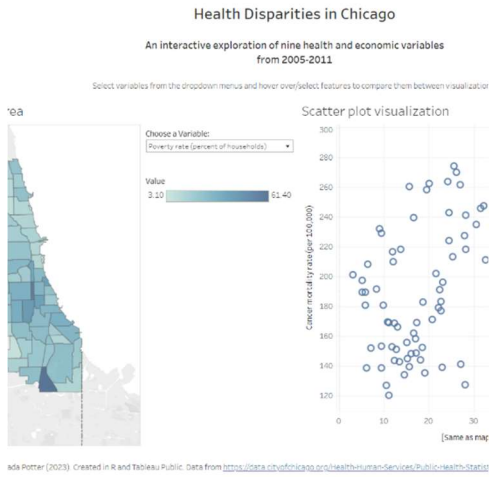
As a person greatly interested in interactivity and web design, the following visualizations are some of my favorite projects in this portfolio. They each demonstrate the use of cartographic techniques, such as dynamic clustering and adjustable variables, that would not be possible to include in a traditional static map.




*Patterns of Movement along the Chicago Riverwalk*

A map visualizing personally collected data on the locations that people were either walking or staying in place along the Chicago Riverwalk on a Sunday afternoon in November 2023. The visualization is interactive, and the size of the clusters will change as you zoom in and out, allowing for aggregation at various spatial scales.

More on page 8.




*Health Disparities in Chicago*

An interactive dashboard visualizing various measures of public health across Chicago's 77 community areas. The dashboard dynamically updates based on the variables that the user chooses to visualize, highlighting disparities between neighborhoods and how each of these variables relate to each other.

More on page 9.

# Other Analyses

These analyses are not examples of my own cartographic work but look at other maps and use cartographic principals learned in the course to assess how well they represent their respective space, either by comparison with other maps or with personally collected data.

*Neighborhood Map Comparison*

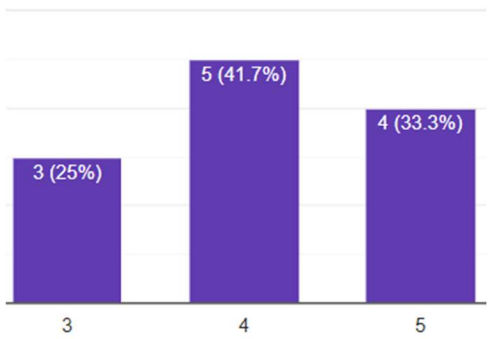
A comparison between online maps of the Hyde Park neighborhood in Chicago and my actual experience of walking through the areas of interest for the first time. This analysis utilizes photography to demonstrate the possible types of visual information that may be missing from top-down web maps.

More on page 10.


*Comparison of Trail Maps*

A comparison between two maps of the Grand Rounds trail network, a symbol of pride in my hometown, Minneapolis. This analysis highlights the differences in the ways in which symbology, scale, and other cartographic elements may be used to various ends, such as information dissemination or artistic expression.

More on page 16.

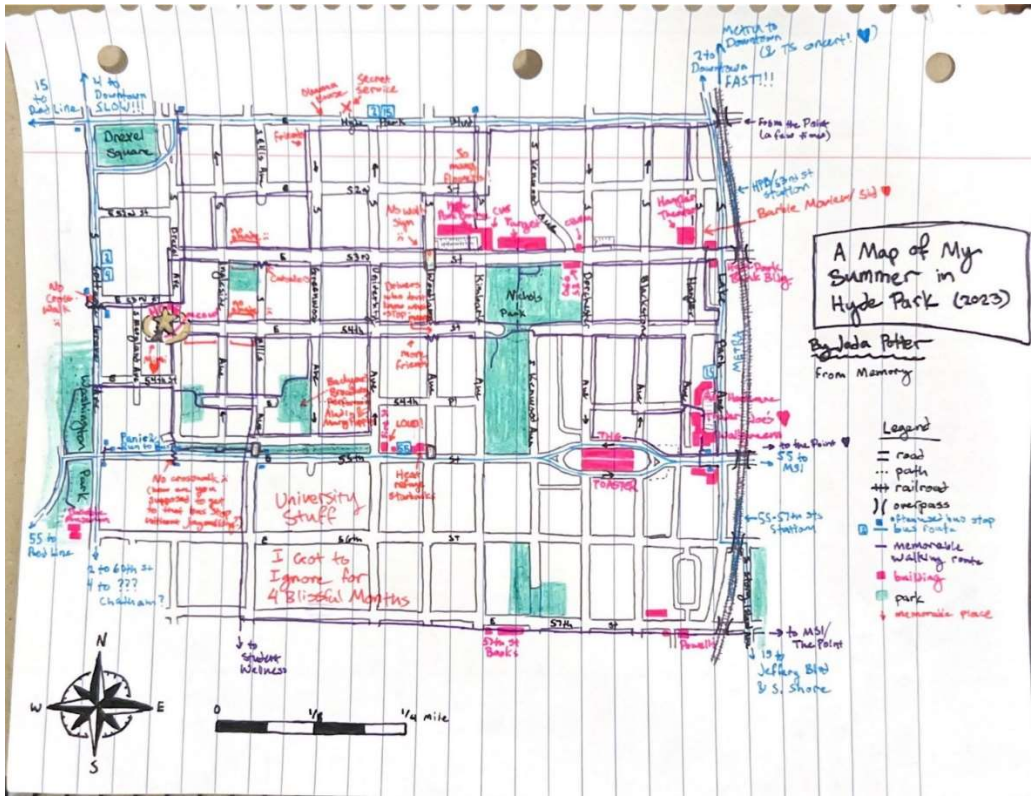



*OpenStreetMap Survey*

A survey assessing the accuracy of OpenStreetMap data based on respondents' knowledge of their neighborhoods or hometowns. As an avid user of OpenStreetMap data, I was curious about the varying levels of data quality that emerge in different areas.

More on page 18.

# Static Maps

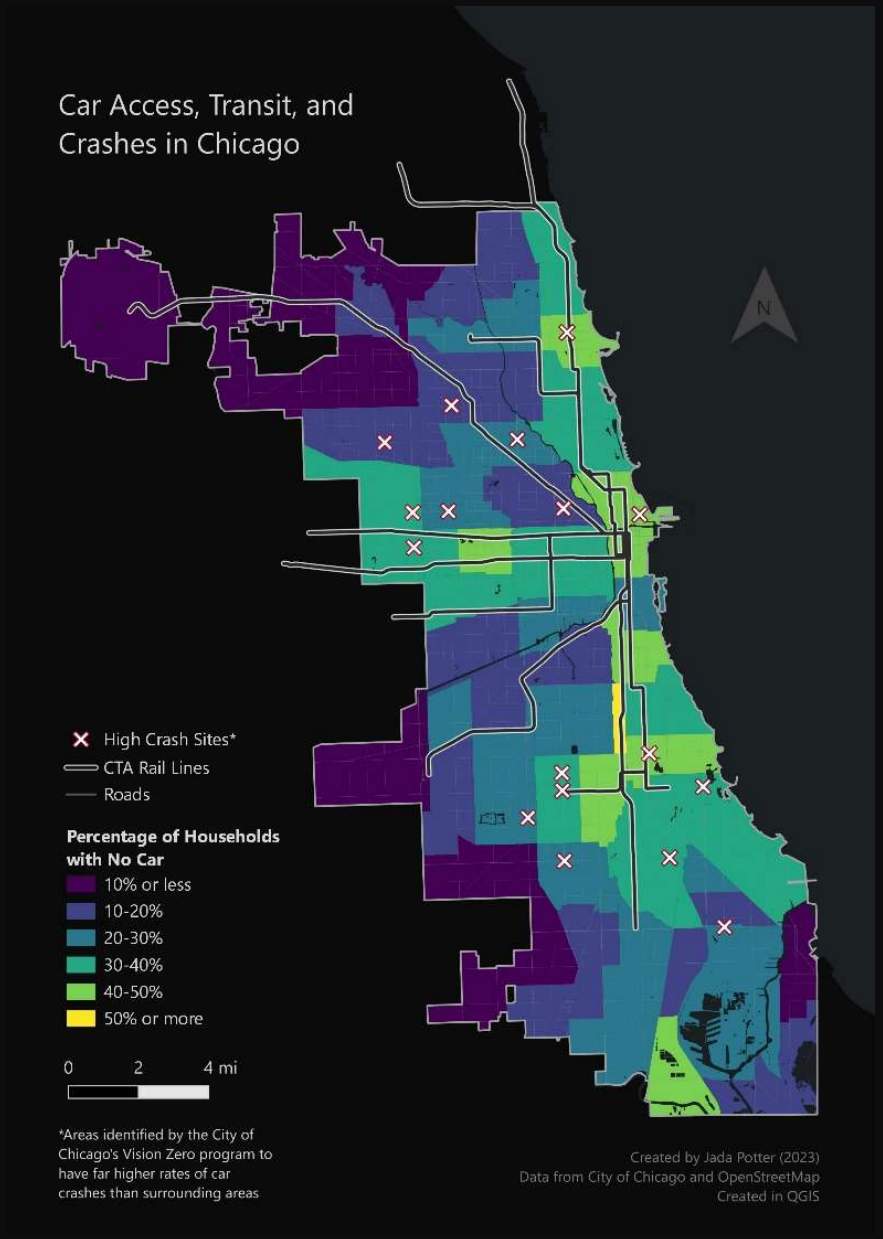



## A Map of My Summer in Hyde Park

The map to the left is a hand-drawn representation of the northern half of Hyde Park, where I stayed last summer working remotely. I decided to include features that were memorable in some way, as well as short descriptions of how different areas made me feel.

Thus, this is not meant to serve as an objective reference map of the area but as a representation of the "image" I created of the area in my mind, to use Lynch's (1960) terminology.[1] The map features are intended to loosely reflect the five image elements that Lynch identifies, paths, edges, districts, nodes, and landmarks.

[1] Kevin Lynch, *The Image of the City* (Cambridge, MA: MIT Press, 1960).



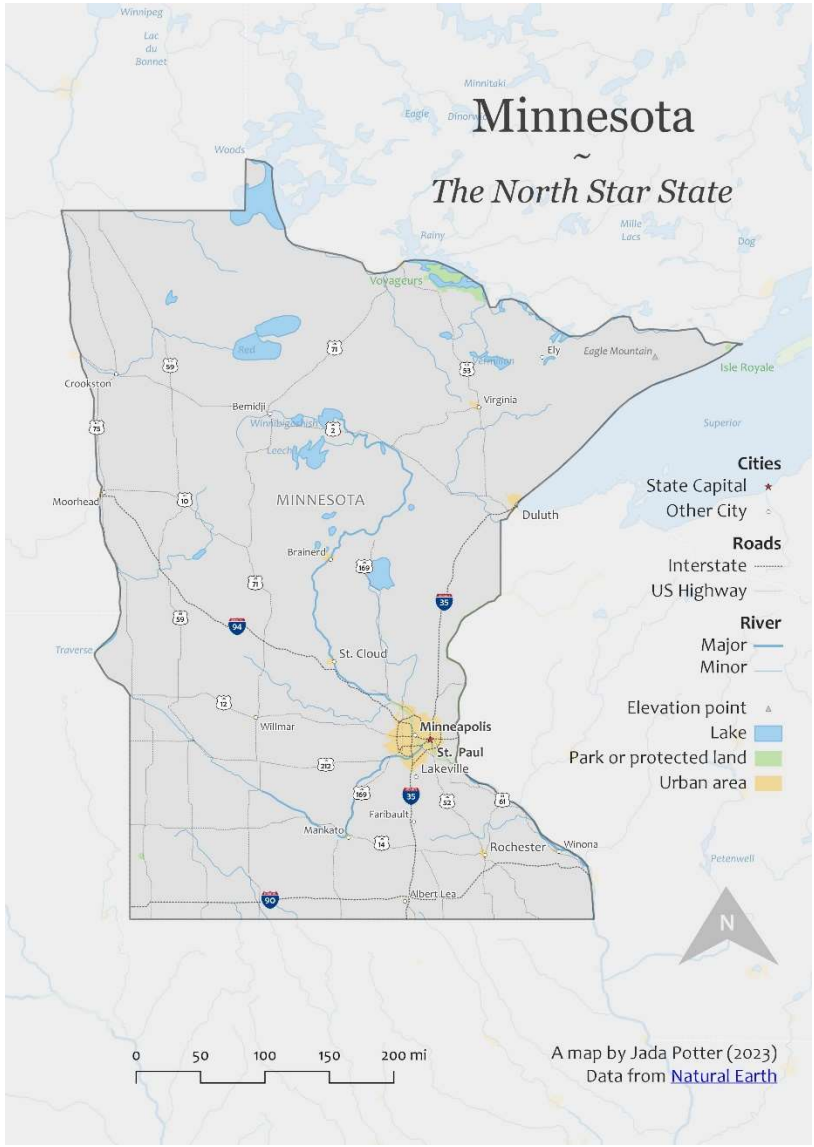

# Methods of Transport and the Distribution of High Crash Sites in Chicago

The map to the left looks at the distribution of three major transportation-related features in Chicago: car ownership, mass transit lines, and High Crash Sites (see note in map for details). While there seems to be a clear connection between proximity to mass transit and car ownership, areas with low car ownership do not appear to be any less likely to have high rates of car crashes. In fact, of the 17 high crash sites identified, just over half are in community areas where over 30% of households do not own a car.

In order to help the colors stand out more I decided to plot the map on a black background. I practiced my choropleth mapping skills using data provided and found online, and fine-tuned symbology in order to ensure that various features, such as roads, would be visible but not visually overwhelming.

Based on the advice of my peers, I incorporated a few important changes that improved the readability of the map:

- High Crash Sites were not originally defined below the legend, making it hard for my peers to understand what the concept was referring to. This type of feedback was highly valuable to the design process, as it is sometimes easy to forget that the concepts you are working with may not be familiar your users.
- I also fixed a few small problems that others helped me catch. I had forgotten to replace the raw text for one of the legend labels to a more readable description, which I made sure to fix. My peers also noticed that the road symbol in the legend was a little hard to see, so I increased its thickness slightly so it would not be completely drowned out by the black background.




## A Reference Map of Minnesota

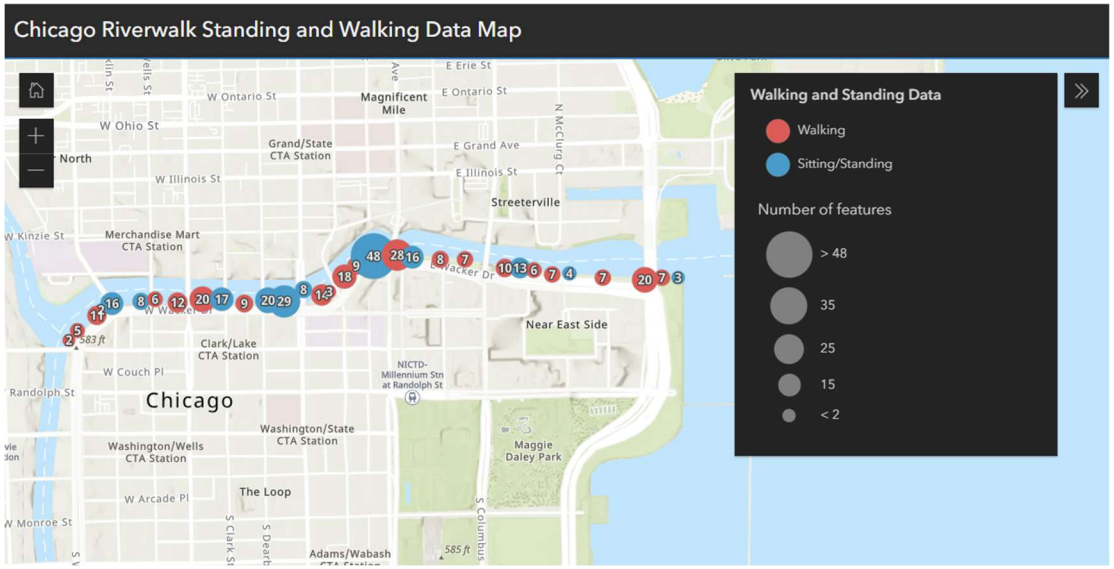
To the left is a reference map I made of my home state, Minnesota. The main objective of this project was to use Natural Earth data to create a reference map that would be highly readable and visually appealing.

The following changes were made based on the incorporation of peer feedback:

- City symbology was changed so that the state capital would be more distinct from other cities. However, labelling was classified by population, such that larger cities would have more prominent labels (with their placement prioritized over other labels). This helped ensure that major cities like Minneapolis are not overshadowed by the features around them.
- To improve the readability of labels, a small white text buffer was added around them. This way, text does not visually conflict with line features, especially those of a similar color.
- Finally, because highway labels were originally placed too frequently, I disabled the repeating of labels between highway segments and forcefully turned off label visibility of certain problematic segments using the conditional labeling feature available in QGIS.

Overall, working in QGIS allowed for a great deal of flexibility throughout the design process of this map. Almost every aspect of the map design is customizable in some way, which may feel somewhat overwhelming, but allows for highly specific techniques like the conditional labeling mentioned above.

# Interactive Visualizations




## Patterns of Movement along the Chicago Riverwalk

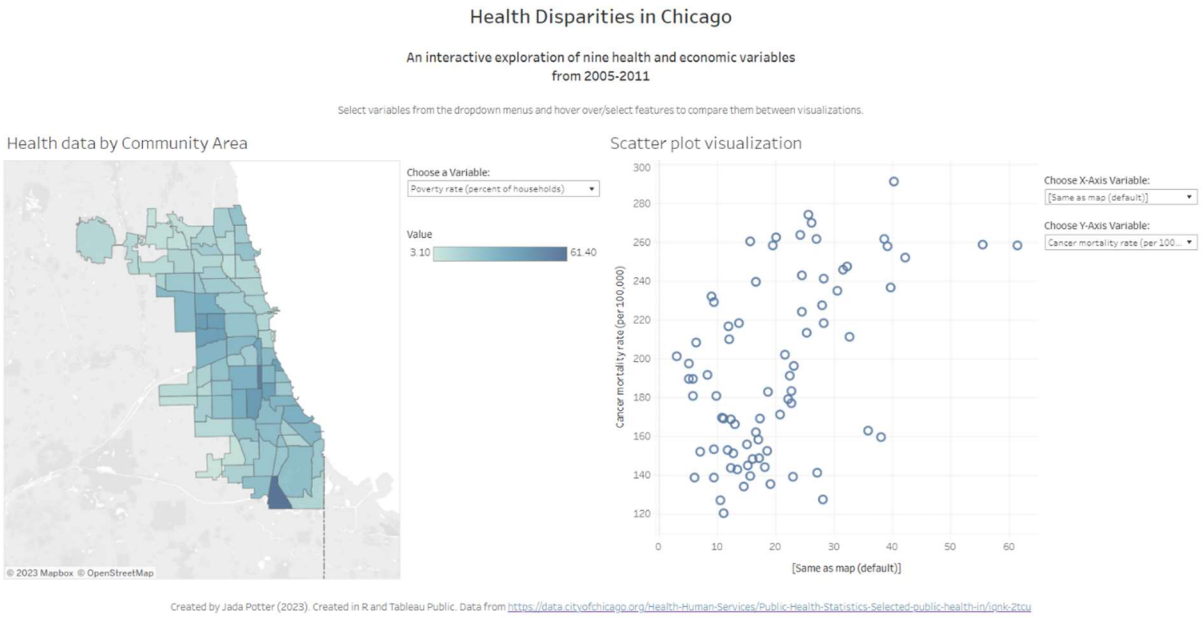
The map to the left was created in ArcGIS Online, using data I collected on people's movement behavior (whether they were moving or sitting/standing in place) along the Chicago Riverwalk. This visualization allows the map viewer to look at clusters of behavior patterns on a large scale, while also allowing for a disaggregated view of the data when zoomed in.

I struggled to find a good way of representing these data. Choropleth mapping would require some form of binning that would obscure patterns at other scales, heatmaps would not work well with the linearity of the data (and are often not great for mapping out the prevalence of two different types of points). The form that I chose felt like a compromise, as it allows patterns to be viewable at various scales and for walking and standing data to remain distinct, yet it also prevents clusters of different types from overlapping, which can be somewhat misleading). Although this problem could be solved with one visualization option in ArcGIS Online that would display the clusters as pie charts (split between the people walking and standing in the area), I felt this much harder to read and made comparisons between areas much more difficult.

Unlike with QGIS, used to create the previous two maps, ArcGIS Online did not offer nearly as much flexibility. Perhaps if more cartographic tools were available, I would not have such a difficult time representing my data.

View the map online here: https://www.arcgis.com/apps/instant/basic/index.html?appid=f5520db77e0943e09224051a96a4262f

## Health Disparities in Chicago




Unlike previous examples, the Health Disparities dashboard pictured to the right focuses more on visual communication of data rather than map design. The goal was to allow the user to explore the data with a great deal of flexibility, while also making it very easy to understand how the data vary between areas and relate to each other. This was done by allowing the user to interactively chose the variables to be displayed in the map and the graph and by linking data points between the two so that when objects are selected or highlighted in one the corresponding data points are selected or highlighted in the other. This leaves the user with no mysteries; if they want to check how any of the variables relate to each other they can instantly select them, rather than having to scroll through a long document to find a comparison that may or may not exist. This is the primary advantage of the interactivity allowed by Tableau Public, the software the dashboard was created in. Static visualizations are far more limited in the amount of information they can communicate at any one time.

Peer feedback allowed me to make the following improvements:

- A default option for the scatter plot was added that automatically set the X-axis to be the same as the variable visualized on the map. This allows the two to be closely linked without requiring the user to manually update the variable in both dropdowns.
- A small amount of jitter was added to the data in R in order to prevent data points with the same value from erroneously highlighting at the same time due to a bug in Tableau.

View the dashboard online here: https://public.tableau.com/views/HealthDisparitiesinChicago/HealthDisparitiesinChicago?:language=en-US&publish=yes&:display_count=n&:origin=viz_share_link

# Other Analyses

## Neighborhood Map Comparison

For this field investigation, I chose to explore parts of Hyde Park I hadn't been to before. I divided this report into two sections based on the distinct areas I went to.

### Part 1: E. 58th St.

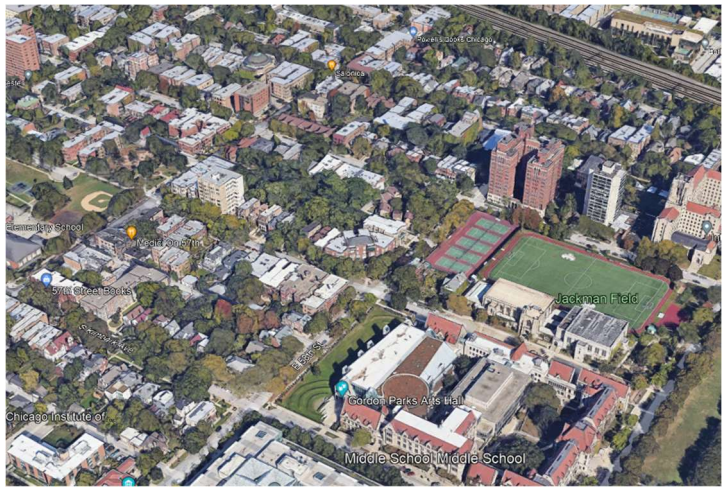



*Figure 1*

Google Earth screenshot of the area on E. 58th St. that I explored, east of the university

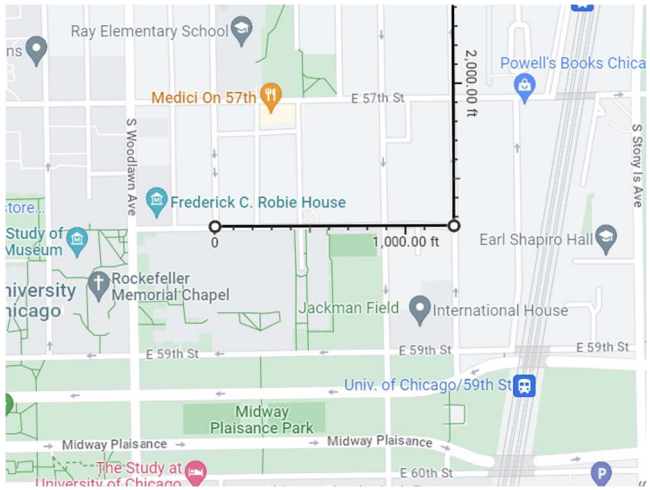



*Figure 2*

Google Maps screenshot of this area with my walking route marked using the Measure Distance tool

a) 

b) 


c) 

*Figure 3*

d) 

e) 

Photos I took from the area I explored around E 58th St, as well as the abandoned St. Stephen's Lutheran Church near Blackstone and 57th.

a) 58th St near Kenwood Ave

b) the intersection of 58th and Dorchester Ave

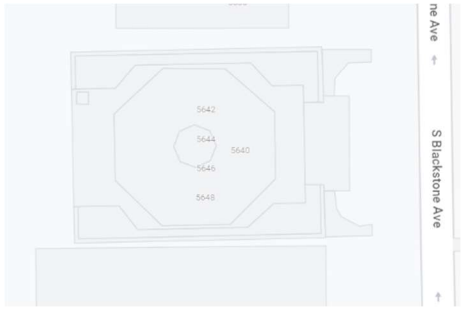
c) near the end of 58th St at Blackstone Ave

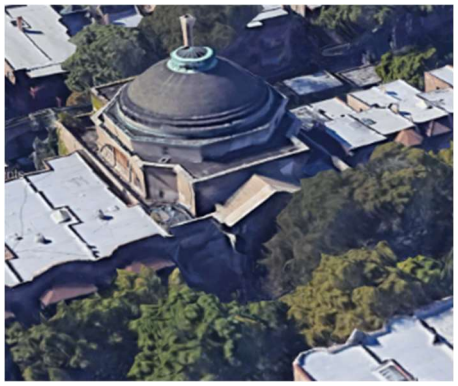
d) St. Stephen's Lutheran Church façade

e) side of the abandoned church blending into rest of buildings on Blackstone Ave

I wanted to start off with this segment of E. 58th St, which I had never been to before. The street occupied a strange liminal space in my mind, spaced between the highly recognizable areas of the Midway and 57th St, and thus it had an air of mystery to it. I couldn't tell what the character of the street would be. I had assumed that it would be flanked, at least on the southern edge, by far more university-affiliated buildings, especially due to the darker gray shading of that area on Google Maps (Figure 2), but counter to my expectations it just appeared to be a quiet residential street, not much unlike other streets in the Hyde Park area. Figure 3a emphasizes this discovery. From a street-level perspective there is little university affiliation apparent. I also found the intersection

of 58th and Dorchester (Figure 3b) to be quite interesting – in a city known for the uniformity of its street grid, it's always interesting to me to find small places where the grid doesn't quite line up correctly. Neither web map emphasized the offset of the intersection; in fact, it is absent from Google Maps entirely, as shown by the screenshot to the right. Finally, towards the end of 58th St, I was struck by the canyon effect of the street's final block; as shown in Figure 3c, it is narrow with tall, imposing apartment buildings on either side with no setback from the sidewalk. This characteristic is somewhat visible on Google Earth, as it is possible to see how close the buildings come to the street and how tall they are, but this is not possible in Google Maps, though the building footprints do give some suggestion. However, there are certainly cases in which this type of information might be valuable. One major consideration I often make when deciding a route to walk is whether there will be shade on the sidewalk. This is something that can only be learned from experience of walking on different streets at different times of the day and year, not from a web map. Though the day I chose to walk was cloudy, I'm sure I would have taken refuge in the shade of these buildings and added this shade to my mental map of the area had it been hot and sunny out.

Though I had not yet arrived at the second leg of my journey on E 52nd St, I was struck by the imposing façade of the abandoned St. Stephen's Lutheran Church that I passed on the way (Figure 3d). This façade can't be found in either web map (as shown on the left) – even Google Earth fails to depict this view, as it is blurred and blocked by trees. Not even the name of the building can be found on either platform, forcing me to sleuth around on the internet for its name. Passing by the building felt creepy and unsettling, which I tried to emphasize with the selection of the photo for Figure 3d; its up-close and tilted framing attempted to convey these feelings. However, what was perhaps most striking about the church was its lack of spatial distinction and inconspicuous location. The church does not sit on a street corner and is simply mixed in with a series of row houses, as illustrated by Figure 3e. However, I would argue that this phenomenon is best illustrated with Google Earth, which shows the church in the context of its surrounding buildings. Though this can be internally perceived when walking by, it is hard to capture this phenomenon in one still photograph. This is a case in which web maps seem to actually be more helpful at illustrating a walking person's perspective of a place than photography.

## Part 2: E. 52nd St.

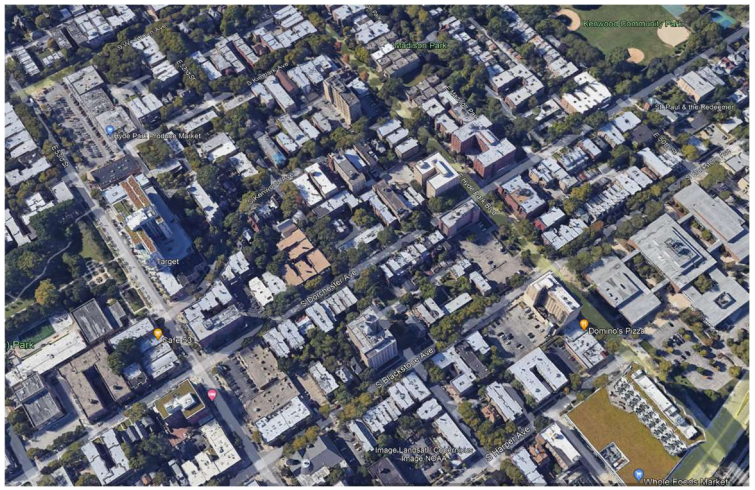


*Figure 4*

Google Earth screenshot of the area I explored on E. 52nd St, between Kimbark and Harper Avenues.

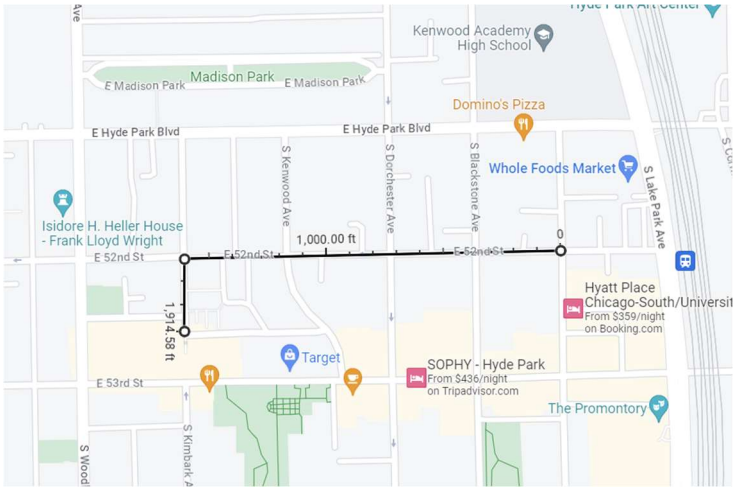
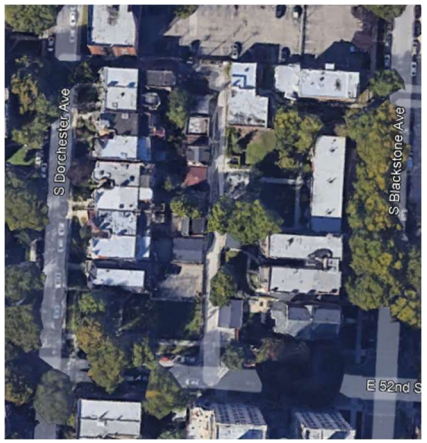



*Figure 5*

Google Maps screenshot of this area with my walking route marked using the Measure Distance tool

The second main area that I explored on this trip is the section of 52nd St between Harper and Kimbark. This area did not possess as much of an air of mystery for me, as I knew it would be largely residential, and not potentially mixed in with university or commercial buildings. My expectations for this area were not far off. However, I was somewhat intrigued by certain areas that were visually interesting yet only appeared as negative space in web maps. The view in Figure 6a (below), for instance, stood out to me as an intricate maze of fire escapes, balconies, and garages all layered atop each other in a chaotic yet visually striking way. However, these features are generally considered mundane or unappealing, and are thus not represented in most web maps. Google Maps, for instance, shows nothing here at all, while Google Earth only shows a strange but seemingly insignificant gap shown between the far more prominent buildings, as pictured on the right.



a)

b)

c)

*Figure 6*

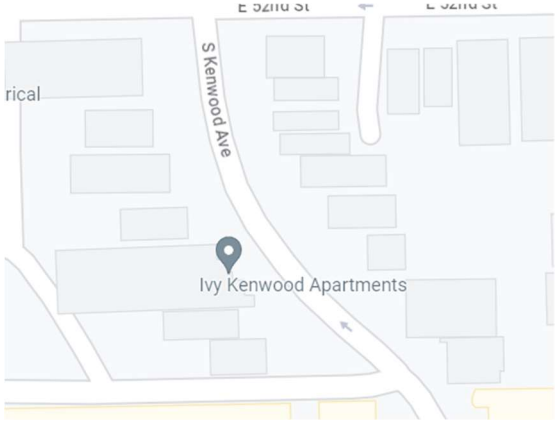
Photos I took from the area I explored around E. 52nd St.

a) 52nd St near Blackstone and Dorchester, looking up to the northwest

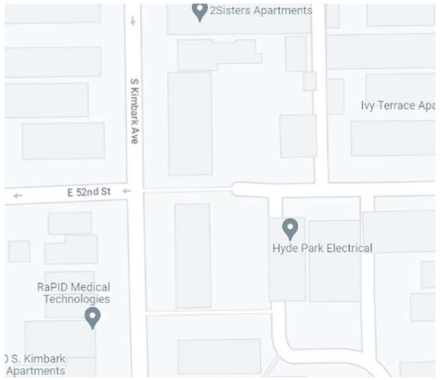
b) The section of Kenwood that curves, a rare sight in Hyde Park

c) The narrow footpath connecting 52nd St for pedestrians between Kenwood and Kimbark

Furthermore, the upward angle of the camera creates a visual relationship between the buildings and the structures behind them that would be difficult to imagine just by looking at an aerial map. However, I think it is also the act of photography that helped me notice what I saw. If I had simply been walking by, I likely would have ignored the view, or at most forgotten about it shortly afterward.




The next area that caught my attention was the curved stretch of Kenwood Ave (Figure 6b), perhaps because a curved road is such a rare find in Chicago. While the road's curvature is definitely noticeable in both maps as a break in the regular street grid pattern, it is much more intriguing up close, viewed in isolation. Particularly striking was seeing the uneasy way in which the surrounding buildings align with the road, all restricted to right angles, and thus set back in a strange, angular fashion. This is somewhat visible in the Google Maps screenshot to the right, but I likely would not have noticed this occurrence had I not visited there first.




Finally, as I approached what I assumed to be a dead end on 52nd St, just past Kenwood, I was pleasantly surprised to find a narrow walking path between two low, brick buildings guiding me to the next stretch of the street. Though I was relieved that I wouldn't have to walk all the way around the block to get where I needed to go, this seemed odd to me, as most map representations I had seen before did not include this path, and I hadn't even noticed its existence in Google Maps until after I found it in person. The map of my summer in Hyde Park (also in this portfolio) did not include this path, as it was not present in my image of the neighborhood. Perhaps this goes to show how car-oriented not only our maps are, but the mental maps we make of our cities are, to the point that entire walking paths are erased from existence because they can't accommodate cars. This false image had led me to plan my time around having to backtrack and walk the long way around, demonstrating how perspectives of space can have real-world ramifications for the people moving around it.


Source: https://www.exploreminnesota.com/article/bike-51-mile-grand-rounds-scenic-byway-minneapolis

## Comparison of Trail Maps

The following analysis compares the use of symbology, scale, and other cartographic elements between two maps of the same trail system in Minneapolis.

The two maps of the Minneapolis Grand Rounds, a network of scenic biking and walking paths encircling the city, each offer a unique perspective on the system. The first one, an official map from the Minneapolis Parks and Recreation Board (MPRB), left, shows a clear outline of the system, intended for general use and to help users understand where the trail goes. The second map on the other hand (see next page), a creative work posted on Reddit, shows a local resident's image (as Lynch (1960) would put it; see footnote on page 2) of the network and all the imagery they associate with it, rather than providing a detailed overview of the network for reference purposes.

Both maps are at roughly the same spatial scale, encompassing the entirety of the Grand Rounds, though the MPRB map does extend roughly a mile beyond it in each direction. However, the spatial scale is more clearly defined in the MPRB map, both through the use of the scale bar and the path distance chart at the bottom, which is likely done in order to make the map more usable for navigation or comprehension of the system. Though there are other MPRB maps depicting smaller sections of the Grand Rounds at a larger scale, the scale of this map allows users to better understand how the network links together and interacts with the rest of the city. The Reddit map, however, gives no sense of spatial scale (other than the label "50+ miles" near the bottom-right), but rather an imaginary scale depicting how the trails and the landmarks around them might be imagined. Along these lines, a large part of the area within Minneapolis is left blank, too, or is covered by pictographic representations of various landmarks on or near the path, and thus it is arguably excluded from the spatial extent of the map despite being physically surrounded by the trail. Even the couple of landmarks not on the Grand Rounds that do appear on the map (the Sculpture Garden and the Minneapolis Institute of Art) are not correctly placed, thus representing them more as concepts that might be imagined while walking or

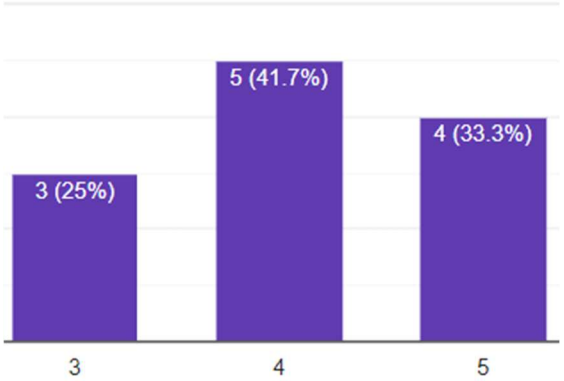

Source: https://www.reddit.com/r/Minneapolis/comments/6r47kv/my_friend_just_made_a_map_of_the_grand_rounds/

biking down the trail rather than actual geographic locations. This makes sense, as the creator is likely not trying to make a map for bikers or joggers to reference, but rather as a piece of imaginative art. The MPRB on the other hand is providing a public service to inform potential users of the service how to navigate it.

Other than the trail itself, there almost no similarity between the symbology of the two maps. The MPRB map depicts other features that one might expect to see on a typical reference map in order to help orient the user. These include major roads, highways, other trails, the Mississippi River (which is notably lacking in the Reddit map), and parks, none of which are overwhelmingly apparent (though the Interstates are perhaps slightly too noticeable) in order to help them blend into the background when they're not helping the user orient themself. Features that might be important to users of the Grand Rounds are more clearly visible, such as the path itself, set apart with its thick blue line and very slight white outline; important facilities like parking lots and bathrooms, using common symbols to clearly depict them; and districts, which very notably fade out on the edges in order to distinguish them from the much more sharply defined city border. The map does include some more icon-based symbology for the labels of each of these districts, though they are by no means realistic, and thus do not detract from the clean, simple look of the map. This simplicity is also reinforced by the exclusion of several features, such as minor roads and many points of interest. This could come at a cost, however, as certain hidden features like side streets with bike lanes might be more useful for trail users than other features already on the map like major highways. In contrast, the Reddit map excludes nearly all reference features, though there is less need to include as the map's purpose is not to orient users. The symbology that is included, however, is far more iconographic, in line with the artistic goals of the map. While some of these icons actually depict the landmarks themselves (such as the Mill City Museum), others depict images associated with, or commonly found within them (such as the Lyndale Rose Garden). Also interesting is the use of mixed perspective. This allows for a compromise between the needs of depicting the loop of the trail itself and depicting the images one would see from ground level when walking along it. However, there are several notable exclusions in this representation that seem rather odd. First of all, the lack of differentiation between lake outlines and the trail itself is confusing, as it is not clear where one ends and the other begins. Second of all, key water features, such as Cedar Lake (the lake to the east of that label is actually Lake of the Isles) and the Mississippi River, each of which are important not only to orient the viewer (which is still important; after all, if too much detail is taken away it's hard to understand what is even being depicted at all) but as a crucial part of the image and identity of the city itself.

## OpenStreetMap Survey

In order to assess how well different people's neighborhoods are represented by OpenStreetMap, I created a survey that I shared with classmates and on several Reddit pages, inquiring whether crowd-sourced data on their area was present and accurate based on their local knowledge.




Through this process, I gained an appreciation of the testing processes behind cartographic products and for how valuable user input can be. The results also uncovered some flaws in my survey design that I would be able to improve for next time. For instance, asking separate questions for whether the data is present and whether it is accurate would help, as it is not entirely clear whether a low rating indicates that a type of feature is missing (in which case it could be added in the future) or whether it is inaccurately portrayed (indicating a larger problem with data quality).

The following link shows the results of the survey:
https://docs.google.com/forms/d/e/1FAIpQLSfJcoexsiTo3DLboHv5h8xwv30MrRbUg_ohLXAr92SHNfLnNA/viewanalytics