Using GIS-Based Density Maps of HIV Surveillance Data to Identify Previously-Unrecognized Geographic Foci of HIV Burden in an Urban Epidemic
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**Objective**
Perform spatial-coordinate-based geospatial analysis of New York City’s (NYC) HIV epidemic to measure geographic distribution of disease with greater precision, detect otherwise obscure concentrations of disease, and improve targeting of resources.

**Methods**
- Persons included were newly-diagnosed with HIV infection in 2007 and reported to NYC HIV Surveillance Registry by Sept 30, 2008
- Residential street addresses matched to spatial coordinates using Geosupport Desktop Edition v. 10.3
- Density map created with ArcGIS version 9.3.1 and the Spatial Analyst extension program
- Compared density map to standard geographic depiction of NYC for the same year (HIV diagnosis rates shown using United Hospital Fund neighborhood as the most discrete geographic unit)
- Any apparent previously-unrecognized concentrations of HIV analyzed further

**Results**

Selection process to create dataset of 2007 New York City newly-diagnosed HIV case-patients with geocoded residential address information:
- 3,787 new HIV diagnoses in 2007 reported to NYC HIV registry
- 215 residential address outside of NYC
- 239 invalid street address
- 69 missing street address
- 43 correctional facility or other institution as residential address
- 39 homeless

Density surface map* of residences of New Yorkers newly-diagnosed with HIV infection in 2007

2007 New York City HIV diagnosis rates per 100,000 by United Hospital Fund (UHF) neighborhood, superimposed with density surface map* of residences of New Yorkers newly-diagnosed with HIV infection in 2007 (top 3 deciles only)

**Conclusions**
- Density mapping enabled identification of a previously-unrecognized geographic focus of HIV in NYC comprised of persons sharing similar demographic characteristics and reported HIV transmission risk.
- Based in part on these findings, NYC DOHMH began funding new HIV risk-reduction interventions that focus on Latino MSM in Queens, with an emphasis on Jackson Heights

**Characteristics of HIV cases newly diagnosed in 2007 in NYC: citywide and in West Queens area of interest**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>All NYC</th>
<th>W. Queens area</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HIV diagnoses N (percent)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>3,787 (100.0)</td>
<td>80 (100.0)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>2,763 (73.0)</td>
<td>74 (92.5)</td>
</tr>
<tr>
<td>Female</td>
<td>1,024 (27.0)</td>
<td>6 (7.5)</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>1,890 (49.9)</td>
<td>7 (8.8)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>1,148 (30.3)</td>
<td>52 (65.0)</td>
</tr>
<tr>
<td>White</td>
<td>633 (16.7)</td>
<td>11 (13.8)</td>
</tr>
<tr>
<td>Asian/P. Islander</td>
<td>100 (2.6)</td>
<td>10 (12.5)</td>
</tr>
<tr>
<td>Native American</td>
<td>4 (0.1)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Multiracial</td>
<td>12 (0.3)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Unknown</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td><strong>Country of origin</strong></td>
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<td></td>
</tr>
<tr>
<td>U.S.</td>
<td>2,252 (59.4)</td>
<td>23 (28.8)</td>
</tr>
<tr>
<td>Foreign</td>
<td>1,021 (27.0)</td>
<td>51 (63.8)</td>
</tr>
<tr>
<td>Unknown</td>
<td>514 (13.6)</td>
<td>6 (7.5)</td>
</tr>
<tr>
<td><strong>Transmission risk</strong></td>
<td></td>
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</tr>
<tr>
<td>MSM</td>
<td>1,516 (40.0)</td>
<td>61 (76.3)</td>
</tr>
<tr>
<td>Injection drug use</td>
<td>247 (6.5)</td>
<td>3 (3.8)</td>
</tr>
<tr>
<td>Heterosexual</td>
<td>923 (24.4)</td>
<td>7 (8.8)</td>
</tr>
<tr>
<td>Perinatal</td>
<td>10 (0.3)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Other</td>
<td>1 (0.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>Unknown</td>
<td>1,090 (28.8)</td>
<td>9 (11.3)</td>
</tr>
<tr>
<td><strong>Clinical status</strong></td>
<td></td>
<td></td>
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<tr>
<td>AIDS</td>
<td>921 (24.3)</td>
<td>16 (20.0)</td>
</tr>
<tr>
<td>HIV non-AIDS</td>
<td>2,866 (75.7)</td>
<td>64 (80.0)</td>
</tr>
</tbody>
</table>

*Estimated cases per mile can be measured by picking any point on the map and drawing a one-mile radius circle around that point. The legend reflects how many new diagnoses would then fall in that circle.

The area outlined in orange is a previously-unrecognized geographically-clustered group of residences of newly-diagnosed HIV case-patients who share similar demographic characteristics and reported HIV transmission risk. This epidemiologically-significant concentration of case-patient residences was not apparent in standard geographic representations of NYC’s HIV epidemic that are based on HIV diagnosis rate by UHF.