Tuberculosis in Southern Nevada, 2011-2015

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Abstract

Objective
This report presents recent data on tuberculosis (TB) incidence and morbidity patterns in Southern Nevada from 2011 through 2015.

Data and methods
Data from SNHD TB surveillance systems and National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention (NCHHSTP) databases were analyzed to compare rates and trends between demographic groups, with national and statewide comparisons where feasible. Statistical methods are primarily descriptive and consist of calculations of frequencies and rates.

Main results
In Clark County, rates of TB remained high in foreign-born populations of Asian, Latin American, and African origins, and in U.S.-born racial/ethnic minorities. While case rates were highest in those aged 55 and over, the relatively high burden of pediatric TB in Clark County when compared with the nation underlines the need for strategies and interventions to track, monitor, and manage TB in children and adolescents, and to address the social determinants that are largely responsible for the spread of TB.

Abbreviations
NHW: non-Hispanic white
NHB: non-Hispanic black
HISP: Hispanic
LTBI: Latent tuberculosis infection

Tuberculosis (TB) is an airborne disease caused by the bacterium *Mycobacterium tuberculosis* (of the *M. tuberculosis* complex). It is spread through airborne droplets when a person with untreated active TB disease sneezes, coughs, or talks. Not all persons exposed to TB will develop TB disease. Individuals that are infected with TB but do not have active disease and thus cannot spread the infection are referred to as having a latent TB infection (LTBI). One third of the world's population is estimated to have LTBI, and about 5-10% of them will be at risk of progressing to active TB disease.[1,2] In the U.S. it is estimated that up to 13 million people (4%) have LTBI.[1] Smoking, injection drug use, homelessness, alcoholism, malnutrition, end stage renal disease (ESRD) and diabetes, along with HIV infection and other conditions that weaken the immune system, or immunosuppressive therapies (e.g., anti-TNF treatments) are typical risk factors for activation of LTBI.[3-6] Although TB most often affects the lungs, it can damage non-respiratory sites in the body, and cause serious illness or death especially if treatment is delayed.

Globally and nationally, TB disproportionately affects the poor and socially disadvantaged groups with unmet housing, food, or health care needs.[1,2] TB also poses a significant public health threat both locally and nationally, due to global trade and travel, immigration flows, population mobility, gaps in timely testing, treatment barriers, and comorbidities. This report presents a statistical portrait of TB in Southern

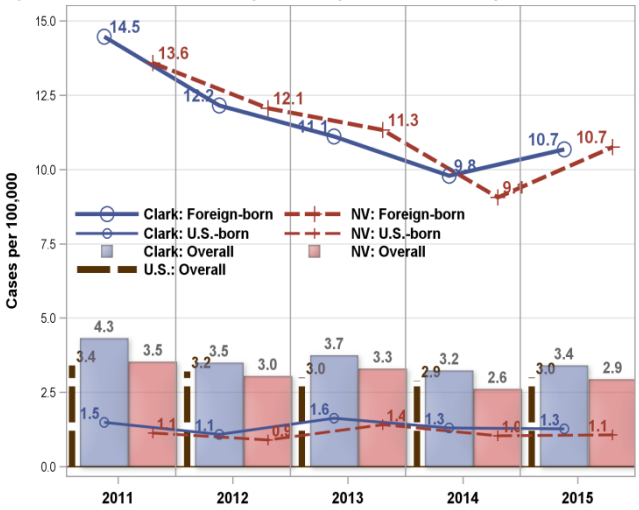
Nevada, including temporal trends, demographic factors, and geographic distribution. It is intended to facilitate greater understanding, better planning, and more effective use of TB prevention resources.

TB case rates in Nevada and Clark County

Clark County's TB incidence rate of 3.4 cases per 100,000 residents was 17% higher than the Nevada rate[7] of 2.9 per 100,000 in 2015 (Figure 1). The Clark County rate has also been consistently higher than the national rate[8,9] over the past five years, despite a decline of 21% from 4.3 per 100,000 residents in 2011. As in the nation, rates of active TB disease are highest among foreign-born persons in both Nevada and Clark County. In 2015, 70% of TB cases in Clark County occurred among foreign-born persons who made up 22% of the residential population,[10] at an incident rate more than 8 times that among U.S.-born residents.

Clark County bears a disproportionate burden of TB cases and risk factors such as poverty and HIV infection, and has higher rates of TB disease than other counties in the state. While accounting for 73% of the state's total population, Clark County accounted for 85% (72 of 85) of the state's TB disease burden and 91% (432 of 477) of the state's newly diagnosed HIV infections in 2015, respectively. Around 18% of families with children under 18 years lived below the federal poverty level in Clark County in the same year, compared with 17.2% in the state.[10] Compounding the issue further, treatment and rehabilitation associated with TB can further exacerbate poverty and residential instability by causing income loss. Additionally, Clark County experienced a 21% increase in the foreign-born population between 2006 and 2015.[10] This adds to the challenge of TB control in high-risk populations (e.g., immigrants and refugees from endemic countries).

Figure 1. TB case rate by nativity, Clark County-NV, 2011-15

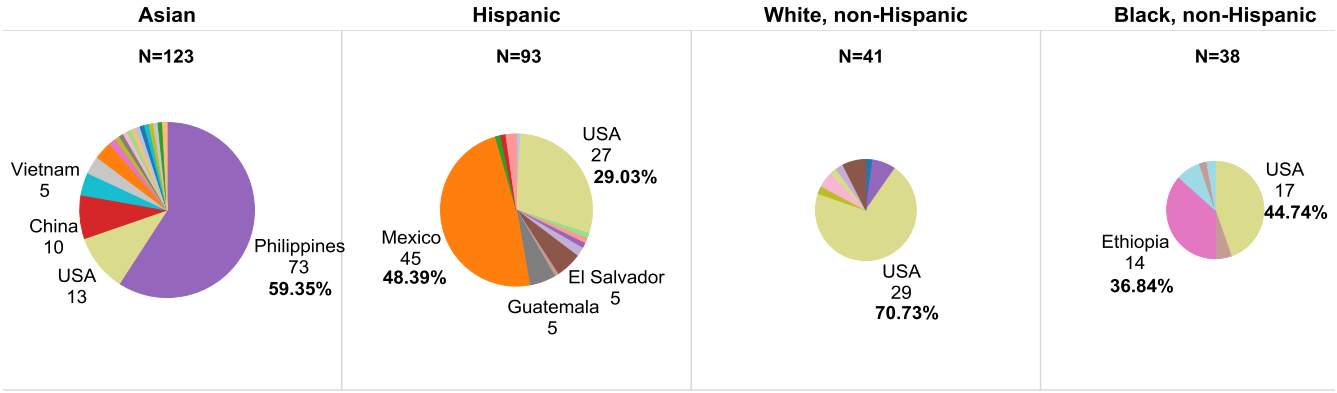


Source: SNHD TB surveillance data and CDC Morbidity & Mortality Weekly Report, Vol 65 (11). Population denominator data from NCHS vintage 2015 postcensal estimates.

Nativity and race/ethnicity distributions

Over one-half of the foreign-born TB incident cases occurred among Asians/Pacific Islanders in 2011-2014, whereas the greatest proportion of U.S.-born cases occurred among non-Hispanic whites (NHW) (34%) and Hispanics (31%), followed by non-Hispanic blacks (NHB) (20%) (Figure 2). The majority of foreign-born TB cases in the same period originated from the Philippines, Mexico, Ethiopia, and China.

Figure 2. Distribution of TB cases by race and nativity, Clark County-NV, 2011-14 aggregated



Source: SNHD TB surveillance data.

The rate of TB disease was highest among Asians/Pacific Islanders (13.7 per 100,000 person-years) in 2014-2015, followed by NHBs (5.5), Hispanics (2.3), and NHWs (0.7) (Figure 3). Among racial/ethnic minorities in the county, TB incidence rate has remained high in U.S.-born NHBs, who represented 48% of all NHB (including immigrant Africans and non-Hispanic African Americans) TB cases in 2014-2015. In contrast, 13% of non-Hispanic Asian/Pacific Islander cases and 28% of Hispanic cases were U.S.-born TB cases, respectively.

Gender and age makeup

While TB case numbers were very similar for males and females in 2015, overall there is a slight predominance of males among TB cases over the past five years in Clark County. The average annual TB case rate among males during 2011-2015 was 3.8 per 100,000, compared with 3.4 per 100,000 for females (Figure 4).

In 2014-2015, the greatest proportion of TB cases was in the age group 45-64 years (37%), followed by the 25-44 age group (26%) and the over 65 age group (18%) (Figure 5). Additionally, children under 15 years of age and persons aged 15-24 years contributed 9.4% and 8.8% of cases, respectively. The TB case rate was highest in those aged 55 and over, an important demographic group for TB risks. While the over 55 age group was also particularly at risk according to the most recent national data,[8,9] the average incident rate among adults aged 55-64 in Clark County (5.2 cases per 100,000) was considerably higher than the U.S. overall in this age group (3.8) over the years 2012-2015. Among older adults, medical comorbidities can increase the risk of developing active TB and the complexity of treatment.[11,12]

Whereas the greatest proportion of adult cases during 2011-2014 was born in the Philippines (28%), the vast majority of pediatric (<18 years) cases were U.S.-born (64%) (Figure 6). The presentation of TB in children is a sentinel event indicating recent and ongoing transmission in the community, as children who develop TB disease usually do so within one year following infection.[6]

The case rate among children 0-4 years of age in Clark County was much higher than the national rate during 2012-2013 (Figure 5). Several of these pediatric cases arose from a maternal source case at a neonatal intensive care unit in a Clark County hospital in 2013.[13] Despite recent declines in TB incidence among infants and children, the relatively high burden of pediatric TB in Clark County when compared with the nation highlights the need for early case detection (e.g., through systematic screening of LTBI) and preventive treatment in this vulnerable group.

Figure 3. TB case rate by race and nativity, Clark County -NV, 2012-15

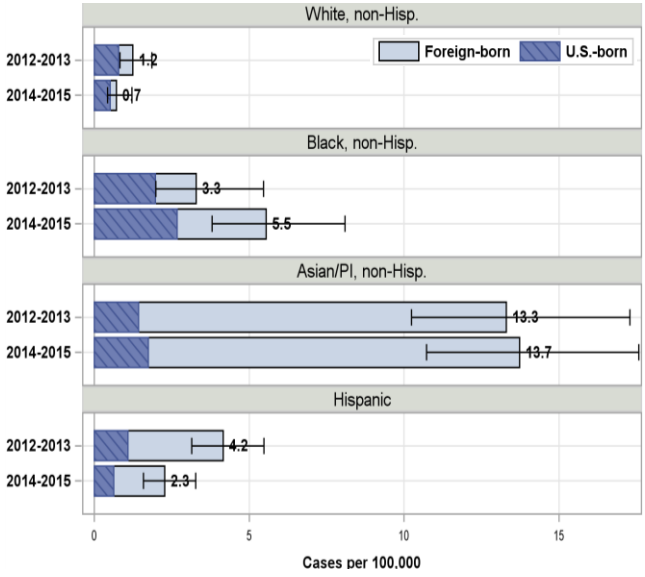


Figure 4. TB case rate by gender, Clark County-NV, 2008-15

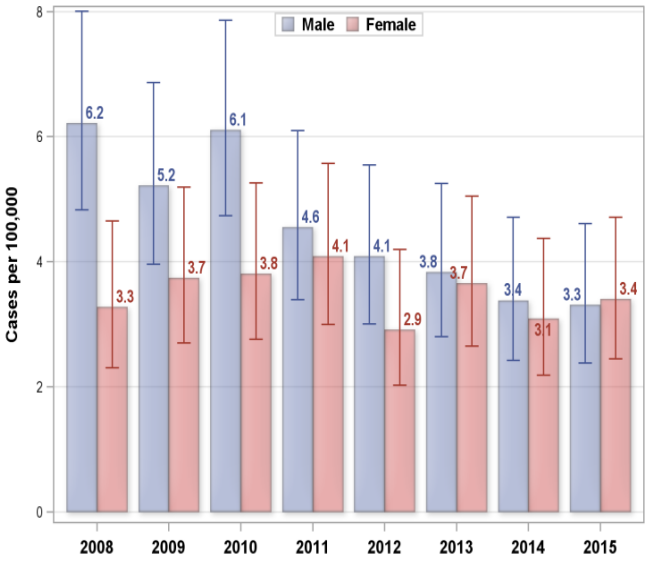


Figure 5. TB case rate by age, Clark County-NV, 2012-15

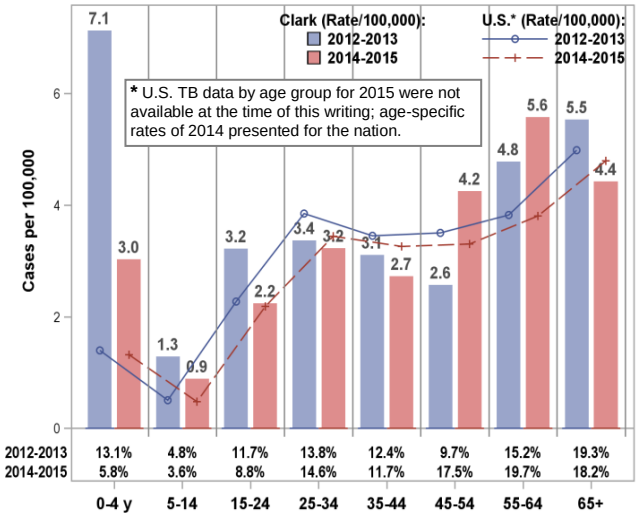
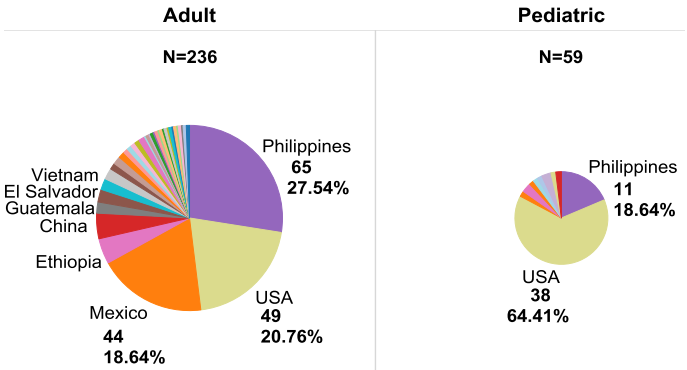


Figure 6. Adult and pediatric (<18 years) TB cases by nativity, Clark County-NV, 2011-14 aggregated



Disease characteristics and mortality

TB can affect sites outside of the respiratory system such as lymph nodes, the urinary tract, or central nervous system. Of the 297 active TB cases confirmed from 2011 to 2014 in Clark County, 20% involved at least one extra-pulmonary site such as lymphatic, bone and/or joint, peritoneal, genitourinary, meningeal, or other site of disease. In general, more extra-pulmonary TB cases were observed among foreign-born persons.

Although TB is preventable and curable, drug resistance can occur when the bacteria fails to respond to conventional, first-line anti-TB drugs (including isoniazid [INH], rifampin [RIF], pyrazinamide [PZA], ethambutol [EMB], and streptomycin [SM]). Among cases with drug susceptibility testing results in 2011-2014, 29 (15%) had resistance to INH, 5 (3%) had resistance to RIF, 16 (8%) had resistance to PZA, 5 (3%) had resistance to EMB, and 20 (13%) had resistance to SM. Of the 55 TB cases with resistance to at least one of the first-line drugs, 78% occurred among foreign-born persons.

Multidrug resistant TB (MDR-TB), defined as resistance to at least both INH and RIF, was identified in 3 TB cases over the same period. Treatment for patients with MDR-TB is often complex and requires lengthier and more costly regimens.[2,14]

Medical comorbidities are associated with a higher risk of progression from LTBI to active TB disease. From 2011 to 2014, 66 (22%) of the TB cases had one or more medical comoridities, including diabetes, ESRD, HIV, cancer, or an immunosuppressive condition (e.g., TNF-alpha antagonist therapy, post-organ transplantation). The most commonly reported comorbidity among these medical conditions was diabetes (n=43; 15%), occurring predominantly in foreign-born cases. Additionally, nine (3%) of the cases were known to be co-infected with HIV/AIDS. Other prevalent conditions among TB cases include smoking (80; 27%), substance abuse (38; 13%), incarceration (18; 6%), and homelessness (13; 4%). Many of these notable issues associated with TB require complicated case management work by the TB Program frontline staff, ranging from screening of persons with conditions that increase the risk of TB reactivation, to providing housing assistance for those displaced from housing as a result of TB diagnosis.

In 2005-2014, there were 38 deaths among TB cases in Clark County, at an age-adjusted rate of 0.2 per 100,000 person-years (on par with the national rate).[15] The mortality burden of TB is likely underestimated however, since death due to TB in HIV-positive people is assigned HIV as the underlying cause in the ICD system. Globally, one in three HIV deaths was attributed to TB in 2015.[2]

Geographic distribution

In 2011-2015, 30% of reported TB cases were among residents of zip codes 89101, 89147, 89103, 89139, 89102, and 89119 (in the southern and central portions of the Las Vegas Valley; Appendix A). Rates of TB disease (per residential population by zip code) also showed a general increasing trend with the proportion of household where Asian/Pacific Islander languages were spoken at home (Appendix B).

Concluding remarks

Despite the progress made in preventing and reducing TB transmission throughout the county, achieving the National TB Program Objective of reducing TB incidence to 1.4 cases per 100,000 by 2020 remains a formidable challenge.[16] While active TB cases generally declined over the past five years in Clark County, rates of TB remained high in foreign-born populations of Asian, Latin American, and African origins, and in U.S.-born racial/ethnic minorities. The relatively high burden of pediatric TB in Clark County when compared with the nation underlines the need for strategies and interventions to track, monitor, and manage TB in children and adolescents, and to address the social determinants that are largely responsible for the spread of TB. As well, TB is associated with acute and chronic health conditions which add to the cost and complexity of TB management. To accelerate reductions in TB and mitigate its associated health and social costs, the emphasis should remain on timely management and prevention as well as early detection and treatment of LTBI in high-risk populations and high-incidence communities.

Acknowledgements

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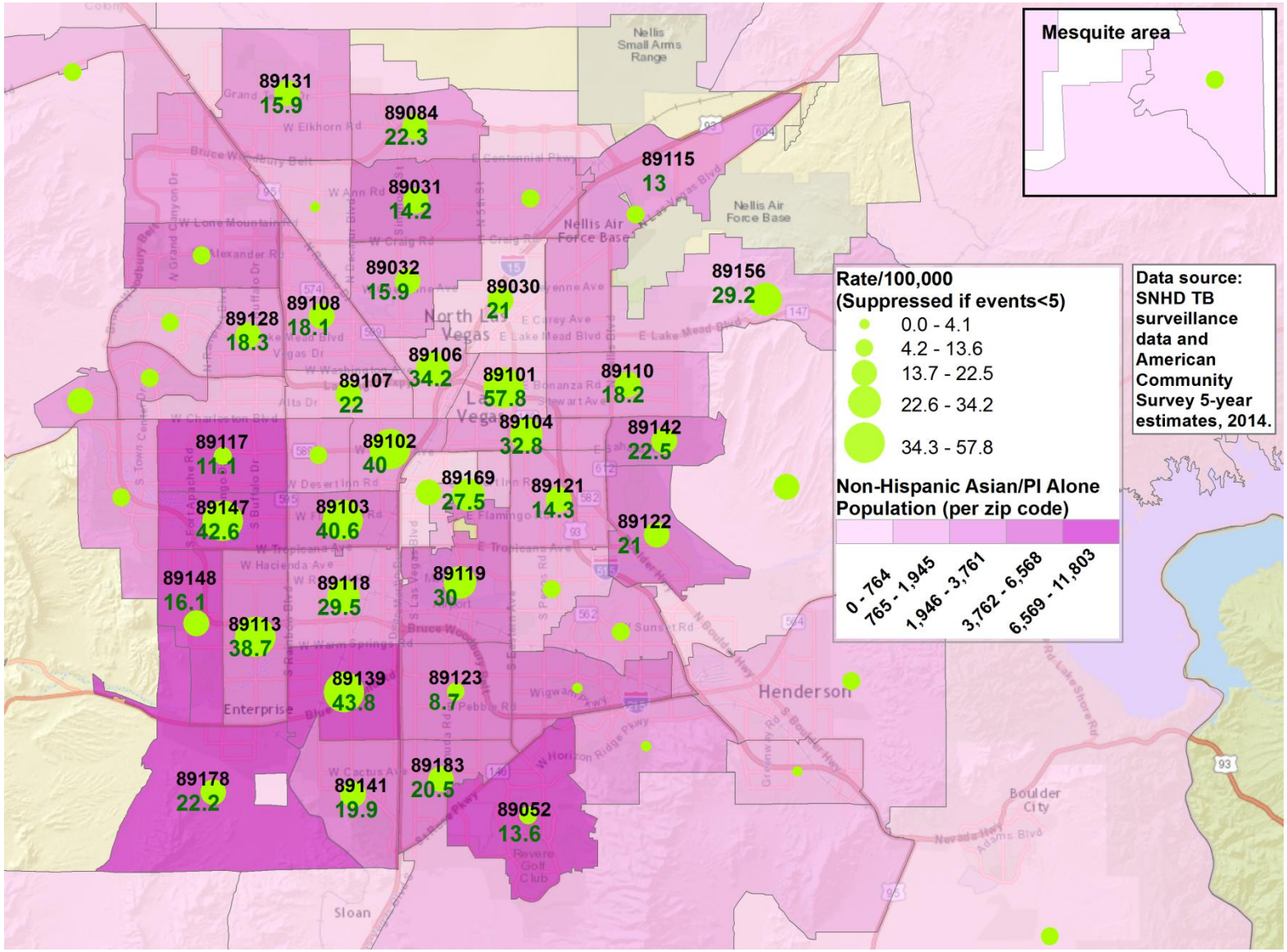
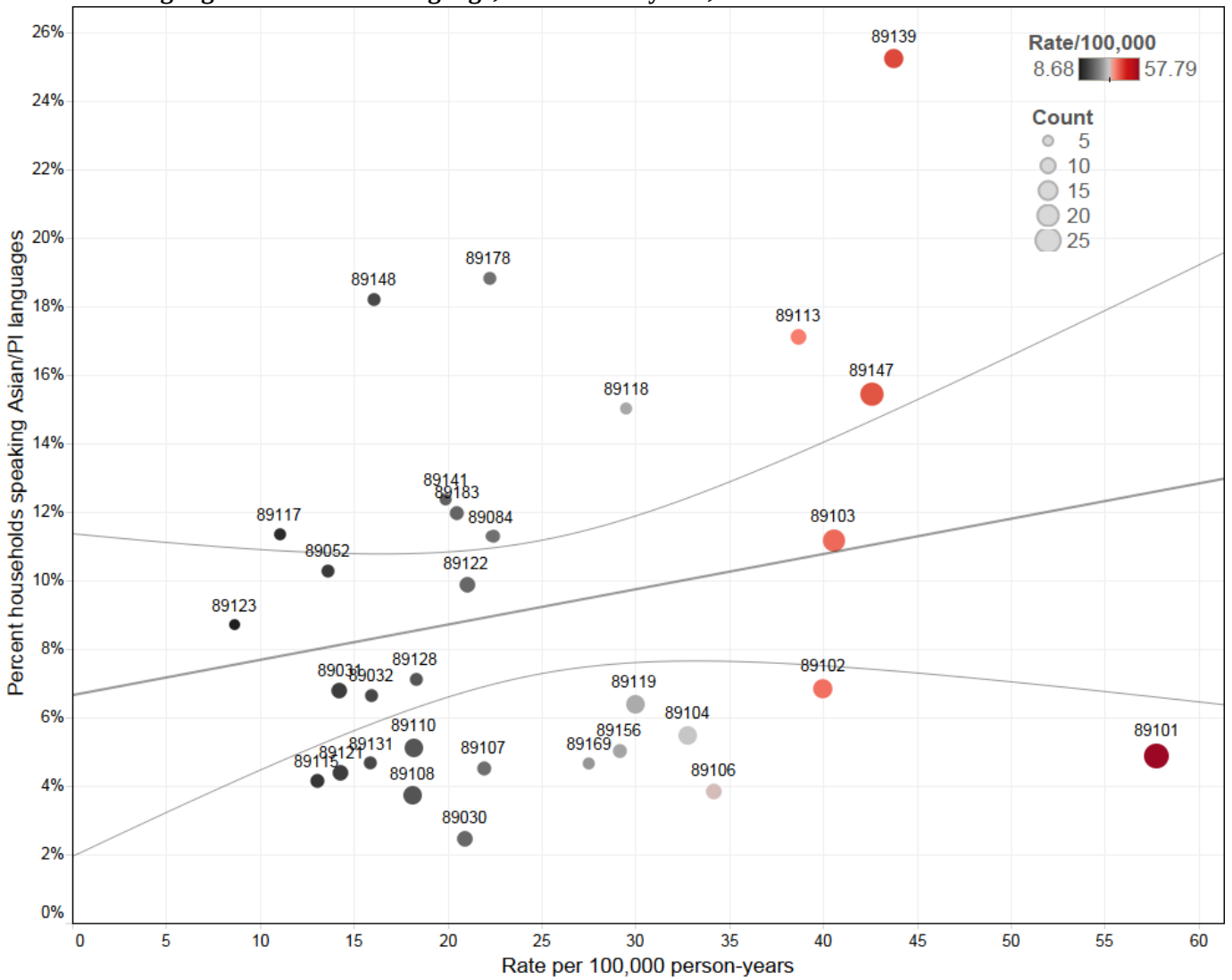
Appendix A. Active TB disease rate with non-Hispanic Asian/Pacific Islander population overlay per residential zip code, Clark County-NV, average 2011-2015



Appendix B. Active TB disease rate and count per residential zip code by proportion of limited English speaking households having Asian/Pacific Islander languages as household language, Clark County-NV, 2011-2015



Note: Demographic data from American Community Survey 5-year estimates, 2014. Size of each dot is proportional to the number of reported cases. High burden zip codes (in terms of case rate) are shown in red. Suppression applied if events<5.