

Understanding Geospatial Barriers to Equitable Cardiac Care Access in Haiti

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BACKGROUND: CARDIAC CARE IN HAITI

- Cardiovascular disease is the leading cause of morbidity and mortality in Haiti. Among the ~33% of the population under 15 years of age, congenital and rheumatic heart diseases are very common causes of premature death and disability
- Only 1 pediatric cardiologist for 4,000,000 Haitian children and 0 minimally-invasive or open-heart surgical programs. 59% of Haitians live under the national poverty line of \$2.41/day, yet a single private cardiac consultation in the *Ouest* region (Port-au-Prince and its surroundings) costs \$20-90
- Study Aims:** With data from Haiti Cardiac Alliance (HCA), a cardiac care NGO, we analyzed **cardiac clinical outcomes based on the distance between patients' residential address and the address of the nearest HCA clinic**. We build on prior research showing how population health variables predict regional health disparities in Haiti

METHODOLOGY

Study Design: Cross-sectional

Patient Population: Patients treated by HCA between April 2012 and December 2020, who resided in the *Ouest* (West) Department of Haiti

Outcome Measurement: All patients classified into 1 of 3 **clinical outcome groups**: 1) Active care (currently engaged in treatment); 2) Lost to follow-up; 3) Deceased preoperatively

Predictor Variables:

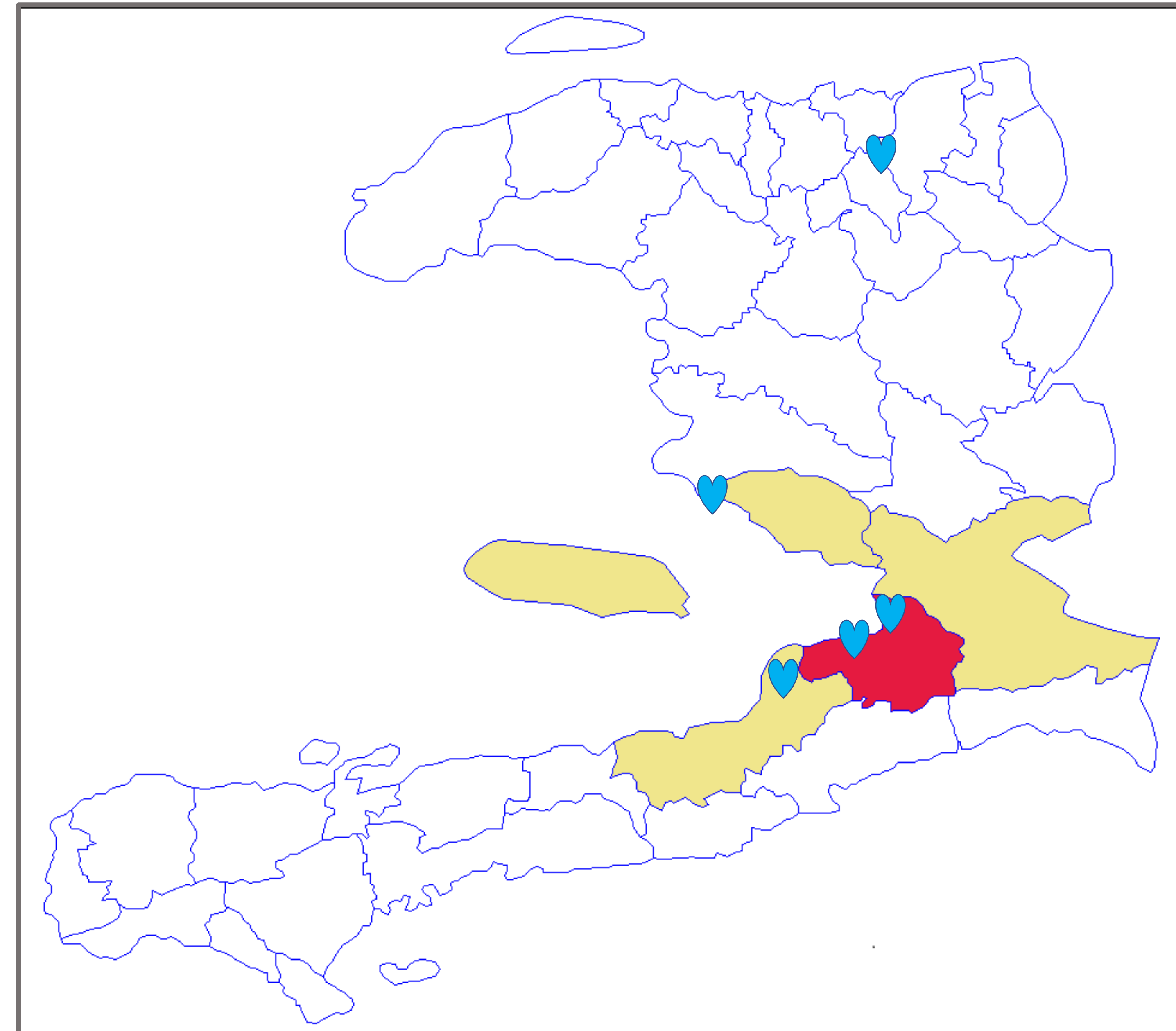
1) Euclidean distance: Calculated via ArcGIS Pro 2.9.1 as the straight-line distance from the centroid of the patient's commune of residence to the nearest HCA clinic

2) Travel-time distance (by bicycle): Calculated via **Open Street Map (OSM)**

Statistical Analyses: Descriptive statistics measured aggregate outcomes of commune-to-clinic distance, travel time, and clinical outcomes

RESULTS

Map of the *Ouest* (West) Region of Haiti



Legend

 **Haiti Cardiac Alliance clinic**

 **Metropolitan region of Ouest (n = 828 HCA patients)**

Communes: Port-au-Prince (n = 124), Delmas (n = 239), Carrefour (n = 172), Pétion-Ville (n = 160), Cité Soleil (n = 45), and Tabarre (n = 88)

 **Non-Metropolitan region of Ouest (n = 453 HCA patients)**

Communes: Croix-des-Bouquets (n = 196), Leogane (n = 80), Cabaret (n = 40), Arcahaie (n = 34), Gressier (n = 23), Anse à Galets (n = 20), Ganthier (n = 18), Kenscoff (n = 17), Petit Goave (n = 12), and Thomazeau (n = 13)

For all communes of *Ouest*, Haiti served by HCA (n = 1281 patients):

Clinical Outcome Group	Median (%)	Interquartile Range (%)
Active care	59.6	(52.2, 70.6)
Deceased preoperatively	13.4	(8.49, 15.9)
Lost to follow-up	28.7	(24.9, 41.5)

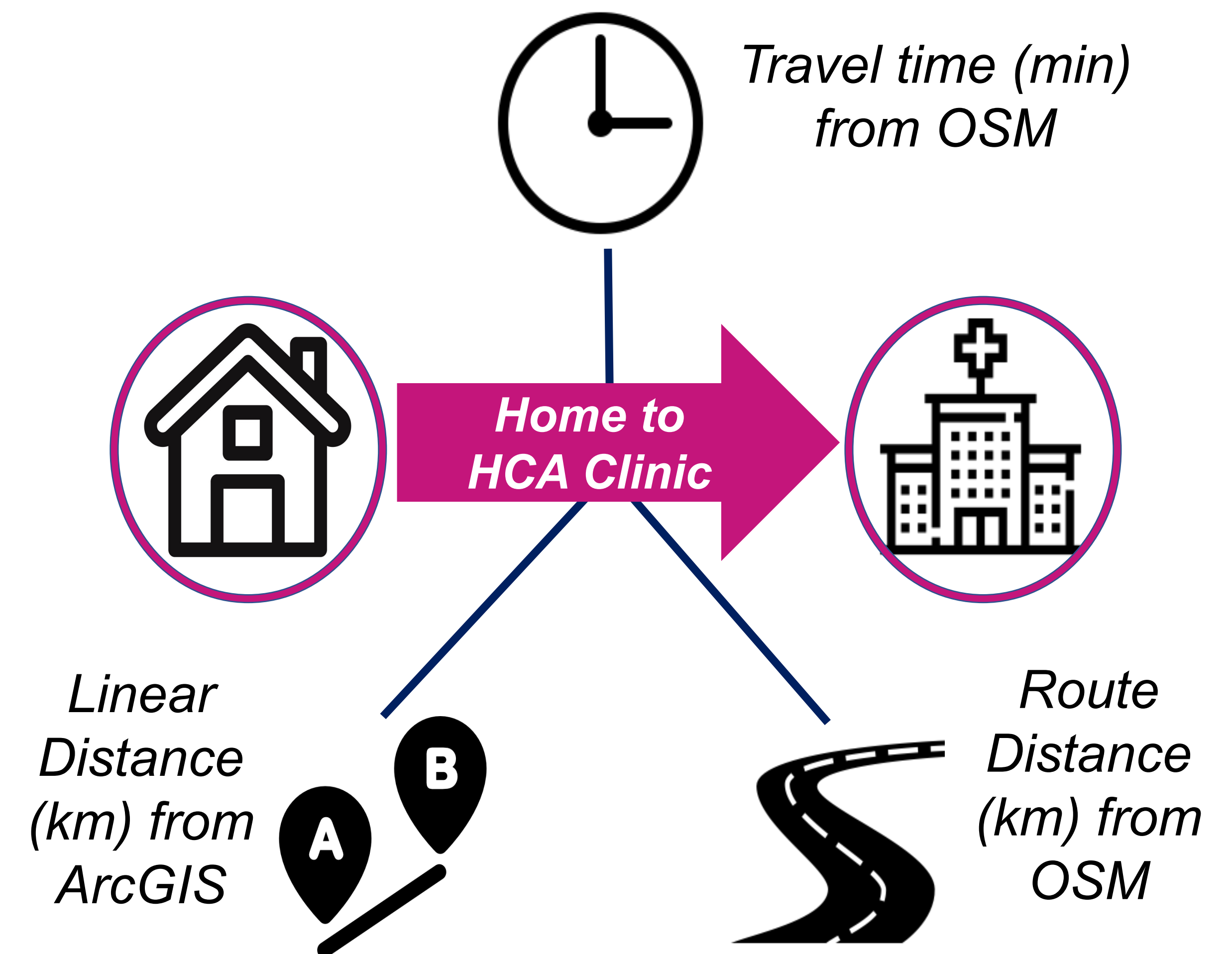
Clinical outcomes of HCA patients in *Ouest*

Travel to Nearest HCA Clinic	Median	Interquartile Range
Straight-line distance (km)	12.98	(8.15, 22.6)
Route distance (km)	21.42	(11.57, 31.7)
Time (min)	104.0	(48.0, 144.5)

Travel time and distance of HCA patients in *Ouest*

ANALYTICAL APPROACH

We triangulate geospatial access to cardiac care based on 3 main metrics:



RESULTS & FUTURE RESEARCH

Within the region of *Ouest*, Haiti, **considerable disparities in cardiac care access and outcomes exist**. Our findings help to identify regions of Haiti with **inequitable cardiovascular disease burdens** to inform public health actions that improve cardiac outcomes across Haiti

Next steps for this study:

Quantify associations between patient travel times and HCA clinical outcome using regression analyses of travel time and distance to HCA clinics

Future research goals:

Utilize personalized, patient-level data (e.g. income, employment, modes of transportation, travel time and distance from residential address to clinic, type of cardiac disease) to better define and predict disparities in cardiac outcomes and treatment access, in both Haiti and other low-income countries