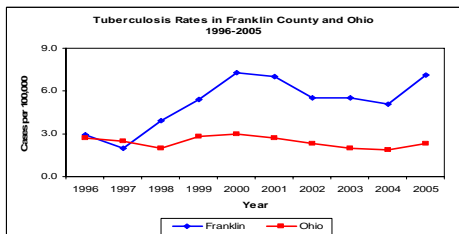
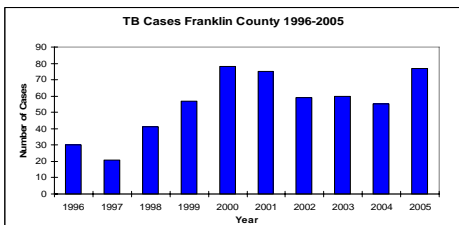


# TRENDS IN TUBERCULOSIS FRANKLIN COUNTY, OHIO 1996-2005

Abdoul Shmohamed, MPH/HSA and Ben DeJesus, MS ♦ Office of Assessment & Surveillance, Columbus Public Health

## Background

In 2005, Franklin County reported 77 new cases of tuberculosis (TB) for a case rate of 7.1 per 100,000 persons, marking the end of a 4 year decreasing trend. The county continues to see changes in both demographic and distribution of TB cases. Reasons for persistence of TB in the United States have been attributed to the high incidence of TB in foreign-born individuals and to reactivation of latent TB infections. A review of local TB cases shows that since 1998, Franklin County has had an increase in the number of foreign-born TB cases and since 2000 the foreign-born rates have been above the national average. Further descriptive and geographic analysis of Columbus and Franklin County TB cases can help gain an understanding of TB patterns and relationships that would support the department in their management of TB.



## Objectives

- To examine the descriptive epidemiology of tuberculosis (TB) infection trends in Franklin County, OH over a ten-year period, 1996-2005.
- To preliminarily examine spatial distribution of TB cases by area in Franklin County, OH over a six-year period, 2000-2005.
- To provide a basis for future examinations into the epidemiology of TB infection in Franklin County, OH and the application of GIS and spatial analysis to help answer additional questions regarding clustering and location-based interventions.

## Methods

TB surveillance data reported to the Columbus Public Health, Ben Franklin TB Control Program from January 1, 1996 to December 31, 2005, were extracted from the Tuberculosis Surveillance Information Management System (TIMS). The reporting system is designed to capture any new case or relapsed TB cases in Franklin County, OH. A total of 553 confirmed cases were included in the descriptive epidemiological analysis. Franklin County, OH population estimates and projections by year were also obtained from the U.S. census for the same time period.

Descriptive analysis of the TB data included tabulation of the total number of cases and number of cases by selected demographics, such as gender, race, race by gender, age, foreign-born status, age by foreign-born status, and country of origin for each year from 1996 through 2005. Additionally, cases with selected risk factors, such as HIV co-infection, homelessness and substance abuse were tabulated for each year. Crude TB incidence rates were also tabulated for each year in the study period. Tabulation was done using Microsoft Excel.

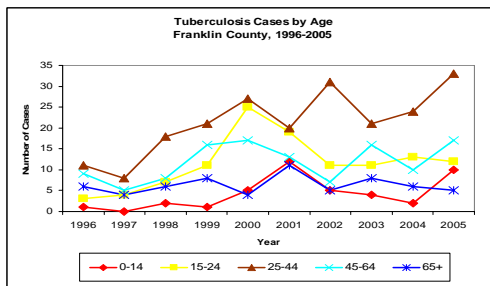
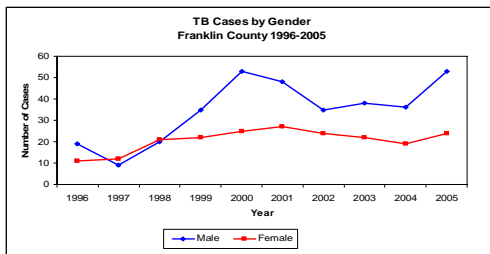
To look at the distribution of TB cases within the Franklin County area, initial exploratory geographic and spatial analysis was also conducted on a subset of the TB data spanning cases from 2000 through 2005. Cases were geocoded to a point location in Franklin County corresponding to the reported resident address information in the TIMS database. Of the 404 reported TB cases from 2000-2005, 382 (~95%) were successfully geocoded and included in the aggregate analysis.

## Methods continued...

Spatial point patterns for all cases, as well as foreign-born and U.S. born cases separately were reviewed using the eyeball method and also evaluated using the kernel density method. Additional distribution analysis included the calculation of the mean center and standard deviation ellipse of the all cases, and foreign-born and U.S. born cases separately. Initial spatial cluster analysis was performed on aggregated counts of cases by census tract using the spatial scan statistic method to indicate the most likely primary and secondary clusters and calculation of relative risk. Geographic analysis was done using ESRI ArcGIS, SatScan, and CrimeStat III.

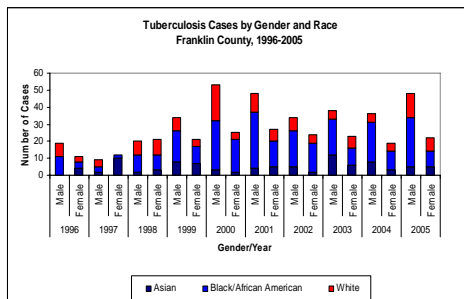
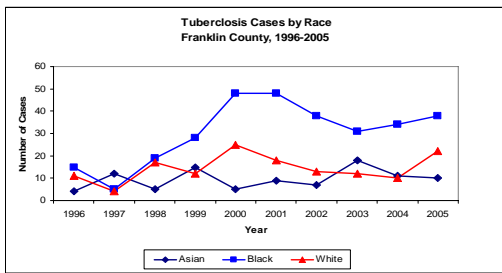
## Descriptive Analysis Results:

- During the past decade, TB incidence in Franklin County increased by 40%, from an annual average of 4.3 cases per 100,000 population during the mid to late 1990s to 6.0 during 2001-2005.
- TB cases reported among males have been increasing since 1998 and accounted for 63% of all cases reported since 1996.
- The largest proportion of cases among age groups (39%) occurred in the 25-44 years old age group.
- TB in young children has been increasing as well. The TB cases in children under 14 years old rose from 2.2/100,000 (5 cases) in 2000 to 4.3/100,000 (10 cases) in 2005.
- TB disproportionately affects black and African American ethnic groups in Franklin County and accounted for 53% of all cases since 1996 followed by whites with 26%, and Asians with 18%.



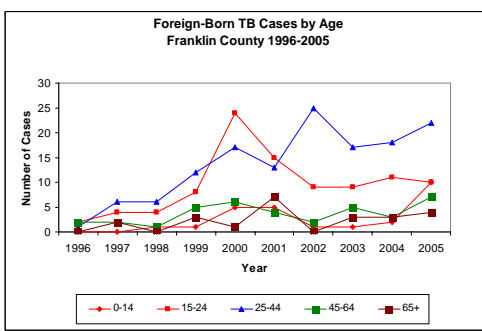
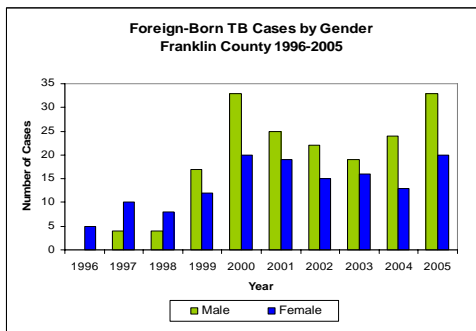
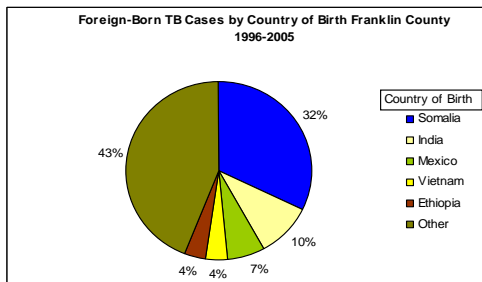
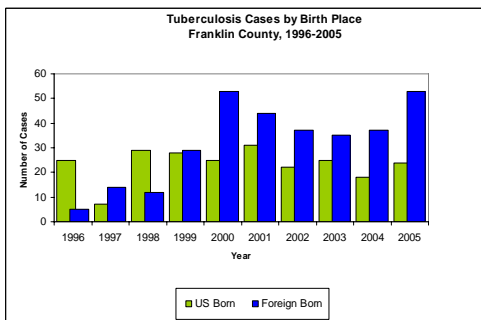
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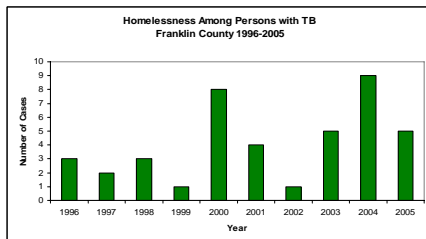
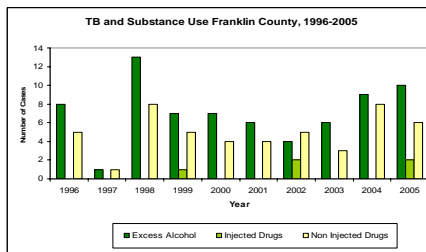
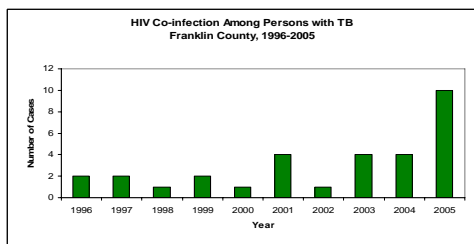
## Descriptive Analysis Results - Foreign-born:

- The proportion of TB cases that are foreign-born has been increasing over the past ten years from 16% in 1996 to 68% in 2005. Reflecting national trends, since 1996, foreign-born TB cases in Franklin County account for 58% of all reported cases. This increase may possibly be explained by the increasing number of immigrants and refugees populations moving into central Ohio.
- There was a change in the gender distribution of foreign-born TB cases, with large majority of cases being male 58%.
- The 25-44 year category of Foreign-born TB cases accounted 43% followed by the 15-24 year category with 30%.
- Foreign-born cases were primarily seen in persons from Somalia (32%), India (10%), and Mexico (7%).



## Descriptive Analysis Results - Risk Factors:

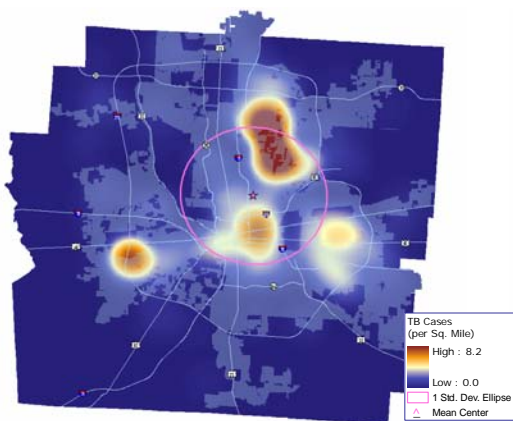
- TB cases co-infected with HIV increased from 2 (6%) cases in 1996 to 10 (13%) in 2005.
- The risk factor of homelessness has been fluctuating over the past ten years with sporadic increases seen in 2000 (8 cases) and 2004 (9 cases).



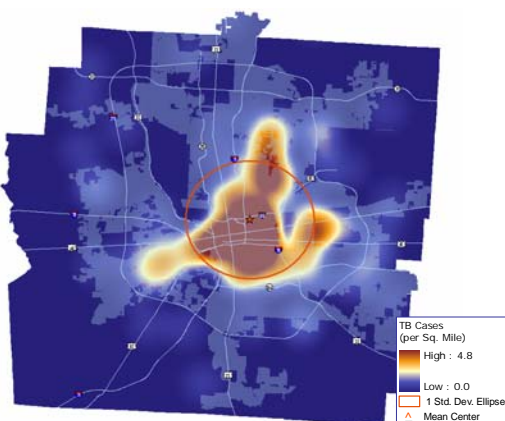
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2000-05 TB Case Density per Sq. Mile and Dispersion of Points (Mean center and Standard Deviation Ellipse)



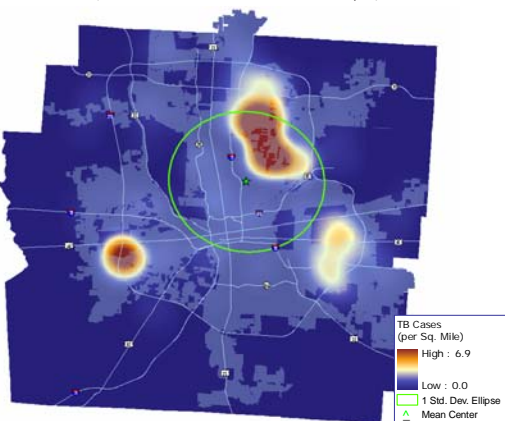
2000-05 U.S. Born TB Case Density per Sq. Mile and Dispersion of Points (Mean center and Standard Deviation Ellipse)



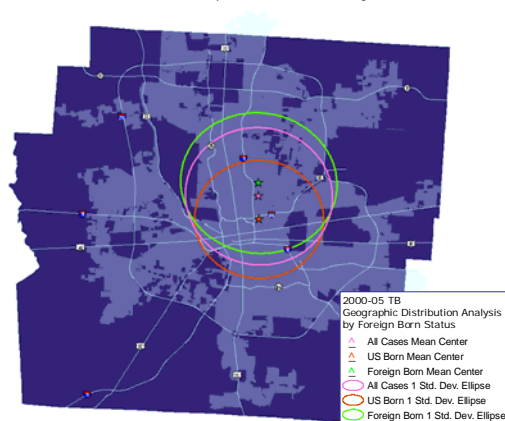
## Selected Exploratory Geographic Distribution Analysis Results

- In Franklin County, OH, the highest concentration of TB cases from 2000-05 are located in the near north-east, south-west, and central portions of Columbus.
- U.S. born cases are generally concentrated closer to the center of Columbus and are less dispersed.
- foreign-born cases are more dispersed than U.S. born cases, and are more heavily concentrated in the near north-east of Columbus.

2000-05 Foreign-born TB Case Density per Sq. Mile and Dispersion of Points (Mean center and Standard Deviation Ellipse)



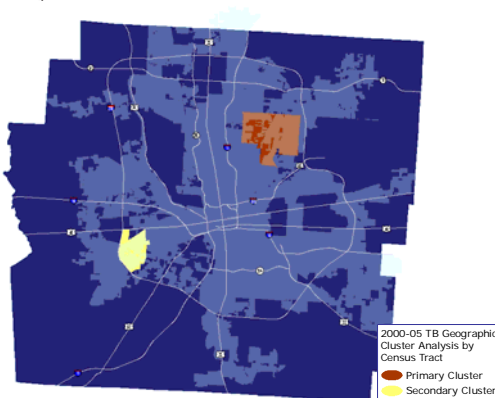
2000-05 Total, U.S. Born, and Foreign-born TB Case Mean Center and Standard Deviation Ellipse Distribution Overlay



## Selected Preliminary Geographic Risk and Cluster Analysis Results

- After adjustment for population distribution, preliminary cluster analysis indicates that the most likely area of excess TB incidence (where the rate is higher within versus outside this area) is located within a group of census tracts located in the north-east portion of Columbus.
- A secondary cluster is located in census tracts in the south-west portion of the city.
- The most likely primary cluster had a relative risk of 7.9 ( $P < 0.001$ ), while the secondary cluster had a relative risk of 4.3 ( $P < 0.001$ ).

2000-05 Most Likely TB Primary and Secondary Geographic Cluster by Census Tract



2000-05 TB Relative Risk (Observed Rate/Expected Rate) by Census Tract

