

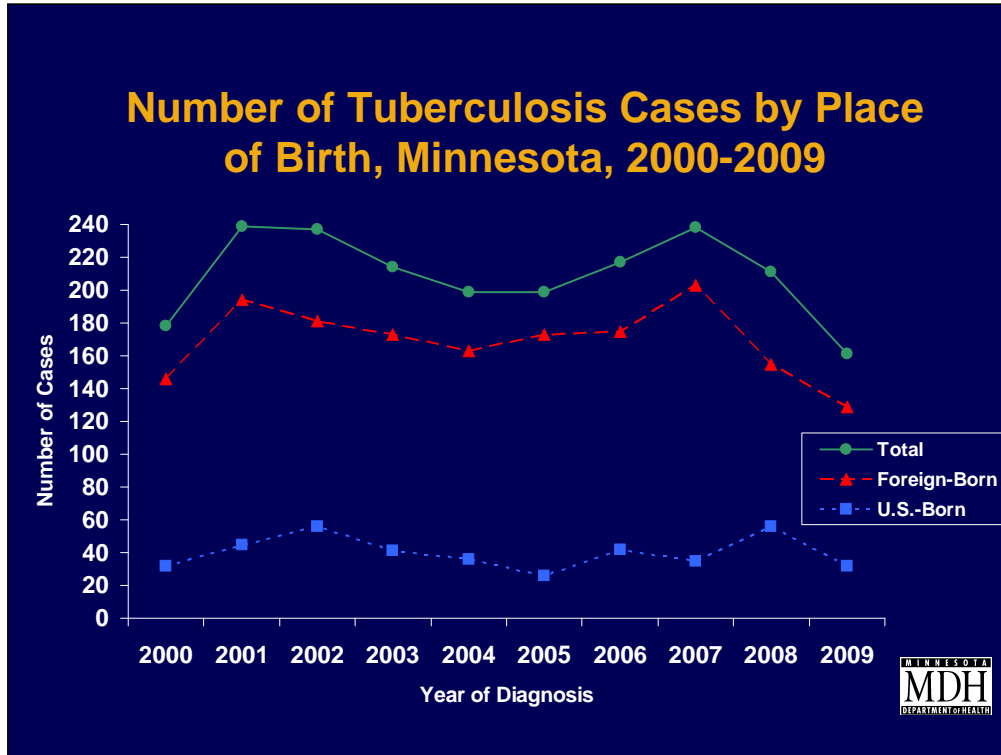
# The Epidemiology of Tuberculosis Among Foreign-Born Persons in Minnesota, 2005-2009



Minnesota Department of Health  
Tuberculosis Prevention and Control Program  
(651) 201-5414

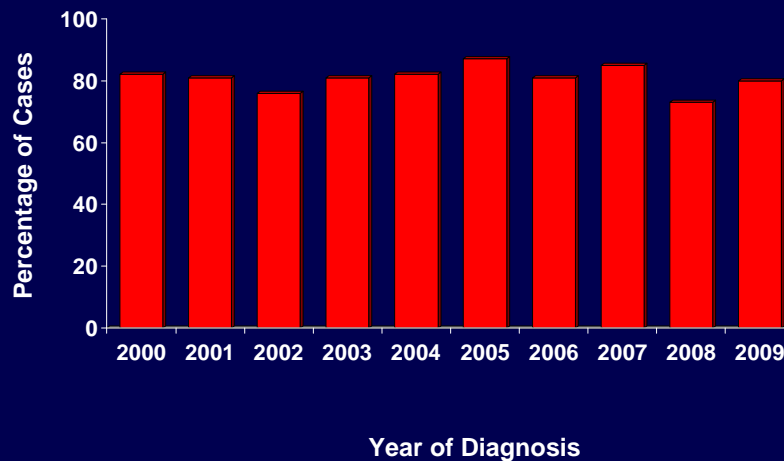
Tuberculosis surveillance data for Minnesota are available on the Web at:  
[www.health.state.mn.us/tb](http://www.health.state.mn.us/tb)

The purpose of this slide set is to characterize the epidemiology of tuberculosis (TB) disease reported among foreign-born persons in Minnesota. The slides present data in tabular and graphic formats that describe both demographic and clinical characteristics of foreign-born TB case-patients and demonstrate how these characteristics differ between foreign-born and U.S.-born patients. The data in these slides pertain to cases of active TB disease reported from 2005 through 2009. In accordance with the Minnesota Communicable Disease Reporting Rule, physicians, laboratories, and other health care providers are required to report all confirmed and suspected cases of TB disease among persons residing in Minnesota to the Minnesota Department of Health; such reports serve as the source of information for the data presented in these slides.



After increasing throughout much of the 1990s, the incidence of TB disease in Minnesota fluctuated during the past decade, with peaks in 2001 (239 cases) and 2007 (238 cases). In 2009, 161 new cases of TB disease (3.1 cases per 100,000 population) were reported statewide, which represents a 24% decline from the 211 TB cases reported in 2008. In particular, from 2008 to 2009 in Minnesota, the number of TB cases reported among U.S.-born persons decreased 43%, while that among foreign-born persons decreased 23%.

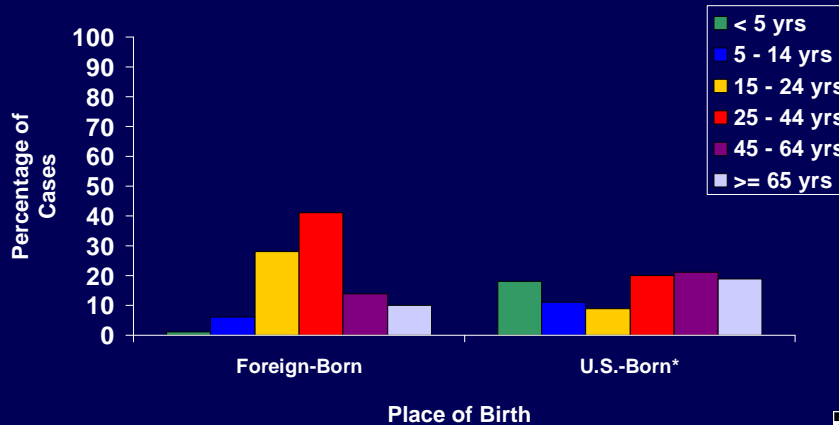
## Percentage of Tuberculosis Cases Born Outside the U.S., Minnesota, 2000-2009



The most distinguishing characteristic of the epidemiology of TB disease in Minnesota is the very high percentage of cases that occur among persons born outside the United States. During the decade from 2000 through 2009, the annual percentage of foreign-born persons among TB cases reported in Minnesota ranged from 73% in 2008 to 87% in 2005 and averaged 81%. In contrast, 58% of TB case-patients reported nationwide in the U.S. during this 5-year period were foreign-born.

The very high percentage of TB cases in Minnesota that occur among foreign-born persons is influenced by the large per capita number of refugees and immigrants in Minnesota and the demographics of those newly arriving refugees and immigrants, many of whom come from regions of the world where TB is prevalent. Notably, however, the percentage of foreign-born TB case-patients reported in Minnesota declined 8% from 2005 to 2009, which reflects decreasing numbers of new primary refugees and immigrants arriving in Minnesota, particularly since 2006.

## Tuberculosis Cases by Age Group and Place of Birth, Minnesota, 2005-2009



\* Includes U.S.-born children of foreign-born parent(s)



The age distribution of TB case-patients reported in Minnesota differs markedly between U.S.-born and foreign-born patients. The majority (69%) of foreign-born TB case-patients reported in Minnesota from 2005 to 2009 were 15 to 44 years of age, whereas persons 45 years of age or older constituted 41% of U.S.-born TB case-patients. These strikingly different age distributions reflect the differing risks of exposure to TB among these populations. For example, just over half of newly-arrived immigrants with Class B TB designation and refugees that arrived in Minnesota during this 5-year period are young adults; TB case-patients of this age likely were infected with TB in their countries of origin prior to being diagnosed with active TB disease in Minnesota. Among U.S.-born persons, adults who were alive 50 or more years ago, when TB was much more prevalent in Minnesota than during more recent decades, are much more likely than younger U.S.-born persons to have been infected with TB. As these older U.S.-born persons age and develop other medical conditions that may weaken their immune systems, they may progress from remotely acquired latent TB infection to active TB disease.

The proportion of children less than 5 years of age was much larger among U.S.-born TB case-patients reported in Minnesota from 2005 through 2009 than among foreign-born case-patients (18% versus 1%, respectively). Approximately 75% of these young U.S.-born pediatric case-patients were attributed to children born in the U.S. to foreign-born parents. These first-generation U.S.-born children appear to experience an increased risk of TB disease that more closely resembles that of foreign-born persons. Presumably, these children may have been exposed to TB as a result of travel to their parents' country of origin and/or visiting or recently-arrived family members who may be at increased risk for TB acquired overseas.

## Tuberculosis Cases by Race/Ethnicity and Place of Birth, Minnesota, 2005-2009

<u>Race/Ethnicity*</u>	<b>Foreign-Born Cases</b>		<b>U.S.-Born Cases</b>	
	<u>No.</u>	<u>(%)</u>	<u>No.</u>	<u>(%)</u>
White	20	( 2)	68	(36)
Black	503	(60)	57	(30)
Asian	229	(27)	14	( 7)
American Indian	0	( 0)	21	(11)
Multi-racial	0	( 0)	1	( 1)
<u>Hispanic/Latino</u>	<u>83</u>	<u>(10)</u>	<u>30</u>	<u>(16)</u>
<b>Total</b>	<b>835</b>	<b>(100)</b>	<b>191</b>	<b>(100)</b>

\*Race categories do not include persons of Hispanic/Latino origin.



The racial and ethnic distribution of TB case-patients reported in Minnesota from 2005 through 2009 differed markedly between foreign-born and U.S.-born populations. Among foreign-born TB case-patients, the majority (60%) were black, 27% were Asian, 10% were Hispanic or Latino, and 2% were white. In contrast, among U.S.-born TB case-patients, the largest proportion (36%) were white, 30% were black, 16% were Hispanic or Latino, 11% were American Indian, 7% were Asian, and 1% were multi-racial. Regardless of place of birth, however, non-white racial and ethnic populations were disproportionately affected by TB, comprising larger proportions among TB case-patients than their proportional representation in the state's population overall.

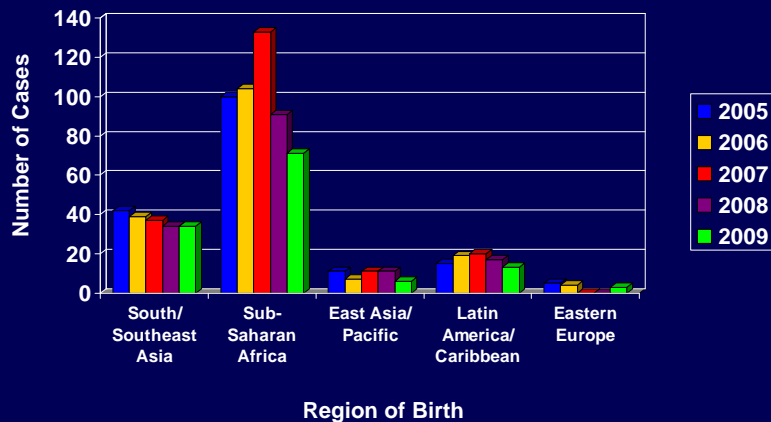
## Tuberculosis Cases by Sex and Place of Birth, Minnesota, 2005-2009

<u>Sex</u>	Foreign-Born Cases	U.S.-Born Cases	Total
	<u>No. (%)</u>	<u>No. (%)</u>	<u>No. (%)</u>
Male	417 (50)	118 (62)	535 (52)
Female	418 (50)	73 (38)	491 (48)
<b>Total</b>	<b>835 (100)</b>	<b>191 (100)</b>	<b>1,026 (100)</b>



This slide presents TB cases, by sex, reported in Minnesota from 2005 through 2009. Slightly more males than females were represented among TB cases reported statewide, which is typical of TB cases reported in the United States. The preponderance of males versus females, however, was limited to U.S.-born TB case-patients (62% versus 38%, respectively), among whom the differential was markedly pronounced. Among foreign-born TB case-patients, essentially half were male and half were female.

## Foreign-Born Tuberculosis Cases by Region of Birth and Year of Diagnosis, Minnesota, 2005-2009



This slide depicts the number of TB cases reported in Minnesota from 2005 through 2009 by region of birth and year of diagnosis. The different colors represent the year of diagnosis. The bars representing the number of TB cases are grouped by region of birth - - for example, South/Southeast Asia, sub-Saharan Africa, etc. The trends visible in this slide are influenced by both the global incidence of TB in specific regions worldwide and also by the frequently changing trends and demographics of immigration to Minnesota. For example, Minnesota is home to a large population of persons born in South/Southeast Asia, which is a region of the world where TB is highly prevalent. Consequently, the annual numbers of TB cases reported among this population have been moderately high but relatively stable from 2005 through 2009. The number of TB case-patients reported in Minnesota among persons originating from sub-Saharan Africa (which is another area where TB is very common) was high during each of the past 5 years. Notably, however, as the number of new primary refugees and immigrants arriving in Minnesota from sub-Saharan Africa has declined markedly since 2006, the number and percentage of TB case-patients reported statewide who originate from that region also has decreased, from 66% of foreign-born TB cases reported in Minnesota during 2007 to 55% in 2009.

## Foreign-Born Tuberculosis Cases by Region of Birth, Minnesota, 2005-2009

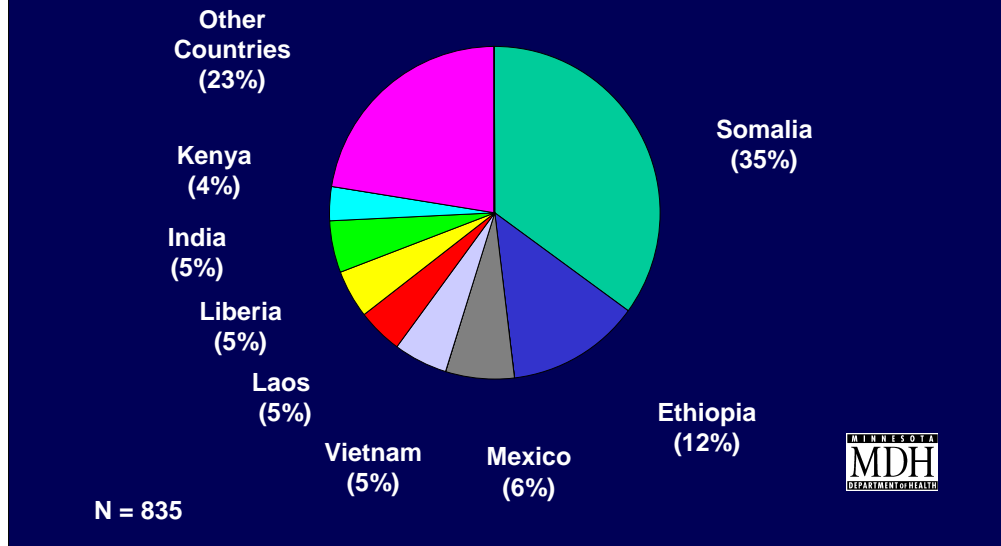
<u>Region of Birth</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>
	<u>No. (%)</u>	<u>No. (%)</u>	<u>No. (%)</u>	<u>No. (%)</u>	<u>No. (%)</u>
East Asia/Pacific	11 ( 6)	7 ( 4)	11 ( 5)	11 ( 7)	6 ( 5)
Eastern Europe	5 ( 3)	4 ( 2)	0 ( 0)	0 ( 0)	3 ( 2)
Latin America/Caribbean	15 ( 9)	19 (11)	20 (10)	17 (11)	13 (10)
North Africa/Middle East	0 ( 0)	2 ( 1)	2 ( 1)	1 ( 1)	2 ( 2)
South/Southeast Asia	42 (24)	39 (22)	37 (18)	34 (22)	34 (26)
Sub-Saharan Africa	100 (58)	104 (59)	133 (66)	91 (59)	71 (55)
Western Europe	0 ( 0)	0 ( 0)	0 ( 0)	1 ( 1)	0 ( 0)
<b>Total</b>	<b>173 (100)</b>	<b>175 (100)</b>	<b>203 (100)</b>	<b>155 (100)</b>	<b>129 (100)</b>



NOTE: THIS SLIDE PRESENTS THE SAME DATA AS THE PRIOR SLIDE, BUT IN TABULAR FORMAT.

This slide depicts the number of TB cases reported in Minnesota from 2005 through 2009 by region of birth and year of diagnosis. The trends visible in this slide are influenced by both the global incidence of TB in specific regions worldwide and also by the constantly changing trends and demographics of immigration to Minnesota. For example, Minnesota is home to a large population of persons born in South/Southeast Asia, which is a region of the world where TB is highly prevalent. Consequently, the annual numbers of TB cases reported among this population have been moderately high but relatively stable from 2005 through 2009. The number of TB case-patients reported in Minnesota among persons originating from sub-Saharan Africa (which is another area where TB is very common) was high during each of the past 5 years. Notably, however, as the number of new primary refugees and immigrants arriving in Minnesota from sub-Saharan Africa has declined markedly since 2006, the number and percentage of TB case-patients reported statewide who originate from that region also has decreased, from 66% of foreign-born TB cases reported in Minnesota during 2007 to 55% in 2009.

## Foreign-Born Tuberculosis Cases by Country of Birth, Minnesota, 2005-2009



Among foreign-born TB case-patients reported in Minnesota from 2005 through 2009, the largest percentage (35%) were born in Somalia. Other countries of birth that represented at least 4% of case-patients each included Ethiopia, Mexico, Vietnam, Laos, Liberia, India and Kenya. Patients from a geographically and ethnically diverse group of 49 other countries comprised the remaining 23% of foreign-born TB cases reported during this period. The tremendous ethnic diversity among foreign-born TB case-patients in Minnesota poses significant challenges for providing TB prevention, treatment, and control services that are appropriate for persons from a wide array of cultural, linguistic, and socio-economic backgrounds.

## Black Tuberculosis Cases by Place of Birth, Minnesota, 2005-2009

<u>Year</u>	<u>Total Black Cases</u>	<u>Foreign-Born Cases No. (%)</u>	<u>U.S.-Born Cases No. (%)</u>
2005	111	102 (92)	9 ( 8)
2006	110	104 (95)	6 ( 5)
2007	147	135 (92)	12 ( 8)
2008	112	91 (81)	21 (19)
2009	80	71 (89)	9 (11)
<b>Total</b>	<b>560</b>	<b>503 (90)</b>	<b>57 (10)</b>



As previous slides demonstrate, country of birth is the predominant risk factor for TB disease in Minnesota. Also, independent of country of birth, TB disproportionately affects non-white racial and ethnic groups statewide. Race, ethnicity, and country of birth are closely associated and highly correlated factors. The following 10 slides demonstrate how interactions between these three factors differ among various racial and ethnic populations in Minnesota.

From 2005 through 2009, 90% of black TB case-patients reported in Minnesota were born outside the United States, and 10% of black TB case-patients were U.S.-born. Notably, the percentage of foreign-born persons among black TB case-patients decreased from an annual average of 93% for 2005 through 2007 to 81% in 2008 and 89% in 2009. This decrease is due, in part, to TB outbreaks that occurred among primarily U.S.-born individuals during 2008, as well as a marked decline since 2006 in the number of new primary refugees and immigrants arriving in Minnesota from sub-Saharan Africa.

## Asian Tuberculosis Cases by Place of Birth, Minnesota, 2005-2009

<u>Year</u>	<u>Total Asian Cases</u>	<u>Foreign-Born Cases No. (%)</u>	<u>U.S.-Born Cases No. (%)</u>
2005	53	53 (100)	0 ( 0)
2006	49	46 ( 94)	3 ( 6)
2007	50	47 ( 94)	3 ( 6)
2008	48	45 ( 94)	3 ( 6)
2009	43	38 ( 88)	5 (12)
<b>Total</b>	<b>243</b>	<b>229 ( 94)</b>	<b>14 ( 6)</b>



Similarly, 94% of Asian TB case-patients reported in Minnesota from 2005 through 2009 were foreign-born, ranging from 88% in 2009 to 100% in 2005.

## White (Non-Hispanic) Tuberculosis Cases by Place of Birth, Minnesota, 2005-2009

<u>Year</u>	<u>Total White Cases</u>	<u>Foreign-Born Cases No. (%)</u>	<u>U.S.-Born Cases No. (%)</u>
2005	12	4 (33)	8 (67)
2006	26	6 (23)	20 (77)
2007	15	1 (7)	14 (93)
2008	16	2 (13)	14 (88)
2009	19	7 (37)	12 (63)
<b>Total</b>	<b>88</b>	<b>20 (23)</b>	<b>68 (77)</b>



In contrast to the predominance of foreign-born persons among black and Asian TB cases reported in Minnesota during this period, the majority (77%) of non-Hispanic white TB case-patients reported in Minnesota from 2005 through 2009 were U.S.-born persons, with only 23% of non-Hispanic white TB case-patients born outside the United States. During this 5-year period, the annual percentage of non-Hispanic white TB cases who were foreign-born varied considerably, ranging from 7% in 2007 to 37% in 2009, with an average of 23%.

## Hispanic/Latino Tuberculosis Cases by Place of Birth, Minnesota, 2005-2009

<u>Year</u>	<u>Total Hispanic/Latino Cases</u>	<u>Foreign-Born Cases No. (%)</u>	<u>U.S.-Born Cases No. (%)</u>
2005	18	14 (78)	4 (22)
2006	23	19 (83)	4 (17)
2007	24	20 (83)	4 (17)
2008	31	17 (55)	14 (45)
2009	17	13 (76)	4 (24)
<b>Total</b>	<b>113</b>	<b>83 (73)</b>	<b>30 (27)</b>



Similar to the epidemiology of TB among blacks and Asians in Minnesota, the majority (73%) of Hispanic or Latino TB case-patients reported in Minnesota from 2005 through 2009 were born outside the United States. The annual percentage of U.S.-born Hispanic or Latino TB case-patients was highly variable during this period, ranging from 17% in 2006 and 2007 to 45% in 2008. This more than doubling in the percentage of U.S.-born Hispanic or Latino TB case-patients in 2008 is due primarily to a TB outbreak during 2008 in an Hispanic/Latino community, which affected many U.S.-born children of Hispanic/Latino decent.

## Tuberculosis Cases Born in East Asia/Pacific by Country of Birth, Minnesota, 2005-2009

<u>Country of Birth</u>	<u>Cases No. ( %)</u>
China/Tibet	22 (48)
Philippines	9 (20)
South Korea	6 (13)
Nepal	4 ( 9)
Japan	2 ( 4)
Taiwan	2 ( 4)
Bangladesh	1 ( 2)
<b>Total</b>	<b>46 (100)</b>



Within the tremendous ethnic diversity among foreign-born TB cases reported in Minnesota, certain countries of birth are predominant among these patients. The next six slides describe, in detail, the ethnic origins of foreign-born TB case-patients reported in Minnesota, by six large geographic regions of the world.

Of TB cases reported in Minnesota from 2005 through 2009 among persons born in East Asian or Pacific countries, the largest proportion (48%) originated from China or Tibet, followed by 20% from the Philippines, 13% from South Korea, and 9% from Nepal. Three other countries of birth (Japan, Taiwan, and Bangladesh) represented the remaining five (10%) case-patients.

## Tuberculosis Cases Born in Eastern Europe by Country of Birth, Minnesota, 2005-2009

<u>Country of Birth</u>	<u>Cases No. ( %)</u>
Bosnia/Herzegovina	4 (33)
Poland	2 (17)
Russia	2 (17)
Other	4 (33)
Total	12 (100)



Among the relatively few (i.e., 12) TB cases reported in Minnesota from 2005 through 2009 among persons from Eastern European countries, the predominant country of birth was Bosnia/Herzegovina (33%), followed equally by Poland and Russia (17% each). Four other countries represented one TB case-patient each.

## Tuberculosis Cases Born in Latin America/Caribbean by Country of Birth, Minnesota, 2005-2009

<u>Country of Birth</u>	<u>Cases No. ( %)</u>
Mexico	50 (60)
Guatemala	12 (14)
Ecuador	8 (10)
El Salvador	6 ( 7)
Other	8 (10)
Total	84 (100)



Many different countries of birth were represented among the 84 TB case-patients reported in Minnesota from 2005 through 2009 who originated from Latin America or the Caribbean. The majority (60%) of these patients were born in Mexico; an additional 14% were born in Guatemala, 10% were born in Ecuador, and 7% in El Salvador. The remaining eight (10%) Hispanic or Latino TB case-patients were born in five different countries.

## Tuberculosis Cases Born in North Africa/Middle East by Country of Birth, Minnesota, 2005-2009

<u>Country of Birth</u>	<u>Cases No. ( %)</u>
Morocco	3 (43)
Egypt	1 (14)
Kuwait	1 (14)
Turkey	1 (14)
United Arab Emirates	1 (14)
Total	7 (100)



From 2005 to 2009, seven TB cases were reported in Minnesota among persons born in the Middle East or North Africa, including three (43%) case-patients born in Morocco and one (14%) case-patient each born in Egypt, Kuwait, Turkey, and United Arab Emirates.

## Tuberculosis Cases Born in South/Southeast Asia by Country of Birth, Minnesota, 2005-2009

<u>Country of Birth</u>	<u>Cases No. ( %)</u>
India	45 (24)
Vietnam	44 (24)
Laos	43 (23)
Cambodia	20 (11)
Thailand	18 (10)
Burma	9 ( 5)
Other	7 ( 4)
Total	186 (100)



The 186 TB case-patients reported in Minnesota from 2005 through 2009 who were born in South or Southeast Asia included 24% each born in India and Vietnam, 23% born in Laos, 11% born in Cambodia, 10% born in Thailand, and 5% born in Burma. Four other countries of birth represented the remaining seven (4%) case-patients.

## Tuberculosis Cases Born in Sub-Saharan Africa by Country of Birth, Minnesota, 2005-2009

<u>Country of Birth</u>	<u>Cases No. ( %)</u>
Somalia	290 (58)
Ethiopia	101 (20)
Liberia	38 ( 8)
Kenya	35 ( 7)
<u>Other</u>	<u>35 ( 7)</u>
<b>Total</b>	<b>499 (100)</b>



Among the 499 TB case-patients reported in Minnesota from 2005 through 2009 who were born in sub-Saharan Africa, the majority (58%) were born in Somalia, followed by 20% who were born in Ethiopia, 8% born in Liberia, and 7% born in Kenya. Fourteen other countries represented the remaining 35 (7%) of these case-patients.

## Tuberculosis Cases by Site of Disease and Place of Birth, Minnesota, 2005-2009

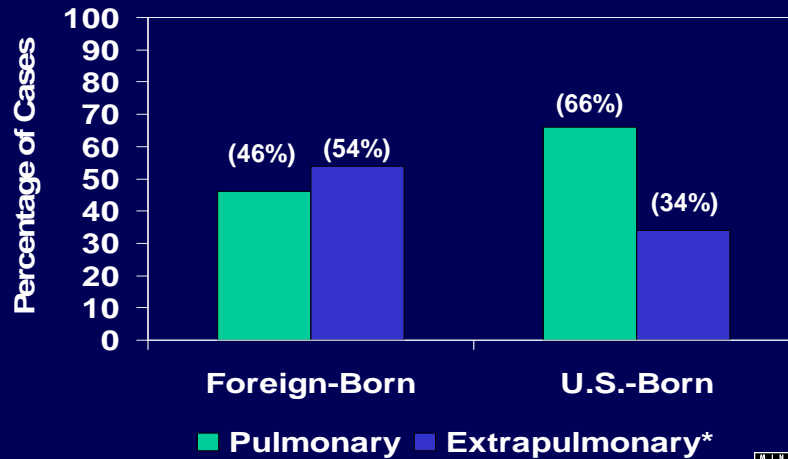
<u>Site of Disease</u>	Foreign-Born	U.S.-Born	Total
	<u>Cases</u>	<u>Cases</u>	<u>Cases</u>
	<u>No. (%)</u>	<u>No. (%)</u>	<u>No. (%)</u>
Pulmonary	387 (46)	126 (66)	513 (50)
Extrapulmonary	357 (43)	36 (19)	393 (38)
Both*	91 (11)	29 (15)	120 (12)
<b>Total</b>	<b>835 (100)</b>	<b>191 (100)</b>	<b>1,026 (100)</b>

\* TB cases with both pulmonary and extrapulmonary sites of disease, including miliary TB



Tuberculosis disease most commonly affects the lungs, although almost any site of the body can be affected. For reasons that are not yet understood despite extensive study, extrapulmonary TB occurs more frequently among foreign-born persons with TB disease than among U.S.-born TB case-patients. Consequently, due to the large proportion of TB cases in Minnesota that occur among foreign-born persons, extrapulmonary TB is very common in Minnesota. More than half (54%) of foreign-born TB case-patients reported in Minnesota from 2005 through 2009 had an extrapulmonary site of disease; in contrast, only 34% of U.S.-born TB case-patients had extrapulmonary involvement. This slide illustrates the need, especially in Minnesota, for clinicians to have a high index of suspicion for TB, particularly for foreign-born patients, even when the patient does not present with a cough or other common symptoms of pulmonary TB.

## Tuberculosis Cases by Site of Disease and Place of Birth, Minnesota, 2005-2009



\* Includes cases with both extrapulmonary and pulmonary sites of disease



NOTE: THIS SLIDE PRESENTS THE SAME DATA AS THE PRIOR SLIDE, BUT IN GRAPHICAL FORMAT.

Tuberculosis disease most commonly affects the lungs, although almost any site of the body can be affected. For reasons that are not yet understood despite extensive study, extrapulmonary TB occurs more frequently among foreign-born persons with TB disease than among U.S.-born TB case-patients. Consequently, due to the large proportion of TB cases in Minnesota that occur among foreign-born persons, extrapulmonary TB is very common in Minnesota. More than half (54%) of foreign-born TB case-patients reported in Minnesota from 2005 through 2009 had an extrapulmonary site of disease; in contrast, only 34% of U.S.-born TB case-patients had extrapulmonary involvement. This slide illustrates the need, especially in Minnesota, for clinicians to have a high index of suspicion for TB, particularly for foreign-born patients, even when the patient does not present with a cough or other common symptoms of pulmonary TB.

## Cases of Drug-Resistant Tuberculosis by Place of Birth and Year, Minnesota, 2005-2009

<u>Year</u>	<b>Foreign-Born Cases</b>		<b>U.S.-Born Cases</b>	
	<u>Cases with Susceptibility Results*</u>	<u>Resistant† No. (%)</u>	<u>Cases with Susceptibility Results*</u>	<u>Resistant† No. (%)</u>
2005	131	13 (10)	20	2 (10)
2006	144	23 (16)	33	4 (12)
2007	152	18 (12)	24	4 (17)
2008	115	22 (19)	34	1 (3)
2009	98	17 (17)	22	3 (14)
<b>Total</b>	<b>640</b>	<b>93 (15)</b>	<b>133</b>	<b>14 (11)</b>

\* Culture-confirmed cases with drug susceptibility results available

† Resistance to at least one first-line anti-TB drug [i.e., isoniazid (INH), rifampin, pyrazinamide (PZA), or ethambutol]



The prevalence of drug resistance among culture-confirmed TB cases reported among foreign-born persons in Minnesota from 2005 through 2009 ranged from 10% in 2005 to 19% in 2008, with 15% of cases reported overall having resistance to at least one first-line TB medication. During this 5-year period, the prevalence of drug resistance among foreign-born TB cases increased 70%, from 10% in 2005 to 17% in 2009. The prevalence of drug resistance among culture-confirmed TB cases reported among U.S.-born persons varied from year to year, ranging from 3% in 2008 to 17% in 2007, with 11% of cases overall being drug-resistant. During this period, drug resistance was approximately 1.4 times more common among foreign-born TB case-patients than among U.S.-born case-patients.

## Tuberculosis Cases by Drug Susceptibility Patterns and Place of Birth, Minnesota, 2005-2009

<u>Place of Birth</u>	<u>Cases With Susceptibility Results*</u>	<u>Any Drug Resistance† No. (%)</u>	<u>INH- Resistant** No. (%)</u>	<u>MDR-TB‡ No. (%)</u>
Foreign-Born Cases	640	93 (15)	69 (11)	9 ( 1)
U.S.-Born Cases	133	14 (11)	9 ( 7)	4 ( 3)
<b>Total</b>	<b>773</b>	<b>107 (14)</b>	<b>78 (10)</b>	<b>13§ ( 2)</b>

\* Culture-confirmed cases with drug susceptibility results available

† Resistance to at least one first-line anti-TB drug [i.e., isoniazid (INH), rifampin, pyrazinamide (PZA), or ethambutol]

\*\* INH-resistant cases may also be resistant to other drugs.

‡ Multi-drug resistant TB, defined as resistance to at least INH and rifampin

§ Three of these cases were resistant to INH, rifampin, PZA, and ethambutol.



Among culture-confirmed TB cases reported in Minnesota from 2005 through 2009, foreign-born case-patients were approximately 1.4 times more likely than U.S.-born case-patients to be resistant to any first-line anti-TB drug and 1.6 times more likely than U.S.-born case-patients to be resistant to isoniazid, in particular. Although the reported prevalence of multidrug-resistant (MDR) TB among U.S.-born case-patients was three times that among foreign-born case-patients, many of the U.S.-born MDR-TB case-patients either had lived extensively outside the U.S. or resided in a household with foreign-born persons. Many of these U.S.-born MDR-TB cases also had several other TB risk factors such as history of drug/alcohol use and homelessness.

## Foreign-Born Drug-Resistant\* Tuberculosis Cases by Region of Birth, Minnesota, 2005-2009

<u>Region of Birth</u>	<u>Cases</u>	
	<u>No.</u>	<u>( % )</u>
Sub-Saharan Africa	42	(45)
South/Southeast Asia	35	(38)
Latin America/Caribbean	11	(12)
East Asia/Pacific	5	( 5)
<u>Eastern Europe</u>	<u>0</u>	<u>( 0)</u>
<b>Total</b>	<b>93</b>	<b>(100)</b>

\* Resistant to at least one first-line anti-TB drug [i.e., isoniazid (INH), rifampin, pyrazinamide (PZA), or ethambutol]

More detailed region-specific and country-specific drug susceptibility profiles are available through the Minnesota Department of Health TB Prevention and Control Program (651/201-5414 or 877/676-5414). Current national guidelines for the treatment of latent TB infection do not take into account the implications of regional differences in drug resistance patterns; however, these data may be empirically useful to guide the treatment of confirmed/suspected TB disease when patient-specific drug susceptibility results are not available.



Among 93 foreign-born, drug-resistant TB case-patients reported in Minnesota from 2005 through 2009, the majority (45%) were born in sub-Saharan Africa, followed by 38% born in South/Southeast Asia, 12% born in Latin America or the Caribbean, and 5% born in East Asia or Pacific countries. When compared with the proportions at which these regions of birth were represented among all foreign-born TB case-patients reported in Minnesota during this period, data in this slide indicate that persons born in South/Southeast Asia were over-represented and those born in sub-Saharan Africa were under-represented among drug-resistant TB cases statewide.

## Foreign-Born Tuberculosis Cases by Visa Status Upon Arrival in the U.S., Minnesota, 2005-2009

<u>Visa Status</u>	<u>Cases No. ( %)</u>
Refugee	429 (51)
Immigrant	255 (31)
Other	122 (15)
Unknown	29 ( 3)
Total	835 (100)



Persons who arrive in the United States as refugees or other immigrants are screened prior to immigration for conditions of public health significance, including certain communicable diseases such as pulmonary TB disease. The next four slides present data that pertain to the percentages of foreign-born TB case-patients reported in Minnesota from 2005 through 2009 who received such screening prior to their arrival in the U.S. and the documented results of that screening.

Over half (51%) of foreign-born TB case-patients reported in Minnesota from 2005 through 2009 initially arrived in the U.S. as refugees, and nearly one-third (31%) arrived as other types of immigrants. Fifteen percent of foreign-born TB case-patients arrived with other non-immigrant visa classifications, including visitors, tourists, and students. The patients' visa classifications were unknown to the patients' health care providers or local public health nurses for only 3% of foreign-born TB case-patients. Therefore, more than 80% of foreign-born TB case-patients reported in Minnesota initially arrived in the U.S. as refugees or other immigrants who received screening for TB prior to immigration.

## “TB Class” Notifications\* Among Foreign-Born Tuberculosis Cases Who Arrived in the U.S. as Immigrants/Refugees Within 1 Year Prior to Diagnosis, Minnesota, 2005-2009

<u>Classification</u>	<u>Cases No. (%)</u>
Class A	0 ( 0)
Class B1	32 (18)
Class B2	2 ( 1)
No Class	92 (51)
Unknown	55 (30)
<b>Total</b>	<b>181 (100)</b>

\* Per results of pre-immigration screening performed overseas



Immigrants and refugees undergo medical evaluation, including TB screening, overseas prior to coming to the United States. Since 2007, revised technical instructions for these pre-immigration medical examinations gradually are being implemented worldwide. Individuals with TB-related conditions identified overseas are assigned a “TB Class” designation, ranging from Class A, which indicates active and potentially infectious TB disease, to Class B2, which indicates latent TB infection. For immigrants and refugees with a TB Class condition, the U.S. Centers for Disease Control and Prevention (CDC) notifies the state public health department where the patient is expected to arrive. State and local public health professionals collaborate to ensure that these individuals are referred to a local health care provider for comprehensive TB evaluation and treatment, as indicated.

Among new foreign-born TB case-patients who were diagnosed with TB disease in Minnesota from 2005 through 2009 and within 1 year after their arrival in the U.S., only 19% had a TB Class designation assigned overseas, and more than half (51%) had known overseas screening results that included no indication of a TB Class condition. The results of the overseas medical evaluations were unknown to the patients’ clinicians and state and local public health officials for 30% of these 181 foreign-born TB case-patients; these patients primarily include persons who were diagnosed with TB disease in Minnesota after initially arriving in another U.S. state and whose overseas screening results were not made available to the Minnesota Department of Health. These findings strongly suggest that clinicians cannot rely solely on the results of pre-immigration medical examinations performed overseas to identify TB disease among foreign-born persons. Clinicians should have a high index of suspicion for TB in any foreign-born patient originating from a region where TB is prevalent and who presents with signs or symptoms consistent with active TB disease.

## Foreign-Born Tuberculosis Cases by Interval Between Arrival in U.S. and Diagnosis of Tuberculosis, Minnesota, 2005-2009

<u>Interval (years)</u>	<u>Cases No. ( %)</u>
< 1	210 (25)
1 - 2	171 (20)
3 - 5	135 (16)
> 5	318 (38)
<u>Unknown</u>	<u>1 (&lt;1)</u>
<b>Total</b>	<b>835 (100)</b>



A quarter (25%) of foreign-born TB case-patients reported in Minnesota from 2005 to 2009 had resided in the United States for less than 1 year when they were diagnosed with TB disease. These patients likely represent persons who acquired latent TB infection outside the U.S. and began to progress to active TB disease prior to arriving in the U.S. Although many such cases may not be preventable in the U.S., clinicians and public health professionals should strive to promptly diagnose and initiate treatment of these cases in order to minimize the length of time for which such patients are infectious and capable of transmitting TB.

More than half (54%) of foreign-born TB case-patients reported during this period in Minnesota had been in the U.S. for 3 years or longer prior to being diagnosed with TB disease. These data suggest that at least half of foreign-born TB cases reported in Minnesota may be preventable by focusing on thorough domestic screening, evaluation, and treatment of latent TB infection among recently arrived refugees, immigrants, and other foreign-born persons.

## Foreign-Born Tuberculosis Cases by Visa Status Upon Arrival and Interval Between Arrival and Diagnosis of TB, Minnesota, 2005-2009

<u>Interval (years)</u>	<u>Immigrant/Refugee</u>	<u>Other/Unknown</u>
	<u>Cases</u> <u>No. (%)</u>	<u>Cases</u> <u>No. (%)</u>
< 1	181 (26)	29 (19)
1 – 2	145 (21)	26 (17)
3 – 5	110 (16)	25 (17)
> 5	247 (36)	71 (47)
<u>Unknown</u>	<u>1 (&lt;1)</u>	<u>0 ( 0)</u>
<b>Total</b>	<b>684 (100)</b>	<b>151 (100)</b>



Among foreign-born TB case-patients reported in Minnesota from 2005 through 2009, data on the length of the interval between the patients' arrival in the United States and their diagnosis of TB disease varied by the patients' visa status at the time of arrival in the U.S. In particular, the percentage of patients who were diagnosed with TB within less than 1 year of arriving in the U.S. was higher among those who arrived as refugees or other immigrants (26%) than among those who arrived with other visa classifications or whose visa status was unknown (19%). In contrast, the percentage of patients who were diagnosed more than 5 years after arriving in the U.S. was higher among those with other or unknown visa classifications (47%) than among refugees and other immigrants (36%). These findings may reflect an actual difference in the pathogenesis of TB between these two groups, or the data may simply reflect the hypothesis that the longer a person resides in the U.S., the less likely that information about the person's visa status will be known by his or her health care provider.