

Prioritizing Prevention Efforts in the Areas Most Impacted in Los Angeles County

A Syndemic Spatial Analysis of HIV and STI Burden

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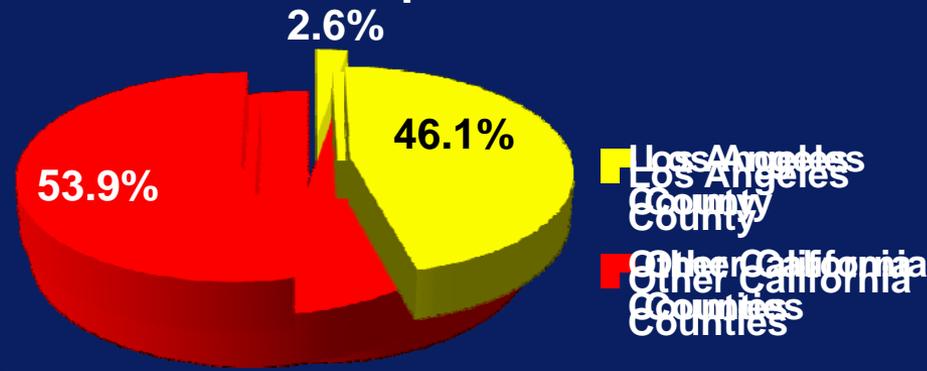
Division of HIV and STD Programs

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Living HIV/AIDS Cases (2 Miles) Population



	Los Angeles County	California
Estimated living HIV/AIDS Cases	59,500	134,401*
Reported HIV/AIDS Cases	43,900	111,100

California

Los Angeles County

Data Source: Los Angeles County Department of Public Health, HIV Surveillance, 2012 California State Department of Public Health, State Surveillance Data, 2012

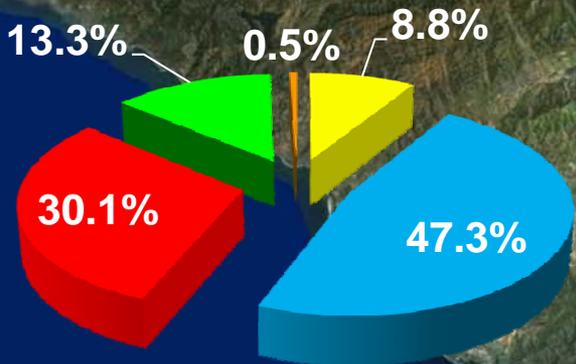
*134,401 calculated assuming 21% of HIV-positive Californians are unaware of their status.
Data Source: U.S. Census, 2010



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Population	Estimated HIV/AIDS Cases
9,848,011	59,500

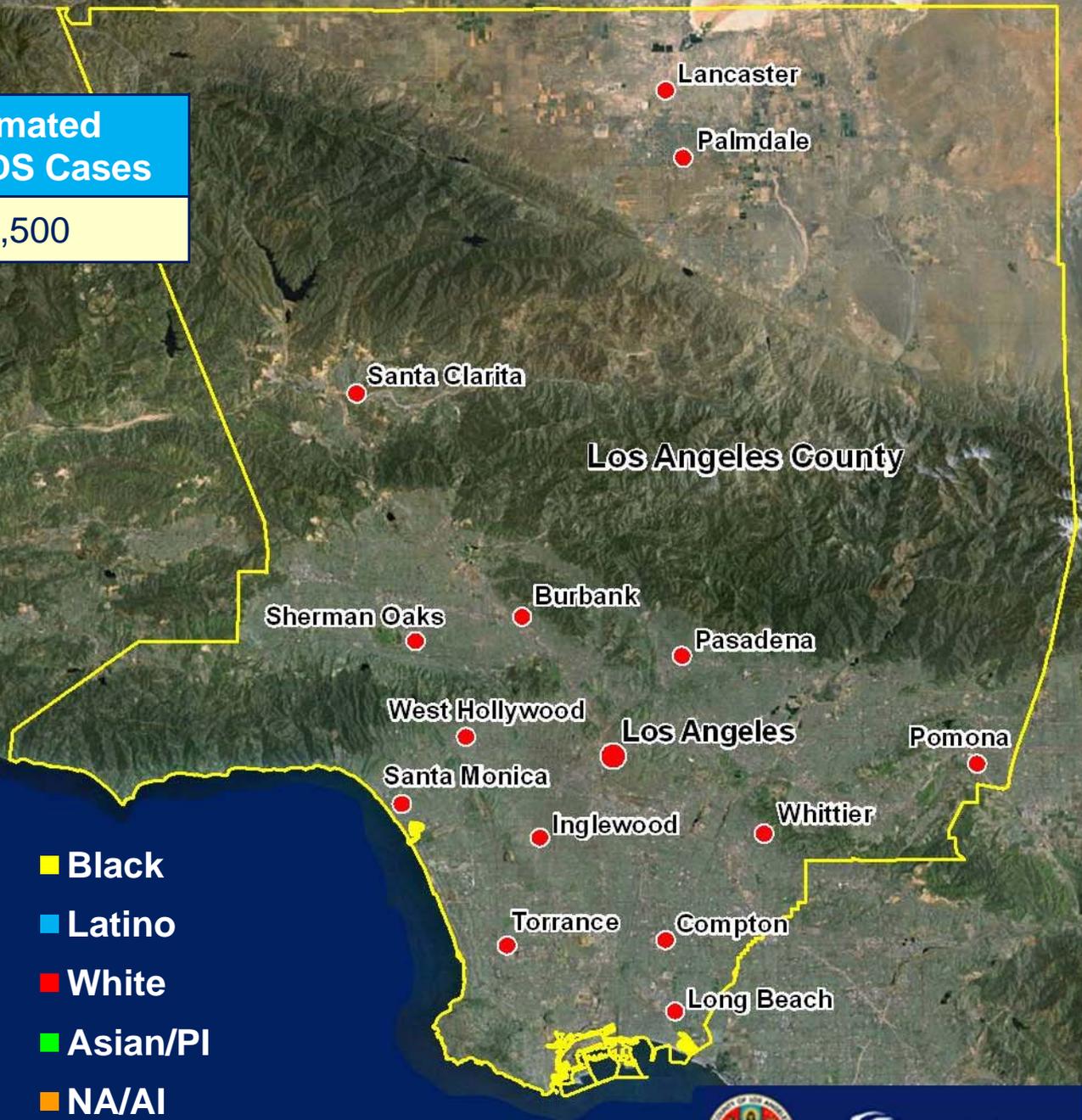
Overall, Race/Ethnicity



HIV/AIDS Cases



- Black
- Latino
- White
- Asian/PI
- NA/AI



Syndemic Planning Model

- Focuses on connections among cofactors of disease
 - HIV
 - Syphilis
 - Gonorrhea
- Considers those connections when developing health policies



Planning for HIV Prevention in LAC

- Who is at risk for HIV?
 - Needs Assessments
 - Program Evaluation
 - Surveillance Data
- What are the effective interventions?
 - Clinical Trials
 - Behavioral Research



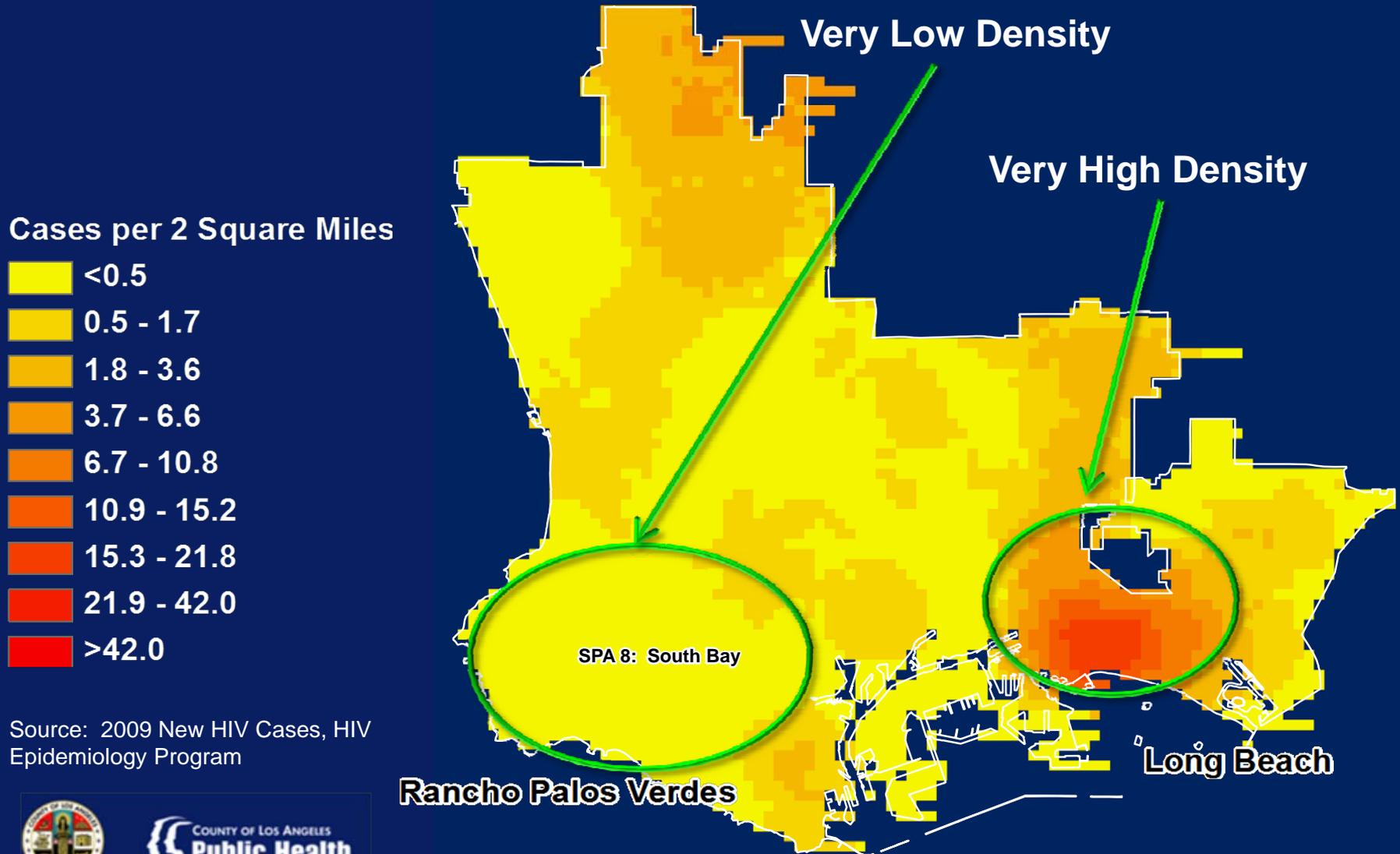
Where should we focus these prevention efforts to make the largest impact with resources we have?



Service Planning Areas (SPAs)



HIV Case Density, 2009, SPA 8



Source: 2009 New HIV Cases, HIV Epidemiology Program



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Spatial Analysis Background

- Services historically prioritized by Service Planning Area (SPA)
 - Disease burden geographical differences are not explained by SPA boundaries
 - The use of GIS allows for small-area analysis and spatial epidemiological techniques
 - The sharing of HIV and STI surveillance data have allowed for a more accurate picture of overall the overall HIV/STI syndemic



Data Sources

- New HIV/STD Cases, 2009
 - 2,036 HIV cases
 - 2,641 Syphilis cases
 - 1,042 with HIV co-infection
 - 7,918 Gonorrhea cases
 - 552 with HIV co-infection
- Case residence addresses were geocoded
 - Overall geocode match >92%



Methodology

- Are HIV/STI cases dispersed or clustered?
 - Average Nearest Neighbor (ANN) statistic, (ArcGIS)
- Can patterns be grouped into manageable clusters?
 - Nearest Neighbor Hierarchical Clustering, (CrimeStat)



Results

Average Nearest Neighbor Summary ¹				
	Index	Z-score	P-value	Result
HIV	0.42	-45.9	<.0001	Clustered
Syphilis	0.26	-73.1	<.0001	Very Clustered
GC	0.18	-140.3	<.0001	Very Clustered

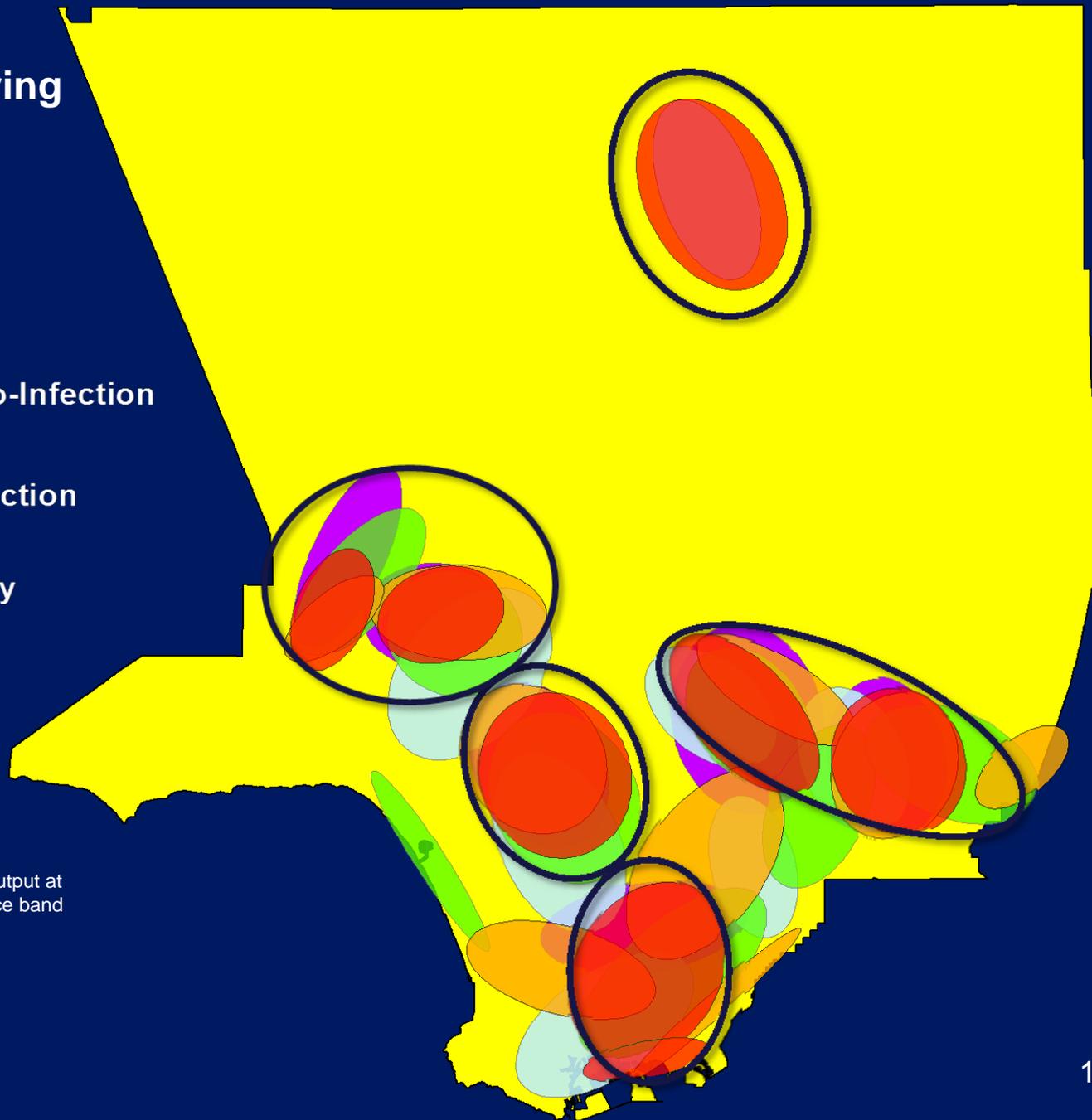
¹Average Nearest Neighbor statistic computed using fixed-distance band conceptualization.



Nearest Neighbor Hierarchical Clustering Summary¹

HIV/STI Clusters

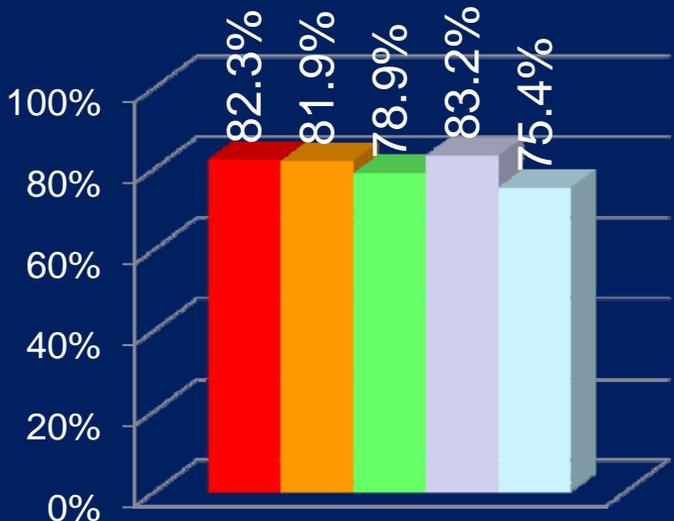
-  HIV Cases
-  Syphilis and HIV co-Infection
-  Syphilis, no HIV
-  GC and HIV co-Infection
-  GC, no HIV
-  Los Angeles County



¹Nearest Neighbor Hierarchical Clusters output at 1.0 standard deviations using fixed-distance band threshold

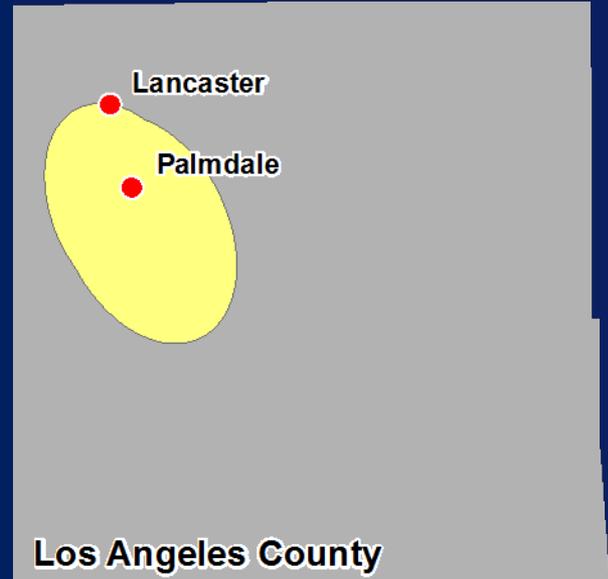


Los Angeles County



% of HIV/STI Cases Within 5 Cluster Areas

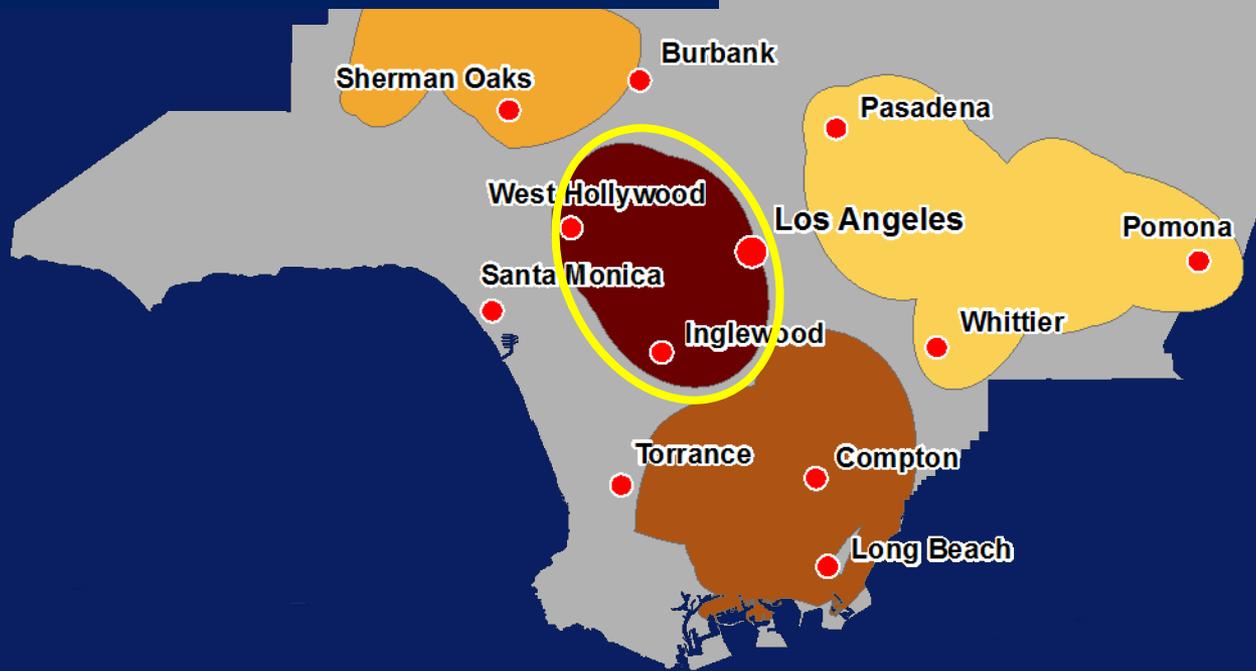
- HIV
- Syphilis+HIV
- Syphilis, no HIV
- GC + HIV
- GC, No HIV



HIV/STI Cluster Areas

HIV Cases, 2009

- 1.3%
- 6.6%
- 9.2%
- 18.4%
- 46.3%
- Los Angeles County

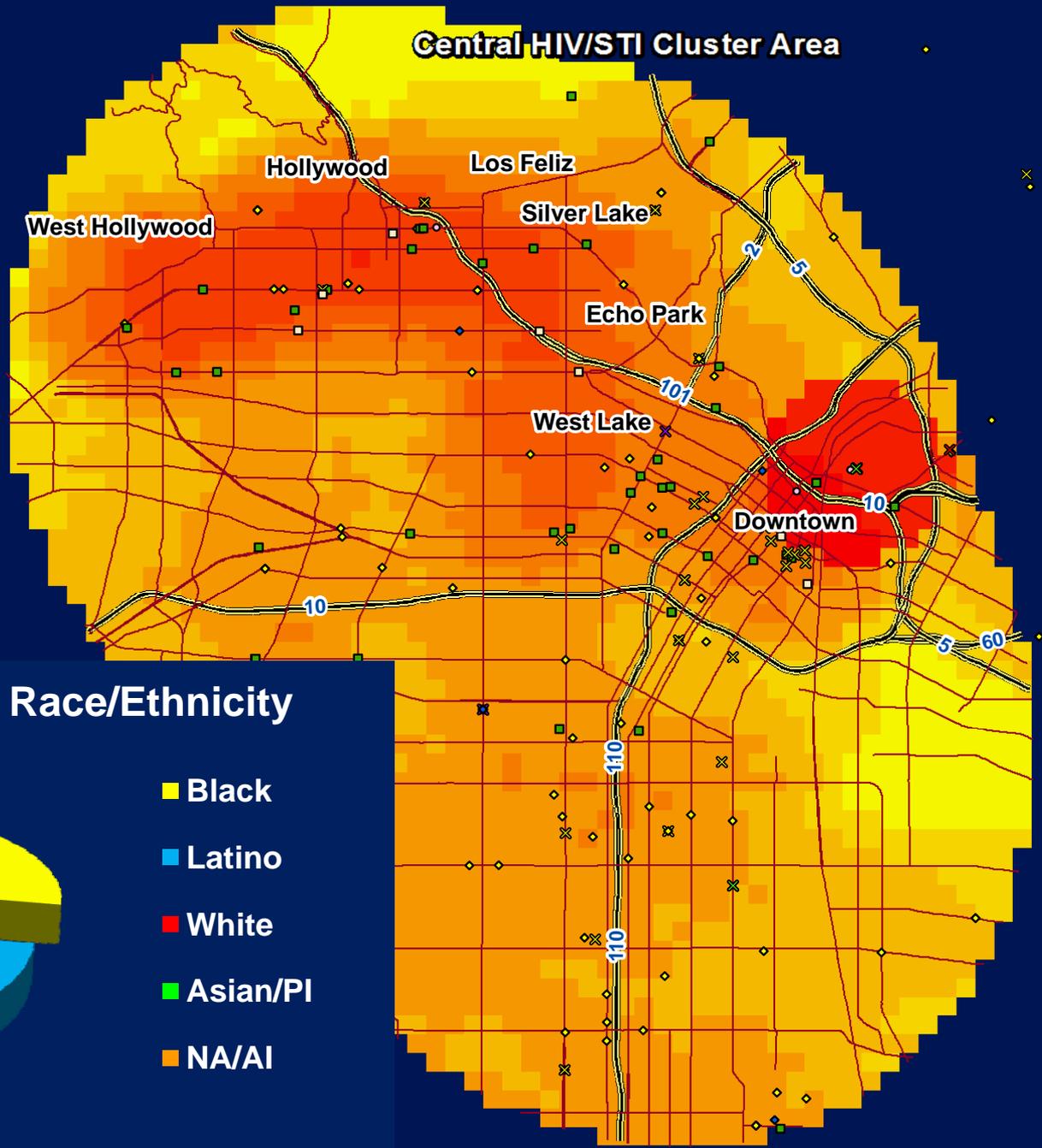


HIV Testing Sites

by Modality

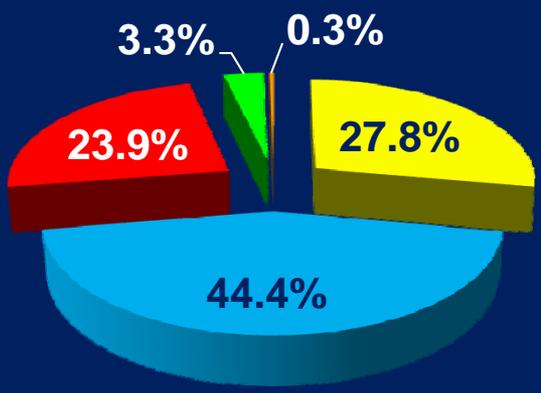
- Bathhouse
- Court-ordered
- Drug Treatment
- × Incarcerated
- Mobile
- × Medical Outpatient
- × Integrated STI
- × Routine
- ◇ STD Clinic
- Store Front
- Major Streets
- Freeways

Central HIV/STI Cluster Area



Cases per 2 Square Miles

HIV Cases, 2009, Race/Ethnicity



- Black
- Latino
- White
- Asian/PI
- NA/AI

Testing Effort Analysis

- What proportion of public HIV testing was done within the cluster areas?

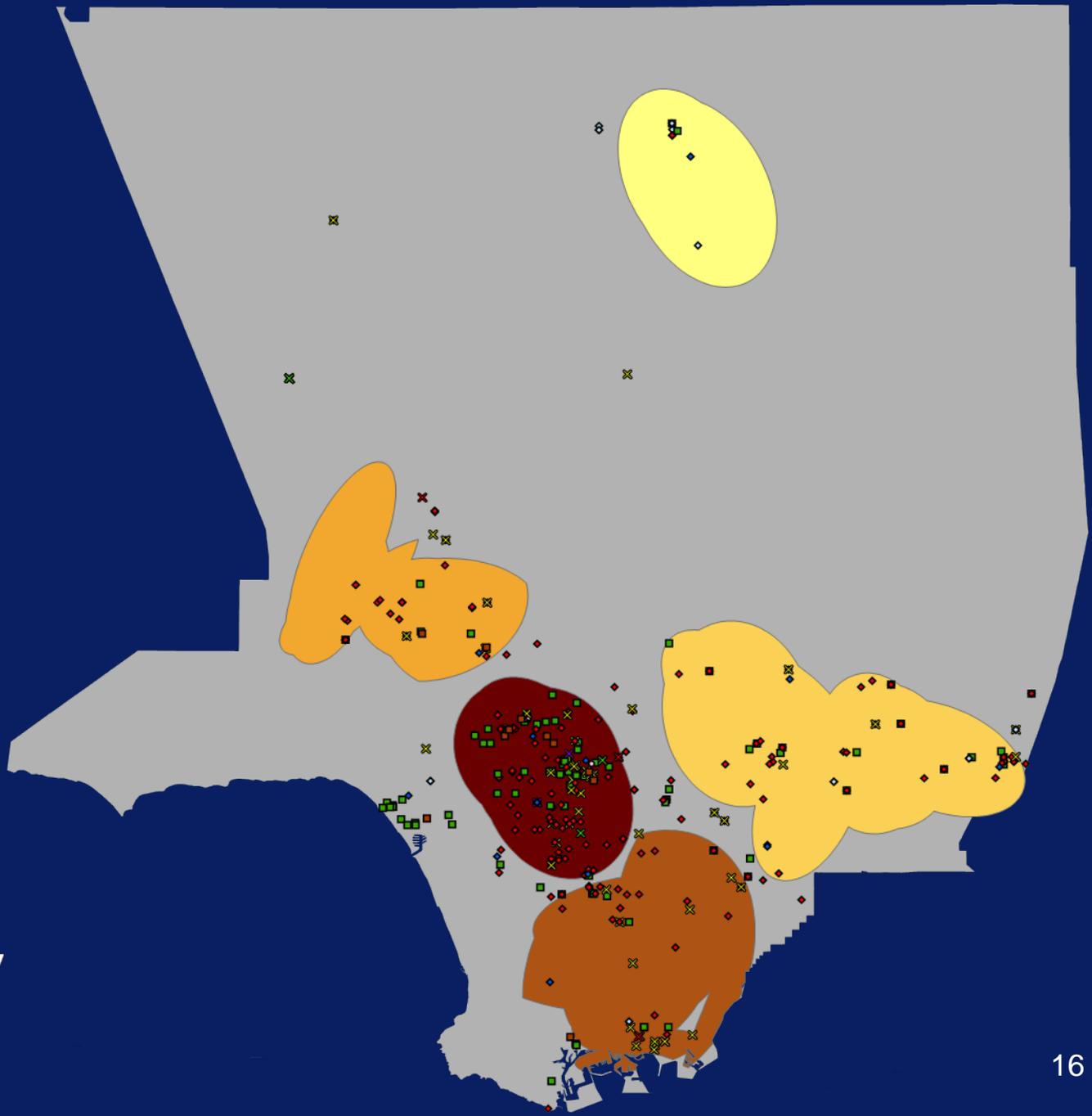
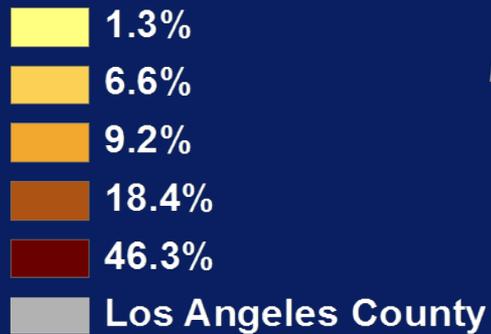


HIV Testing Sites by Modality

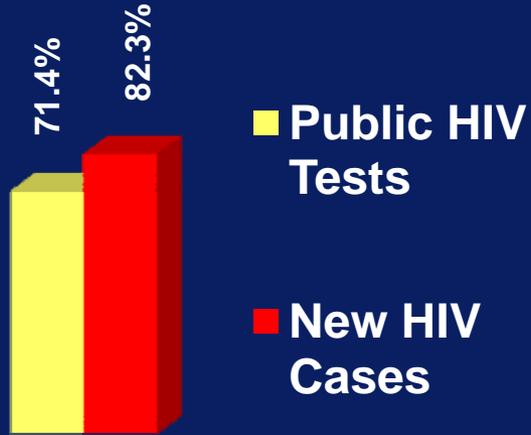
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HIV/STI Cluster Areas

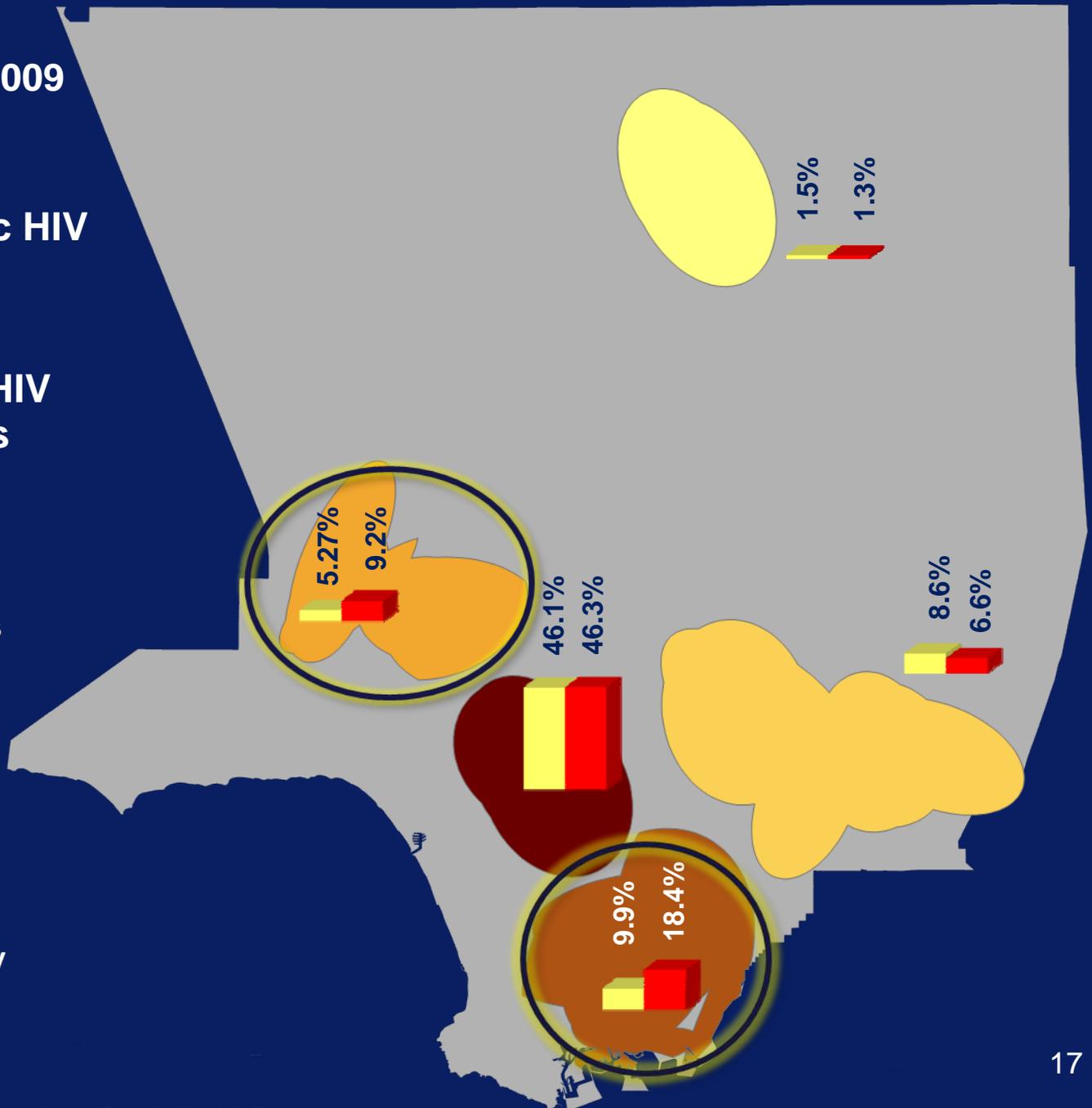
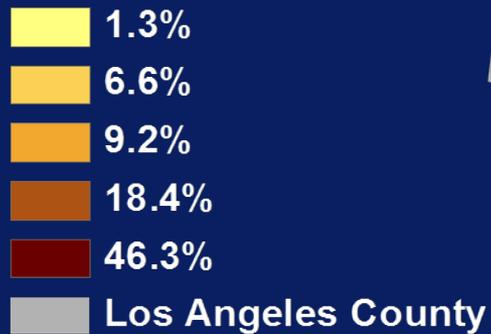
HIV Cases, 2009



Los Angeles County, 2009



HIV/STI Disease Clusters HIV Cases, 2009



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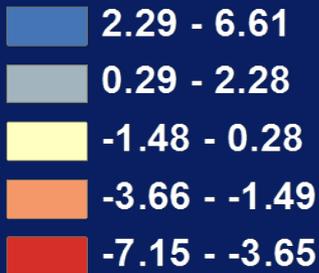
Spatial Correlates of HIV/STI

- Why are new HIV/STI cases clustered in specific areas within Los Angeles County?
 - Dense population areas
 - Income
 - Education Level



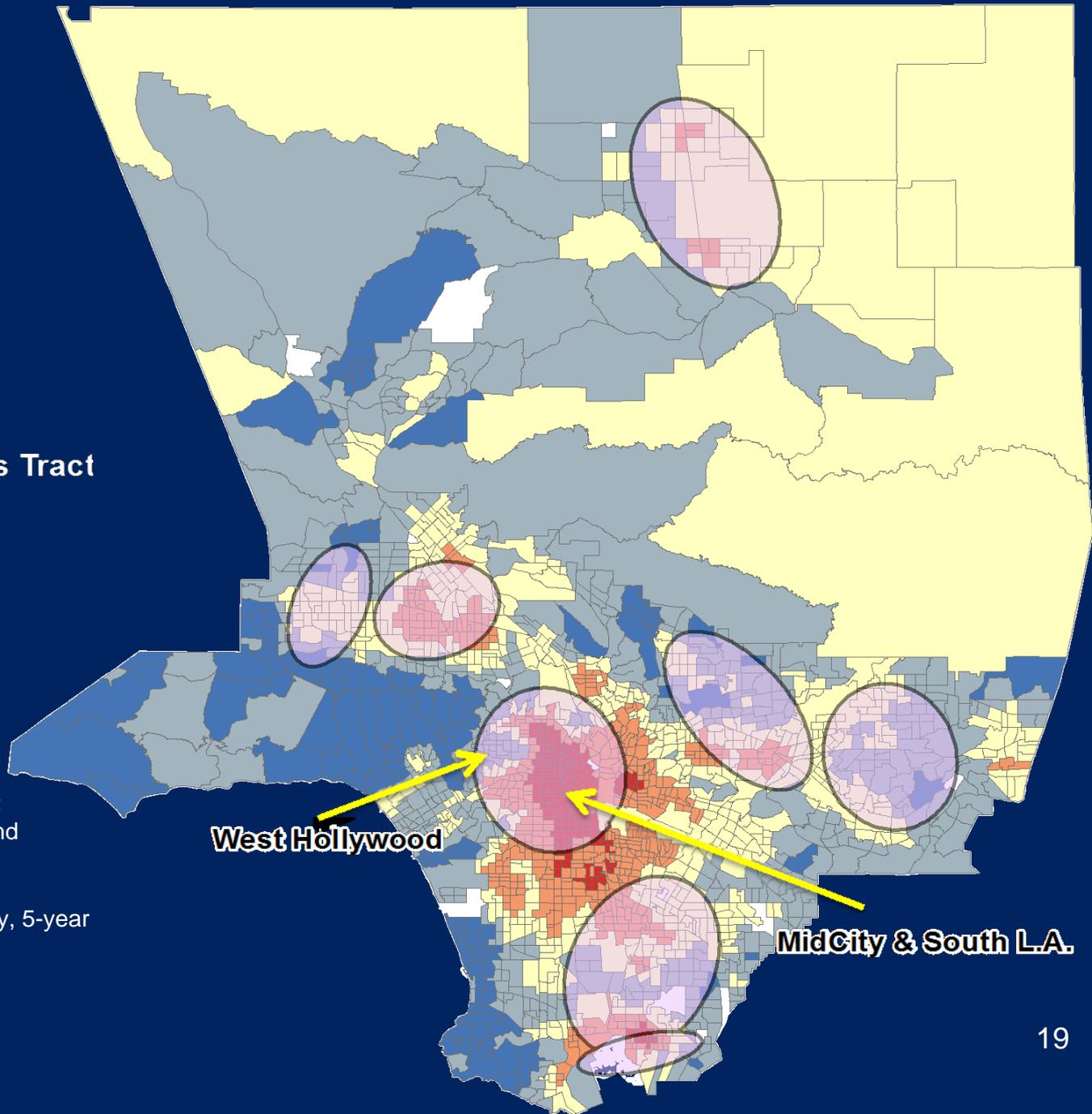
Median Income by Census Tract

Getis-Ord G_i^* Z-score



Getis-Ord G_i^* calculated at 6,000 foot threshold using the fixed distance band spatial conceptualization

Source: American Community Survey, 5-year estimates, U.S. Census



Conclusions

- HIV cases are clustered within Los Angeles County; Syphilis and GC cases are very clustered
- Five cluster groups represent more than 80% of all HIV/STI cases and < 33% of the land area
- Poverty is correlated with 4 of 5 cluster areas
- Current HIV testing resources are mostly in line with HIV/STI syndemic



Limitations

- Spatial Model limited to new HIV/STI cases for 2009
- Missing some co-infection due to unmatched surveillance data
- Assumes that infection occurs within resident case clusters
- Does not fully include homeless populations



Next Steps

- Include multiple years of new cases to assess trends
 - Include prevalence cases
 - Examine relationships of upstream determinants of health with HIV/STI
 - mental health, sub use, poverty, violence
 - Include community viral load as a factor
- Spatial Regression



Next Steps (Cont.)

- Spatial Regression
 - Determine how much of each co-factor is contributing to the spatial pattern of HIV/STI cases



References

1. Mitchell, Andy. *The ESRI Guide to GIS Analysis Volume 2: Spatial Measurements & Statistics*. 1st Edition. Redlands (CA): ESRI Press; 2005.
2. de Smith, Michael J; Goodchild, Michael F; Longley, Paul A. *Geospatial Analysis: A Comprehensive Guide to Principles, Techniques and Software Tools*. 3rd Edition. UK: Splint Spatial Literacy in Teaching; 2011



Thank You!

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