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Distance to Care: Measuring Temporal Variability in Care Access

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Background: Transit burden is a little explored factor, though it is likely a key barrier to the care of many children. GIS technology has been used in the past to incorporate space and place into healthcare access. While such findings have generally concluded that disparities exist between groups and geographies, they have relied on data from ZIP codes and euclidean distance calculations as the analytical focal points. However, ZIP codes are in many cases too large a scale of geography to be useful, and euclidean distance does not incorporate routing information.

Methods: Data were obtained from the EHR systems at Children's Hospital Los Angeles under an IRB-approved study. All patient encounters from January 1, 2017 through September 1, 2023 were extracted. The addresses associated with each patient were then translated to latitude \& longitude points using a HIPAA-compliant geocoding process. Transportation routes were generated using a street network dataset from which route distance and travel time could be derived at different times throughout the day. Route times and distances were mapped and compared against ZIP code estimates and euclidean distance.

Results: CHLA has a wide footprint throughout the LA region, and drive-times and traffic variability vary substantially throughout this area. Time-of-day plays a significant impact in drive-time and has a clear spatial pattern. Different demographic groups are more affected than others by this variability. Euclidean distance and distance from ZIP codes are unreliable and inconsistent indicators of route distance and vary substantially geographically.

Conclusion: Patient geography is a rich and under-exploited facet in providing comprehensive care. It provides a more granular understanding of the transit environment and the patient's experience of accessing care. Traditional approaches to care access, like euclidean distance and ZIP codes are prone to underestimate commute time and drive distance for patients.

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