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

A Syndemic Spatial Analysis of HIV and STI Burden

Division of HIV and STD Programs

2012 Department of Public Health Science Summit
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### HIV/AIDS Cases

<table>
<thead>
<tr>
<th></th>
<th>Los Angeles County</th>
<th>California</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated living HIV/AIDS Cases</td>
<td>59,500</td>
<td>134,401*</td>
</tr>
<tr>
<td>Reported HIV/AIDS Cases</td>
<td>43,900</td>
<td>111,100</td>
</tr>
</tbody>
</table>

*134,401 calculated assuming 21% of HIV-positive Californians are unaware of their status.

<table>
<thead>
<tr>
<th>Population</th>
<th>Estimated HIV/AIDS Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>9,848,011</td>
<td>59,500</td>
</tr>
</tbody>
</table>

Overall, Race/Ethnicity

- Black: 35.0%
- Latino: 40.0%
- White: 3.0%
- Asian/PI: 1.0%
- NA/Al: 0.5%
- Overall: 13.3%

Data Source: U.S. Department of Commerce, 2010; Los Angeles County Department of Public Health, HIV Surveillance, 2011
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?
HIV Case Density, 2009, SPA 8

Cases per 2 Square Miles
- <0.5
- 0.5 - 1.7
- 1.8 - 3.6
- 3.7 - 6.6
- 6.7 - 10.8
- 10.9 - 15.2
- 15.3 - 21.8
- 21.9 - 42.0
- >42.0

Source: 2009 New HIV Cases, HIV Epidemiology Program
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

<table>
<thead>
<tr>
<th>Average Nearest Neighbor Summary¹</th>
<th>Index</th>
<th>Z-score</th>
<th>P-value</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIV</td>
<td>0.42</td>
<td>-45.9</td>
<td>&lt;.0001</td>
<td>Clustered</td>
</tr>
<tr>
<td>Syphilis</td>
<td>0.26</td>
<td>-73.1</td>
<td>&lt;.0001</td>
<td>Very Clustered</td>
</tr>
<tr>
<td>GC</td>
<td>0.18</td>
<td>-140.3</td>
<td>&lt;.0001</td>
<td>Very Clustered</td>
</tr>
</tbody>
</table>

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

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

1 Nearest 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

Cases per 2 Square Miles

HIV Cases, 2009, Race/Ethnicity

- Black: 27.8%
- Latino: 44.4%
- White: 23.9%
- Asian/PI: 3.3%
- NA/AI: 0.3%
Testing Effort Analysis

• What proportion of public HIV testing was done within the cluster areas?
HIV Testing Sites by Modality
- Bathhouse
- Court-ordered
- Drug Treatment
- Incarcerated
- Mobile
- Medical Outpatient
- Integrated STI
- Routine
- STD Clinic
- Store Front

HIV/STI Cluster Areas
HIV Cases, 2009
- 1.3%
- 6.6%
- 9.2%
- 18.4%
- 46.3%

Los Angeles County

Source: HIV Testing Services, 2009
Los Angeles County, 2009

Public HIV Tests
New HIV Cases

HIV/STI Disease Clusters
HIV Cases, 2009
- 1.3%
- 6.6%
- 9.2%
- 18.4%
- 46.3%

Source: HIV Testing Services, 2009; City of Long Beach Health Department,
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 Gi* Z-score

- 2.29 - 6.61
- 0.29 - 2.28
- -1.48 - 0.28
- -3.66 - -1.49
- -7.15 - -3.65

Getis-Ord Gi* 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
• Spatial Regression
• Include community viral load as a factor
Next Steps (Cont.)

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


Thank You!

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