

Investigating Health Inequality in Primary Care Spatial Accessibility Among Races/ Ethnicities in King County

Amy Jan

Study settings

- Is there inequality in primary care spatial accessibility among different races/ ethnicities ?
- Target Population: people in King County
- Primary care: Primary care physician
- Time: 2019
- Method: Enhanced 2-step Floating Catchment Area (E2SFCA)

Population

Data Sources

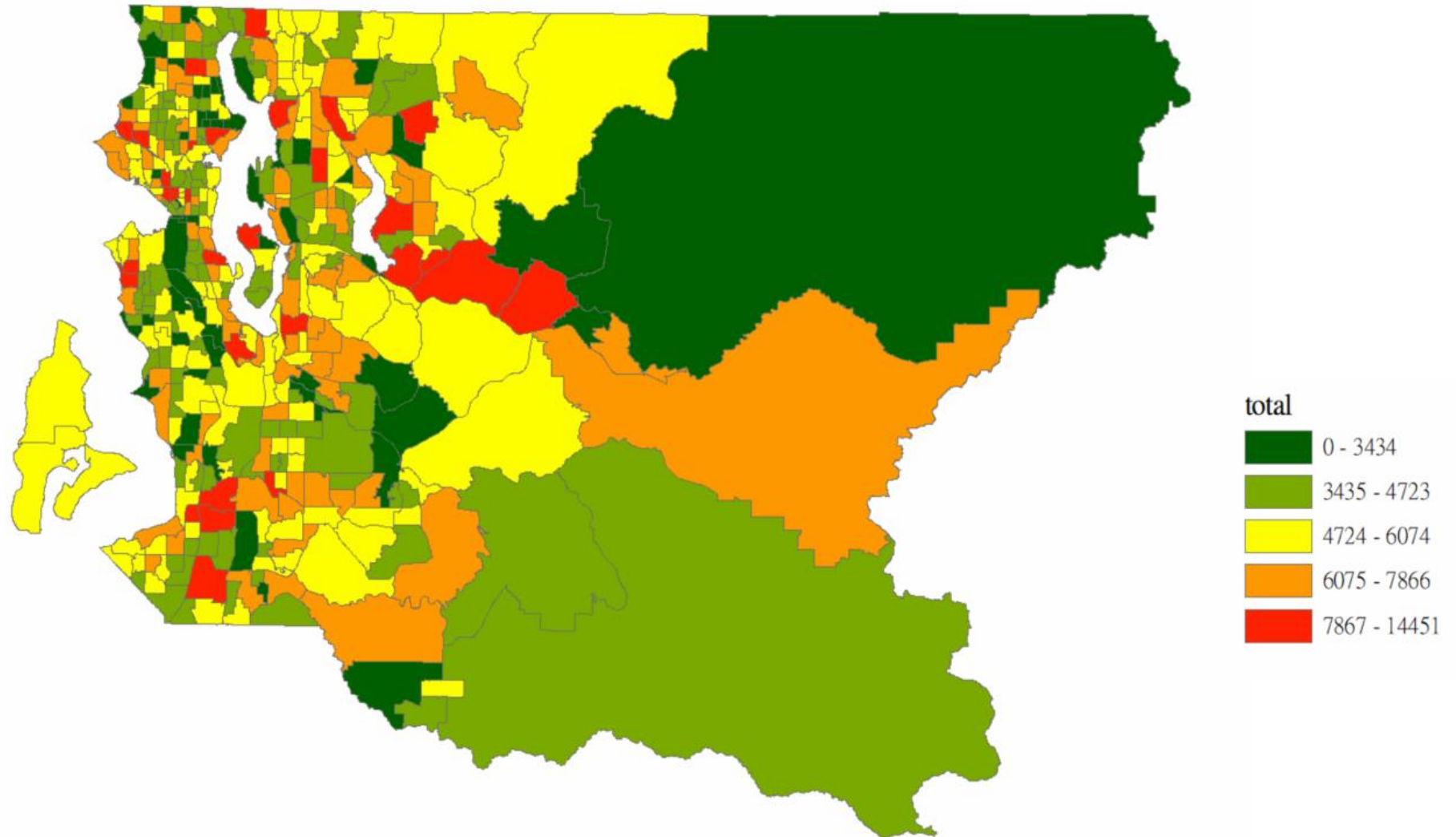
Physician

Transportation Network

Population

- Census Bureau – American Community Survey (ACS)
- 2019 ACS 5-year estimates (updated 12/10)
- Geographic area – census tract (398 tracts)
- Centroid point for each area

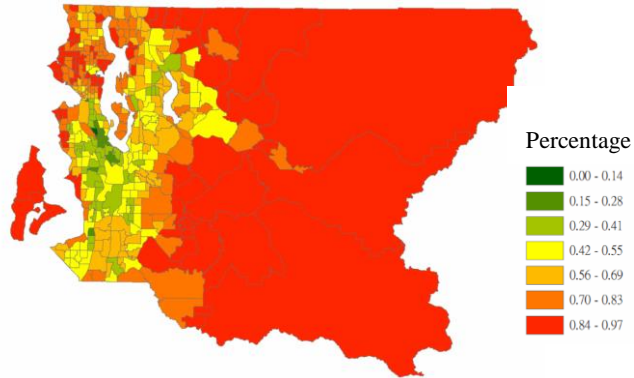
Population



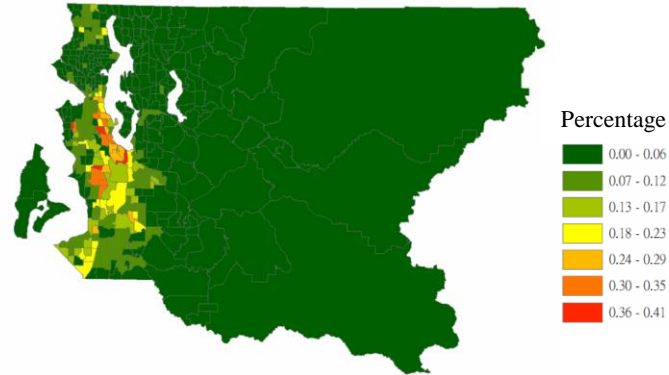
Population

Percent Population by race/ethnicity

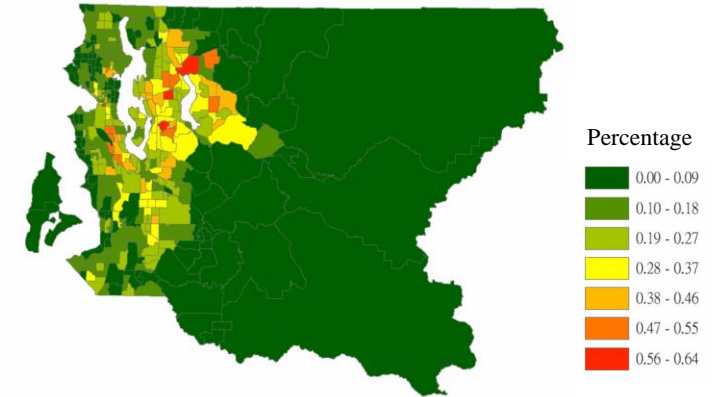
Non-Hispanic White



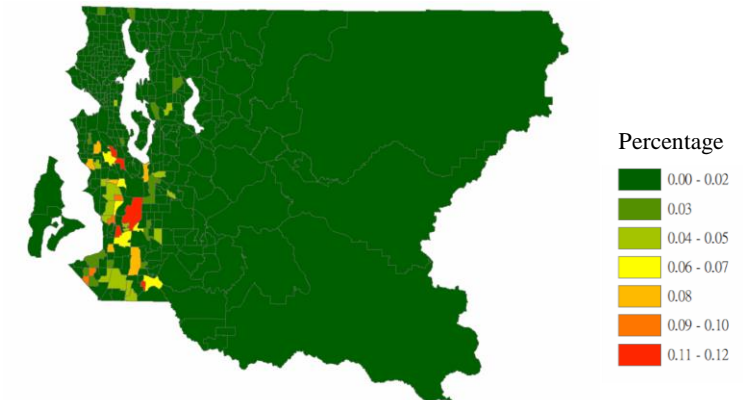
Non-Hispanic Black



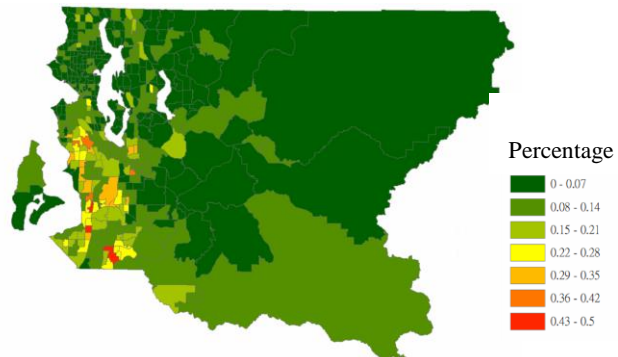
Non-Hispanic Asian



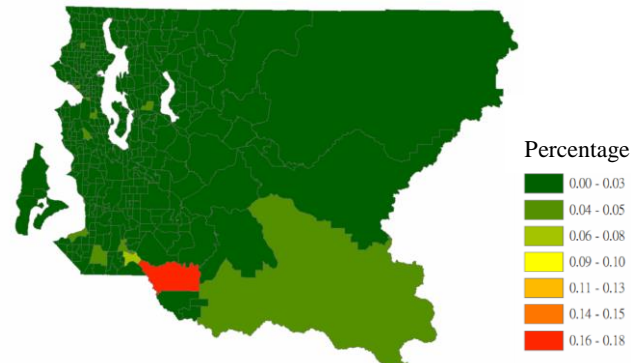
Non-Hispanic Native Hawaiian and Pacific Islander



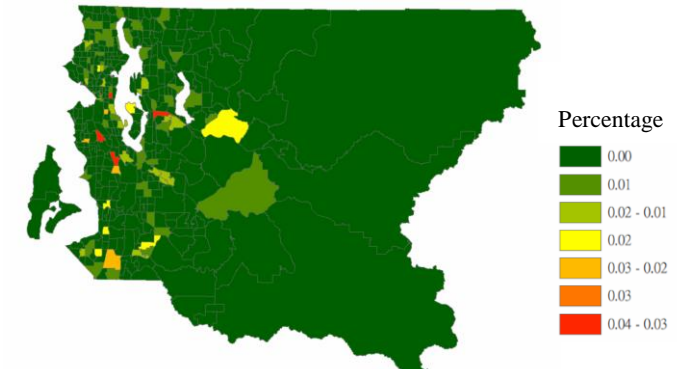
Hispanic



Non-Hispanic American Indian and Alaska Native



Non-Hispanic Other



Primary Care Physician

- Office of Financial Management
- 2019
- Data Sources
 - Network Access Report (NAR)
 - National Provider Identifier Registry (NPI)
 - Provider License Database

Primary Care Physician

Data sources

Network Access Report

- Health insurance companies
- Monthly report
- Show adequate supply of health care providers in its network(s)
- Name/ Taxonomy/ Credential/ Practice location

National Provider Identifier

- National Plan & Provider Enumeration System
- 10-digit unique number assigned to an individual or organizational provider
- Name/ NPI/ Taxonomy/ Practice location

Provider License Database

- Health care providers are required to obtain a provider license with DOH
- Renew every 2 years
- Name/ Age/ Sex/ Credential/ license start date/ recent renewal date/ expiration date

MATCH

Make sure the record is for unique individual

MATCH

Make sure the physician works in WA state

Primary Care Physician Weighting

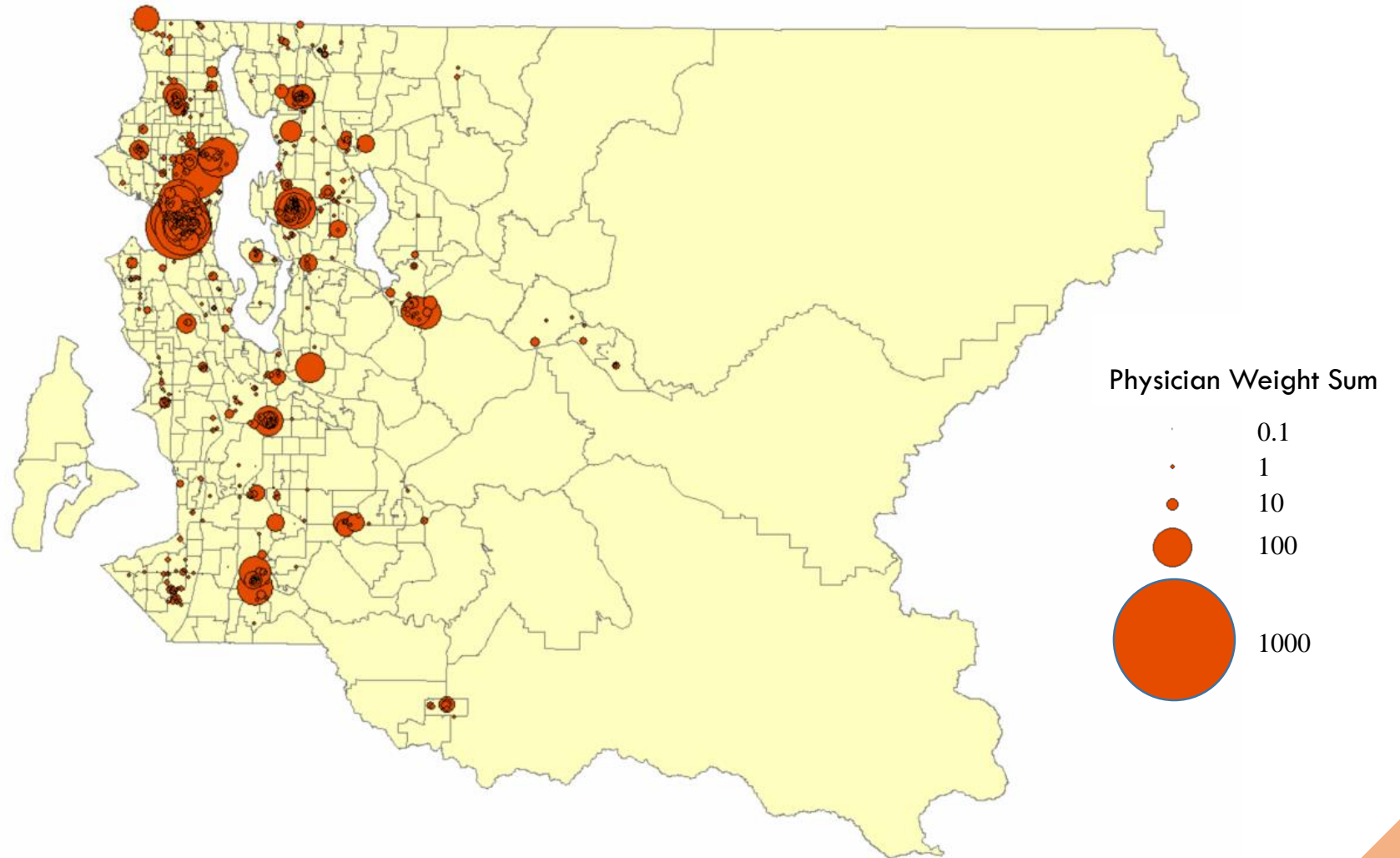
- Multiple working locations
- Divided by number of working locations
- Exclude locations outside King county
- Total number 35,945 Individuals = 10,873

Weight = 1 / 3

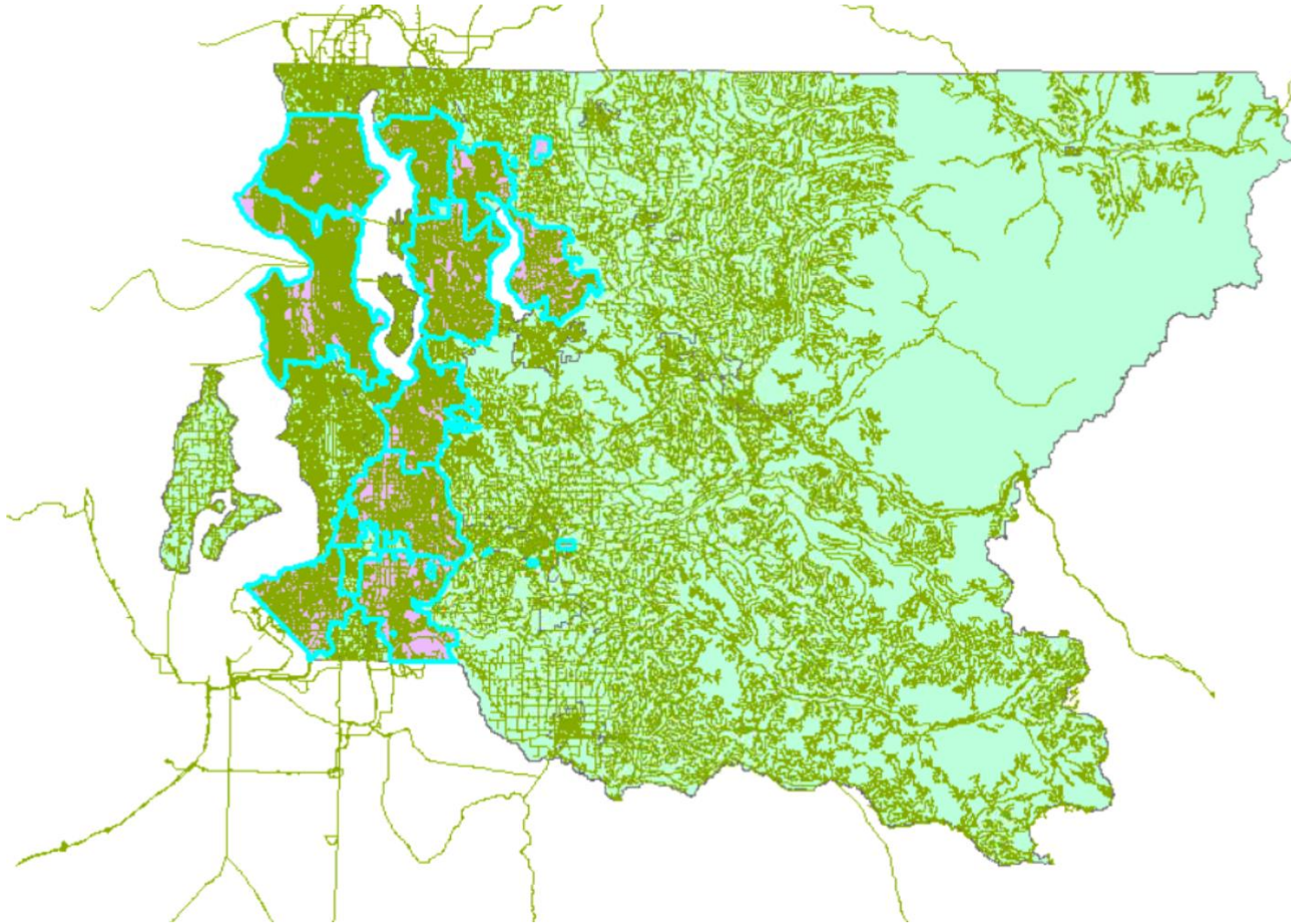
NPI	Address	County
1003003153	350 S 38TH CT	King
1003003153	1035 116TH AVE NE	King
1003003153	11011 MERIDIAN AVE	Skagit

Primary Care Physician

Aggregate by location
800 locations



Car Line Transportation Network (TNET) for Car Mode



Methods

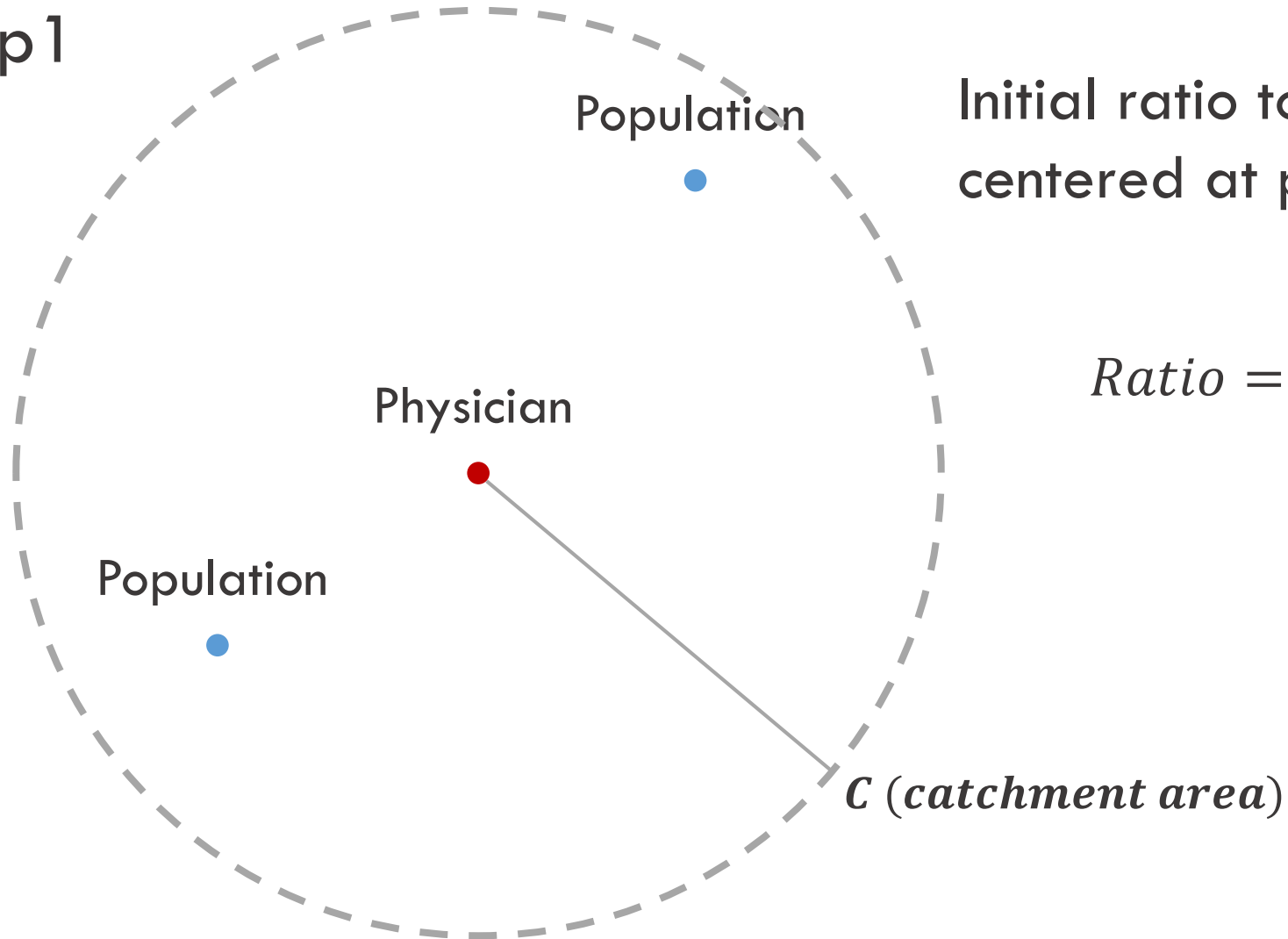
Enhanced 2-step Floating Catchment Area (E2SFCA)

Physician Population

- Measure supply to demand ratios within certain catchment area
- Modified 2SFCA method: introducing distance decay concept

2-step Floating Catchment Area (2SFCA)

Step 1

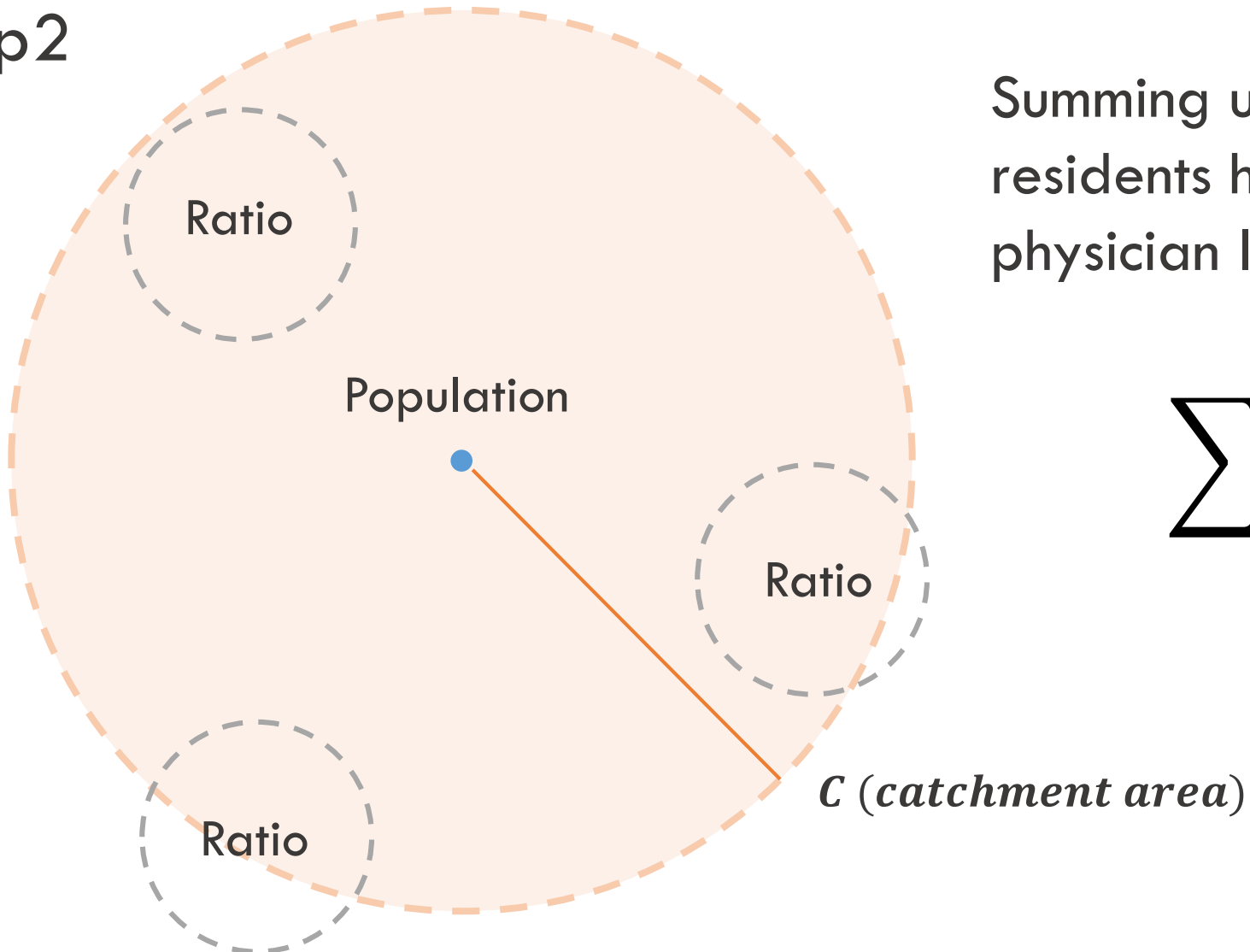


Initial ratio to each catchment area centered at physician location

$$Ratio = \frac{\text{Physician}}{\# \text{ Population (within C)}}$$

2-step Floating Catchment Area (2SFCA)

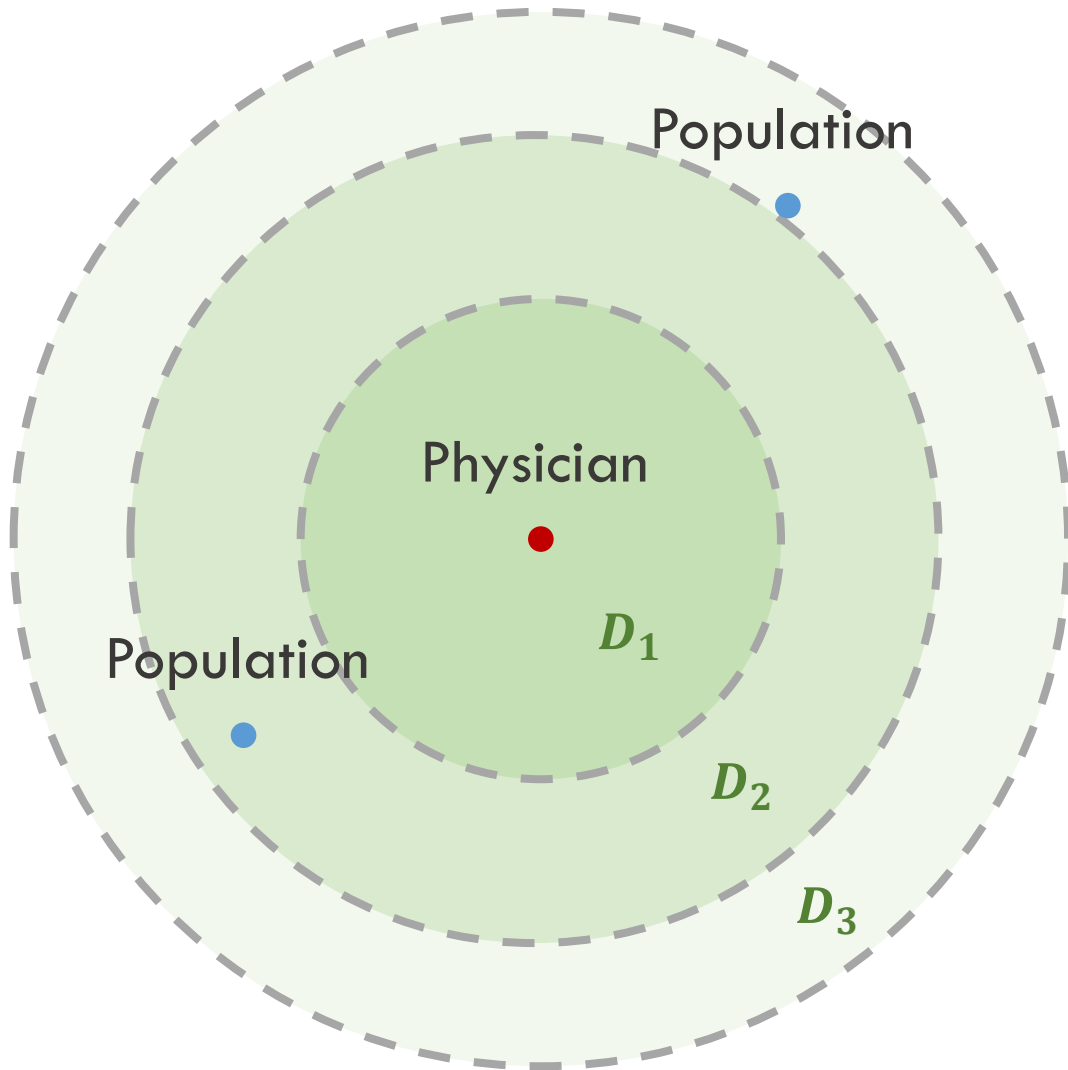
Step2



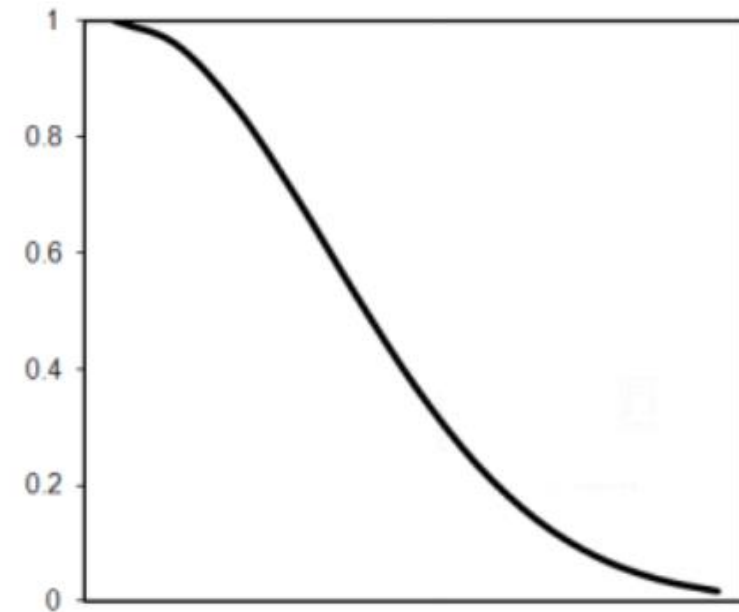
Summing up the initial ratios where residents have access to multiple physician locations

$$\sum \text{Ratio (within } C)$$

Enhanced 2-step Floating Catchment Area (E2SFCA)



- Weight – Gaussian decay function
- Bandwidth: 50



Enhanced 2-step Floating Catchment Area (E2SFCA)

Step 1

Initial ratio to each catchment area centered at physician location

$$Ratio = \frac{\text{Physician}}{\# \text{ Population (within D1)} \times W_1 + \# \text{ Population (within D2)} \times W_2 + \# \text{ Population (within D3)} \times W_3}$$

Step 2

Summing up the initial ratios where residents have access to multiple physician locations

$$\sum \text{Ratio (within D1)} \times W_1 + \sum \text{Ratio (within D2)} \times W_2 + \sum \text{Ratio (within D3)} \times W_3$$

Enhanced 2-step Floating Catchment Area (E2SFCA)

- Is there inequality in primary care spatial accessibility among different races/ ethnicities ?

Stratify population by race/ ethnicity



Calculate E2SFCA Score

Tools

- ArcGIS Desktop
 - ArcMap
 - Network Analyst
 - USWFCA add-in tool

Results

E2SFCA score

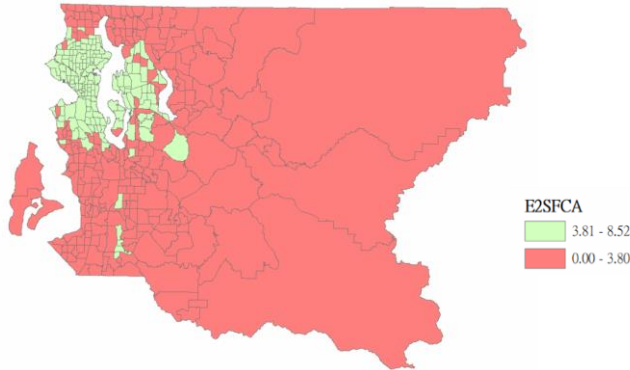
Total mean E2SFCA score: **3.80** SD: 2.29

Race/ Ethnicity	Population	(%)	Weighted E2SFCA score (*1000)	
			Mean	SD
Non-Hispanic White	1308660	63.0	3.81	2.11
Non-Hispanic Black	137919	6.6	4.98	3.54
Hispanic	212241	10.2	4.74	3.50
Non-Hispanic Asian	384359	18.5	4.07	3.30
Non-Hispanic Native Hawaiian and Pacific Islander	16608	0.8	9.29	7.24
Non- Hispanic American Indian and Alaska Native	10965	0.5	4.43	2.90
Other	5738	0.3	4.27	4.18

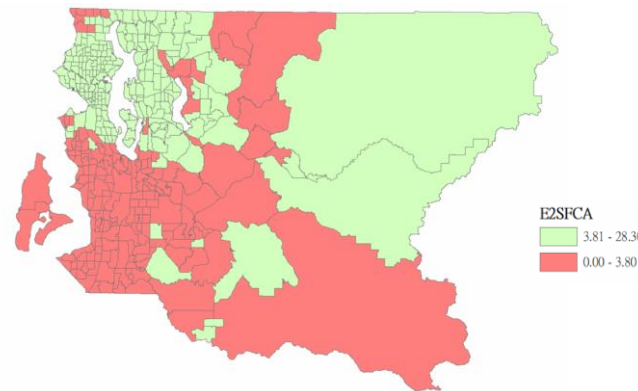
E2SFCA Score

Above/ Under
average score

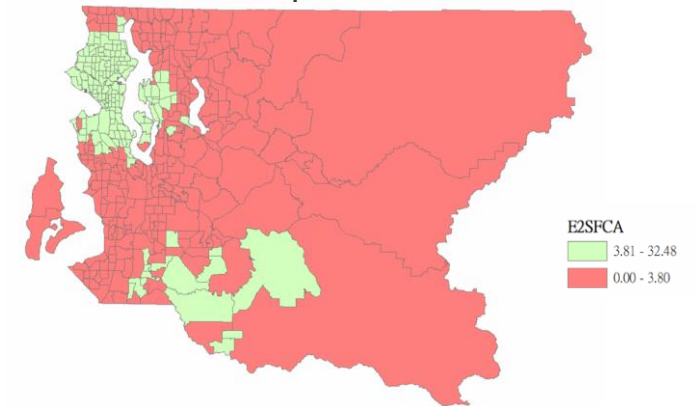
Non-Hispanic White



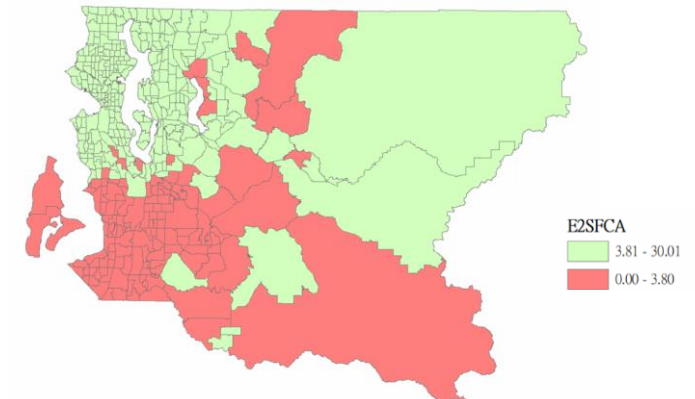
Non-Hispanic Black



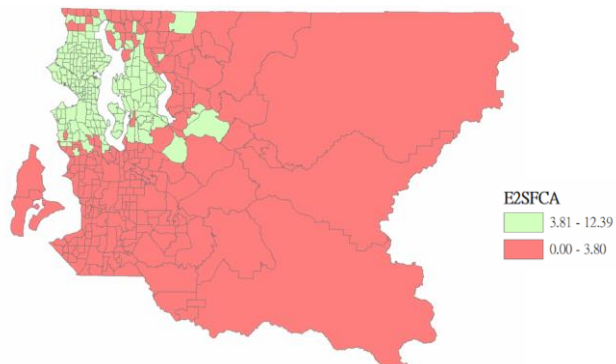
Non-Hispanic Asian



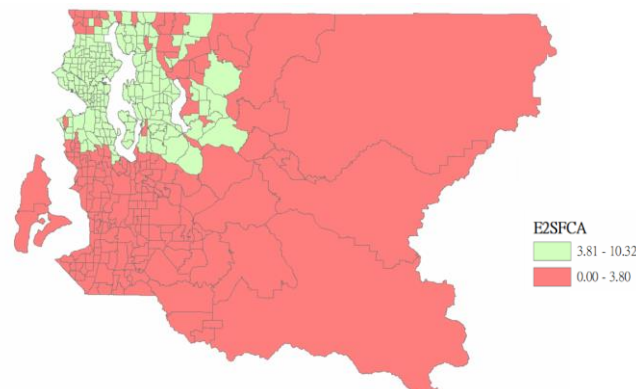
Non-Hispanic Native Hawaiian
and Pacific Islander



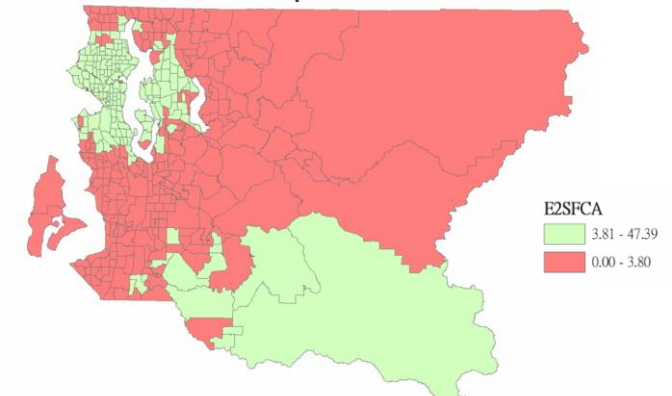
Hispanic



Non-Hispanic American Indian
and Alaska Native



Non-Hispanic Other



Limitations

Factors affect people's decision of seeking care

- Health insurance
- Language Preference
- Telemedicine

Factors may influence driving time estimation

- Traffic jam
- Stop sign
- Road direction

