

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

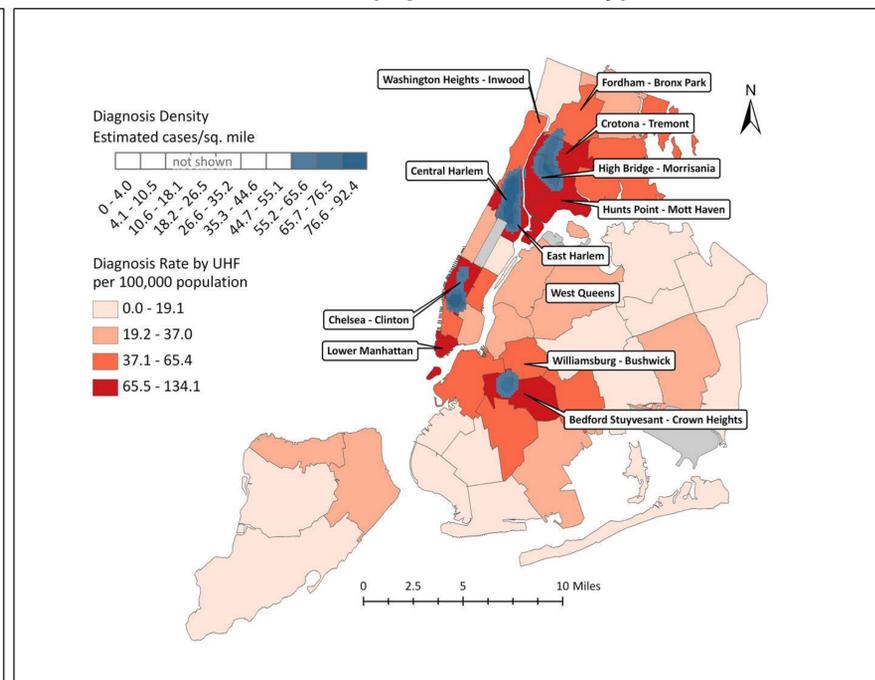
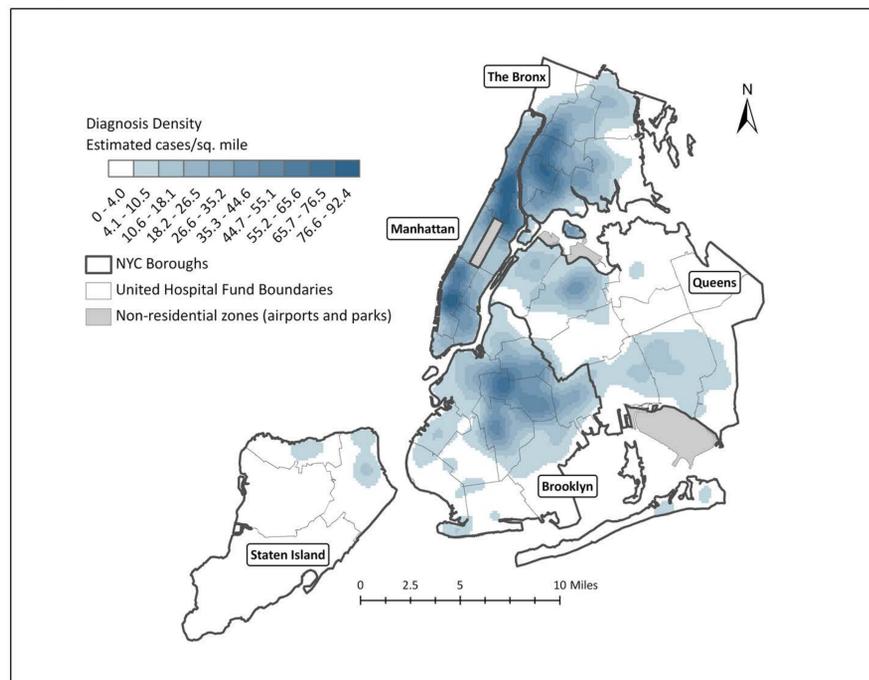
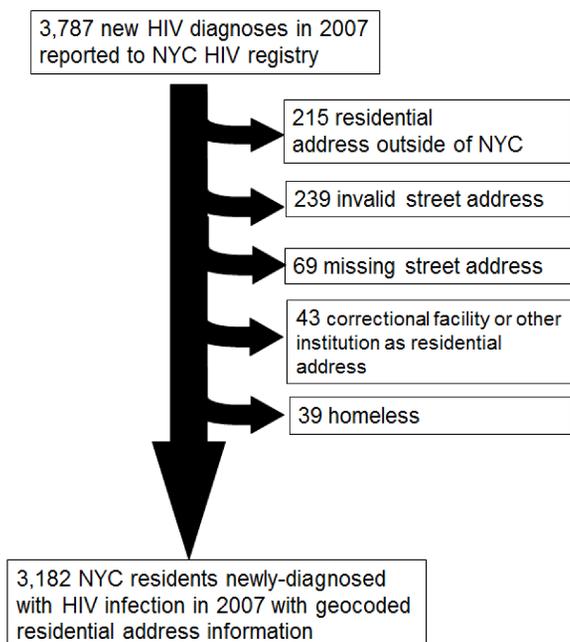
- Density map created with ArcGIS version 9.3.1 and the Spatial Analyst extension program
- Compared density map to standard geographic depiction of NYC for the same year (HIV diagnosis rates shown using United Hospital Fund neighborhood as the most discrete geographic unit)
- Any apparent previously-unrecognized 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

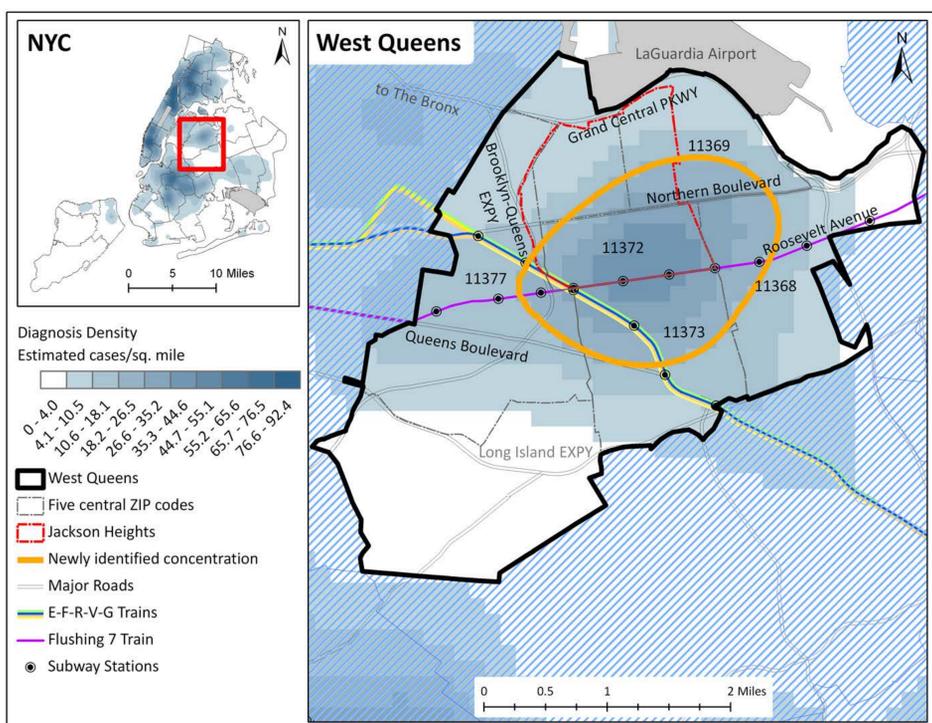
Density surface map* of residences of New Yorkers newly-diagnosed with HIV infection in 2007

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)



*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.

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



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

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

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



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