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**Risk Factors for Tuberculosis in  
Kansas from 2004-2013: Analysis of  
Kansas TB Surveillance Data**

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University of Kansas School of Medicine – Wichita  
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**Presenter Disclosures**

**Sonalli Kurlekar**

“No relationships to disclose”

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**Aims and Objectives**

- Discuss risk factors for tuberculosis (TB) based on race, ethnicity & US-vs. foreign-born in Kansas.
- Discuss characteristics & incidence rates of TB between US- vs. foreign-born population.
- Identify high risk groups for TB among foreign-born in Kansas.

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## Tuberculosis: Still A Significant Public Health Concern

- TB is the second greatest killer worldwide due to a single infectious agent.<sup>1</sup>
- TB is a challenging disease to diagnose, treat, & control with increasing rates among specific population groups.<sup>2</sup>




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### Who Carries the Burden of Tuberculosis?


... the most vulnerable

Poor, crowded & poorly ventilated settings




TB linked to HIV infection, malnutrition, alcohol, drug and tobacco use, diabetes

Half a million women and over 65,000 children die of TB each year



Migrants, prisoners, minorities, refugees face risks, discrimination & barriers to care



WHO. (2011). <http://www.who.int/tb/>

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## TB Infection and TB Disease

Latent TB Infection (LTBI)	TB Disease (in the lungs)
Inactive, contained tubercle bacilli in the body	Active, multiplying tubercle bacilli in the body
TST or blood test results usually positive	TST or blood test results usually positive
Chest x-ray usually <b>normal</b>	Chest x-ray usually <b>abnormal</b>
Sputum smears and cultures <b>negative</b>	Sputum smears and cultures may be <b>positive</b>
<b>No symptoms</b>	<b>Symptoms</b> such as cough, fever, weight loss
<b>Not infectious</b>	<b>Often infectious</b> before treatment
<b>Not a case of TB</b>	<b>A case of TB</b>

Latent Tuberculosis Infection: A Guide for Primary Health Care Providers; <http://www.cdc.gov/tb/publications/tbi/diagnosis.html#1>




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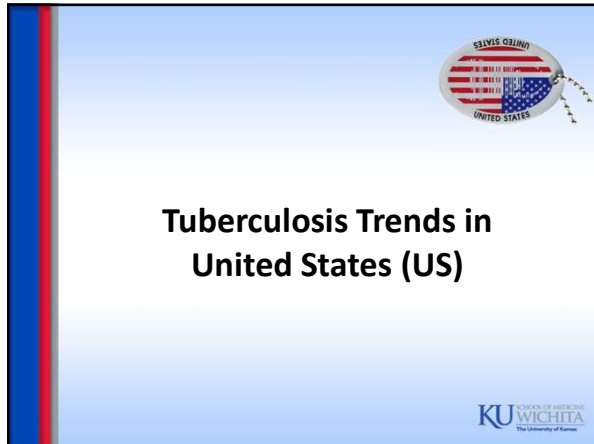
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**Tuberculosis Trends in United States (US)**

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**Overview of TB trends in US**

- In 2013, total 9,588 new TB cases were reported with an incidence rate of 3.0 cases per 100,000 population.<sup>9</sup>
- Although case counts & incidence rates continue to decline, elevated rates of TB in specific populations is a challenge.

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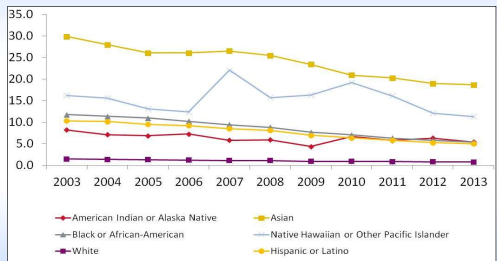
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**TB Case Rates\* by Race/Ethnicity, US, 2003–2013**



Year	American Indian or Alaska Native	Black or African-American	White	Asian	Hispanic or Latino	Native Hawaiian or Other Pacific Islander
2003	7.5	10.5	2.0	28.5	10.5	15.5
2004	7.0	10.0	2.0	27.0	10.0	15.0
2005	6.5	9.5	2.0	25.5	9.5	14.5
2006	6.0	9.0	2.0	25.5	9.0	14.0
2007	5.5	8.5	2.0	26.0	8.5	21.5
2008	5.0	8.0	2.0	25.0	8.0	16.0
2009	4.5	7.5	2.0	23.5	7.5	16.0
2010	4.0	7.0	2.0	21.5	7.0	20.0
2011	4.0	6.5	2.0	20.0	6.5	18.5
2012	4.0	6.0	2.0	19.0	6.0	13.5
2013	3.0	5.5	2.0	18.5	5.5	11.5

\* Cases per 100,000 population .  
<http://www.cdc.gov/tb/statistics/surv/surv2013/default.htm>

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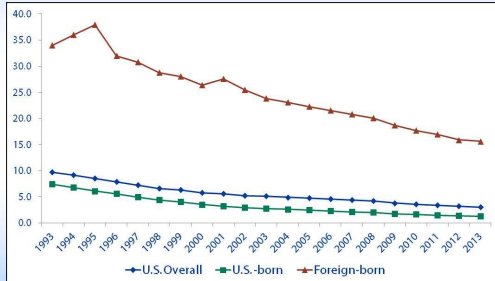
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### TB Case Rates\*in US-born vs. Foreign-Born Persons, 1993-2013



\*Cases per 100,000.  
<http://www.cdc.gov/tb/statistics/surv/surv2013/default.htm>



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### Research Questions

1. What are the demographic patterns for TB disease in Kansas from 2004-2013?
2. What are the differences in TB incidence among US- vs. foreign-born population?
3. Discuss the effect of length of stay before TB diagnosis based on world region of origin?



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### Methods



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### Study Participants

- Kansas Department of Health & Environment:  
The available data on patients reported (N= 544) active TB cases from Kansas Tuberculosis surveillance database from Kansas Tuberculosis Control Program between 2004 - 2013.<sup>6</sup>



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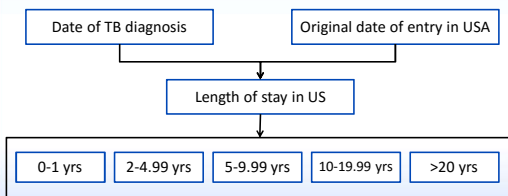
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### Procedures

- New variable for Length of stay in US was created :



Reported Tuberculosis in the United States, 2013  
<http://www.cdc.gov/tb/statistics/reports/2013/pdf/report2013.pdf>



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### Procedures

- The Kansas Annual Summary of Vital Statistics was used to derive population denominators to calculate TB case rates.<sup>8</sup>
- TB rates were calculated with respect to race/ethnicity, foreign vs.US-born per 100,000 population.



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**Data Analysis**

- Descriptive statistics were calculated for categorical variables.
- Logistic regression was used to predict the odds of having TB disease by race, ethnicity and country of origin.
- $p < 0.05$  was considered significant.



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**Results**



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**Research Question 1**  
**Demographic Patterns of Active TB Disease**



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### Demographics

	Frequency (N= 544)	Percent %
<b>Race Category</b>		
Non-Hispanic White	271	49.8
Non-Hispanic Asian	148	27.2
Non-Hispanic African American	111	20.4
Other Races	14	2.57
<b>Ethnicity</b>		
Not Hispanic	382	70.2
Hispanic or Latino	162	29.7
<b>Country of Birth</b>		
Foreign-born	345	63.4
US-born	199	36.5




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### Research Question 2 Differences in Incidence of TB in Kansas from 2004 -2013




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
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### Characteristics of TB in US-born & Foreign-born Population

	Kansas Population			
	Foreign born		US-born	
	Number (N=345)	Frequency (%)	Number (N=199)	Frequency (%)
<b>Race</b>				
Non-Hispanic Asian	140	40.5	8	4.0
Non-Hispanic White	139	40.2	131	65.8
Non-Hispanic Black	60	17.3	51	25.6
Others	5	1.4	9	4.5
Total	345	100	199	100
<b>Ethnicity</b>				
Not Hispanic or Latino	220	63.7	162	81.4
Hispanic or Latino	125	36.2	37	18.5
Total	345	100	199	100




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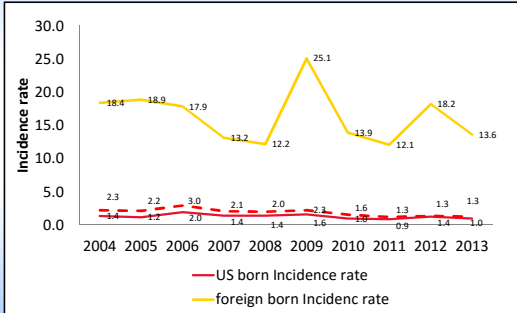
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### TB Incidence Rate\* in Kansas for Us- vs. Foreign-born 2004 - 2013



\* Cases per 100,000 population

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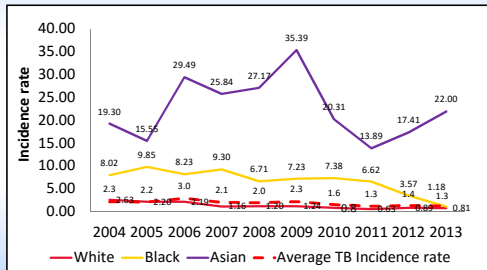
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### TB Incidence Rate\* by Race from 2004 -2013 in Kansas



Cases per 100,000 population  
 \*race category "other" was not included in the calculating the rate due to very small sample size (n=5) and lack of denominator




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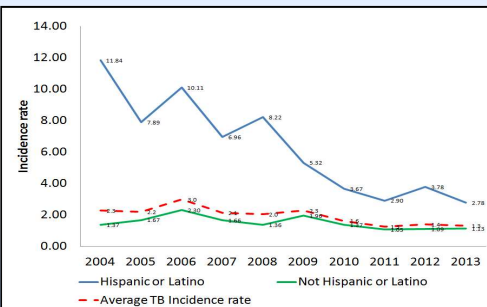
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### TB Incidence Rate\* by Ethnicity From 2004 -2013 in Kansas



Cases per 100,000 population




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### Unadjusted Odds Ratio of Having a TB disease with 95% C.I.

Race*	95% Confidence		P-value
	OR Estimate	Interval	
Non-Hispanic Asian	16.42	13.2 - 20.56	<0.0001
Non-Hispanic Black	5.079	4.07 - 6.33	0.0414
Non-Hispanic White	Reference		
<b>Ethnicity</b>			
Hispanic/Latino	4.14	3.44 - 4.98	<0.0001
Not Hispanic/Latino	Reference		
<b>Country of Birth</b>			
Foreign-Born	26.00	21.60 - 31.29	<0.0001
US-Born	Reference		

\*race category "other" was excluded in analysis due to very small sample size (n=5) These are unadjusted OR with only two variables considered in the regression model (Time period and each variable)

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### Research Question 3 Length of Kansas Residence Before TB Diagnosis




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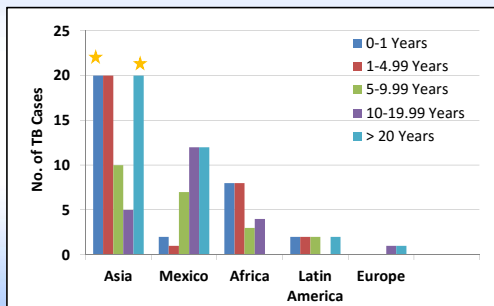
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### Distribution of Length of Stay Before TB Diagnosis by Region




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**Discussion**



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**Race/Ethnicity Disparity in TB**

- As per our study, 50.8% of the TB cases that occurred in Kansas were among racial/ethnic groups other than white population.
- The average TB incidence rate among the Asian-Americans & Hispanics was highest among all the racial/ethnic groups in Kansas.



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**Differences between US- vs. foreign-born population**

- As per our study, foreign-born population has a substantially elevated risk of TB as compared to the US-born in Kansas.
- The resulting disparities between US-and foreign-born persons have raised concerns about TB elimination in Kansas.<sup>9</sup>



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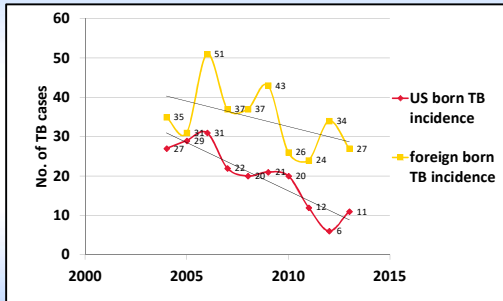
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### Change in TB Incidence from 2004-2013 in Kansas



Nationally the rate of decline in TB incidence among foreign-born persons (2.1%) lagged behind the rate of decline among the US-born (8.4%) in 2013, causing the proportion of TB cases in foreign-born persons to continue to increase (up to 64%).<sup>3</sup>

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### Effect of Length of US Residence

- There is neither a policy to test TB in adult foreign-born residing in US for more than 5 years nor for those originating from high TB endemic countries.
- We may need to update current guidelines about TB screening and diagnosis.<sup>11,12</sup>



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### Latent Tuberculosis Infection (LTBI)

- Most of the foreign-born TB cases may be attributed to acquisition of infection (LTBI) in the country of origin & subsequent activation of TB disease after their arrival in US.<sup>3,15,16</sup>
- Strong effort required to address the burden of LTBI among foreign-born persons in Kansas.



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### Conclusions

- Significant disparities in the incidence of TB exists between US- vs. foreign-born and racial/ethnic groups.
- Elevated risk of TB infection occurs among foreign-born, especially those originating from Asia.



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### Study Implications

To achieve statewide TB elimination following approach may be initiated:

- Find and treat foreign-born persons with LTBI before and or after they come in Kansas.
- Provide education to health providers about risk, screening and diagnosis of TB in high risk groups.<sup>12</sup>



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## Questions



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