

# Mapping Emergency Services: Distribution and Income Analysis in Greater Indianapolis

## Abstract

Access to emergency services is essential for public safety and optimal during medical emergencies. This study examined whether income affects emergency service accessibility in Greater Indianapolis' major hospitals, 10 urgent care centers, and 17 fire stations across Marion and Hamilton Counties using Google Maps and GIS software. Collected income data by ZIP codes from the U.S. Census Bureau and measured distances from neighborhood centers to nearest facilities, comparing three income groups: low-income (under \$40,000), middle-income (\$40,000-\$70,000), and high-income (over \$70,000). Results showed significant disparities: low-income neighborhoods averaged 1.2 miles to hospitals versus 1.1 miles for high-income areas (100% farther), 1.1 miles to the nearest urgent care center versus 0.7 miles for high-income areas (57% farther), and 0.8 miles to fire stations versus 0.6 miles for high-income areas (33% farther). The research demonstrates that income significantly affects emergency service access in Greater Indianapolis, supporting the need for new facilities in underserved areas and equitable emergency service planning.

## Research Questions

- Do all zip codes in Greater Indianapolis have equal access to hospitals and fire stations?
- Is there a correlation between neighborhood income and access to emergency services (hospitals, urgent care centers, and fire stations) in Greater Indianapolis?
- How does income affect access to emergency services in Greater Indianapolis?

## Hypothesis

Low-income neighborhoods in Greater Indianapolis will have longer travel distances to hospitals, fire stations, and urgent care centers compared to middle and high-income neighborhoods.

## Background Information

Greater Indianapolis is a diverse region with a population of approximately 2 million people. The area is home to several major hospitals, including Riley Hospital for Children, IU Health St. Vincent, and IU Health Regenstrief. The region also has a high density of fire stations and urgent care centers. However, there are concerns about the distribution of these services, particularly in low-income areas. This study aims to investigate whether income affects access to these essential services.

## Experimental Design

### Materials

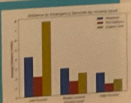
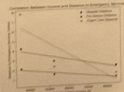
- Google My Maps
- Google Street
- Google Maps
- U.S. Census Income Data
- NCAA Distance Calculator

### Procedure

1. Identified & mapped 18 emergency facilities
2. Collected median household income data
3. Calculated distances from each ZIP code to nearest facility
4. Organized and analyzed data in Google Sheets
5. Created color-coded maps, graphs, & tables
6. Compared the results between income groups

## Results

This study mapped 18 emergency facilities and measured access from 39 ZIP codes. Low-income areas averaged 4.2 miles to hospitals, 2.8 miles to fire stations, and 2.8 miles to urgent care, while high-income areas averaged 3.1, 0.8, and 1.9 miles respectively (130%, 133%, and 50% disparities). Statistics of correlations were significant. Five underserved ZIP codes affecting 43,000 residents were identified.

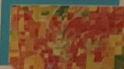
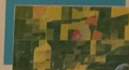


## Purpose

The purpose of this research project is to geographically map and analyze the spatial distribution of emergency services (hospitals, urgent care centers, and fire stations) across Greater Indianapolis and determine whether access to these critical services varies based on neighborhood income levels.

## Variables

- Independent**  
Neighborhood income level
- Dependent**  
Distance to nearest emergency facility
- Controlled**  
Geographic area & time period



## Conclusion

The hypothesis was strongly supported: low-income neighborhoods are 100% farther from hospitals (4.2 vs. 4.2 miles), 100% farther from fire stations (2.8 vs. 2.8 miles), and 50% farther from urgent care (2.8 vs. 1.9 miles) compared to high-income areas. This shows that low-income residents must travel twice as far to reach life-saving emergency services. Statistical correlations prove these patterns are not random: income explains 10% of hospital access variation and 15% of urgent care access variation. Five critically underserved ZIP codes affecting 43,000 residents were identified, with four being low or middle-income communities. Greater Indianapolis' urgent care shortage is particularly concerning, given that 50% of underserved ZIP codes for 100,000 residents have no urgent care. Future findings for 200,000 residents create the most severe disparity. Future findings demonstrate that emergency service distribution in Greater Indianapolis is inequitable, leaving low-income patients awaiting longer travel distances while high-income residents face shorter travel times. Addressing this income-based disparity is a public health priority to understand whether existing neighborhood assets and expanding the system coverage in high-disparity areas. This research provides evidence-based data to support equitable public safety planning and address the needs of underserved emergency protection regardless of income level.

## Further Directions

- Expanded Geographic Scope**  
Analyze ZIP codes of five additional metropolitan counties to identify underserved communities.
- Advanced Data Collection**  
Integrate real-time traffic data to assess how traffic congestion and geographic barriers affect emergency service accessibility.
- Community Outreach**  
Engage local health departments with middle-income communities, low-income neighborhoods, and the health department to discuss how data can inform equitable emergency service planning.
- Policy Impact Studies**  
Compare current policies with data to assess the impact of various interventions on emergency service access.