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Background
- Worldwide prevalence of human immunodeficiency virus (HIV) in men who have sex with men (MSM) remains high, with high rates of HIV incidence in MSM in Thailand. 1,2
- The Silom Community Clinic (SCC), established in 2005 by Thai-U.S. intergovernmental collaboration, provides free, anonymous, and rapid testing for HIV and many sexually transmitted infections to MSM. 2
- SCC is a major testing venue for MSM and has been a key partner for 10 years in CDC’s efforts to reach their target MSM population and build community trust. 2
- Voluntary counseling and testing (VCT) data from SCC contains a wealth of information on HIV and STIs in MSM in Bangkok over the past 10 years.

Public Health Significance
- Spatial nature of HIV in Thailand not yet described, nor is geography of MSM in Bangkok well understood.
- Application of geographic information systems (GIS) to HIV in Thailand allows for holistic understanding of epidemic. 3

Project Aims and Goals
- Characterize spatial aspects of the Thai HIV epidemic to better address high incidence rates in Thai MSM.
- Provide analytic support for efforts of SCC, policy initiatives, and community organizations to implement prevention measures in a high-risk population.
- Describe geographic distribution of HIV infection in Thai MSM.
- Determine geospatial factors linked with HIV serostatus.
- Evaluate accessibility of public MSM HIV clinics in Bangkok.
- Create spatial files and methods for sharing with partners.

Research Questions
- Do SCC clients living near SCC have lesser HIV prevalence?
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- Have new clinics expanded the proportion of SCC clients who live near testing venues?
- Does SCC’s client geographic profile change over time?

Project Partners
- Service Workers in Group (SWING)
- Rainbow Sky Association of Thailand (RSAT)
- Bangkok Metropolitan Authority (BMA)
- SCC MSM Community Advisory Board (M-CAB)
- Thailand Ministry of Public Health (MOPH)
- U.S. Centers for Disease Control and Prevention (CDC)
- Division of HIV/AIDS Prevention (DHAP)
- Division of Global HIV/AIDS (DGH)

Population Served
- Both HIV-negative and HIV-positive MSM in Bangkok to whom services are provided by community organizations.

Methods
- Spatial Temporal Methods
  - Conducted ecologic spatial analysis of SCC client data using postal codes as a modifiable area unit
  - Analyzed 8,945 VCT clients contributing 35,000+ visits
  - Paired visit dates into three periods based on history of HIV testing for MSM in Bangkok:
    - Jan. 2010 - Sep. 2013
  - Overlaid geocoded public HIV testing venue locations for MSM and spatial visit data from SCC in choropleth maps using ArcGIS 10.1
  - Calculated distance between centroids of client postal codes and testing venues as proxy for accessibility

Statistical methods
- Chi-square tests of independence, tests of trend, and Kruskal-Wallis for differences in demographics of first visit and 2) HIV serostatus at first visit
- Calculated prevalence odds ratios (ORs) and 95% confidence intervals for measures of associations
- Global Moran’s I test used to evaluate spatial autocorrelation of client visit density and HIV prevalence

Results
- Of 8,945 total clients, 76.3% lived in Bangkok and 15.2% lived within 5 kilometers (km) of SCC at first visit.
- HIV prevalence was 30.9% in MSM study population.
- Proportion living within 2 km of any testing venue increased from 12.6% in Period 1 to 41.0% in Period 3 (p<0.01).
- No evidence of spatial autocorrelation and clustering of HIV prevalence (Moran’s I=1.58, p<0.11) or visit density by postal code (Moran’s I=1.17, p<0.24)

Lessons Learned
- Applied epidemiologic methods to meaningful data
- Gained proficiency with spatial and statistical software programs to better conduct research analyses
- Acquired experience working in international field setting as well as within governmental public health setting
- Presented to, met, and collaborated with community and governmental stakeholders in design, analysis, and presentation stages of practice
- Fostered an interpersonal, independent, professional research experience

Limitations
- Postal codes not uniform in size or shape
- Lack of population denominators for area units
- Ecologic studies can lead to ecological fallacies in analysis
- No systematic recording of risk factors of interest
- Centroid analysis may not be sufficient for estimating distance

Conclusions
- Spatial predictors are associated with time period of visit, but not with HIV serostatus in MSM VCT clients at SCC.
- Spatial data highlight time-varying client demographics.
- Accessibility of public HIV testing venues to clinic-using MSM has increased over time, but nearly 60% of MSM clients live a significant distance away from any venue.
- SCC appears to serve MSM individuals from all across the city, not just within a certain distance of the clinic.

Next Steps
- Further analysis using advanced spatial statistics
- Geographically-weighted and Poisson regression
- Population interpolation from district-level data
- Application of spatial methods to additional questions
- Movement and loss-to-follow-up in SCC cohort studies
- Hotspots and clusters of sex work in Bangkok
- Activity space analysis in upcoming R01 grant
- Future spatial data to be collected by different area unit
- Implementation of training manual to aid community organizations in mapping
- Presentation of research at and feedback from CROI

Citations