Master of Public Health Field Experience Report

# *DEVELOPING A TUBERCULOSIS PROTOCOL MANUAL FOR THE SALINE COUNTY HEALTH DEPARTMENT*

by

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submitted in partial fulfillment of the requirements for the degree

MASTER OF PUBLIC HEALTH

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# Summary

Tuberculosis (TB) is a communicable disease in humans caused most commonly by *Mycobacterium tuberculosis* and less commonly by other bacterial species in the *Mycobacterium tuberculosis* complex (*Africanum, bovis, microti,* etc.). A strictly followed drug regimen administered by directly observed therapy (DOT) is the standard of treating TB, due to the severity of consequences of treatment non-compliance (e.g. acquired drug resistance). Prevention and management of TB is best done by targeted testing of at-risk populations, management and treatment of both latent and active TB cases, contact investigations of cases, and properly applied infection control methods.

The Kansas Tuberculosis Control Program (founded 1901) currently supports local public health agencies, physicians, and health care facilities responsible for TB control and management, and provides medications for nearly 90% of Kansas TB cases. However, the program does not provide a structured guide for TB management and control, and health care workers rely on outside source manuals for referral during TB care. In the event of a TB outbreak, it is critical that clear and concise health communication is exchanged between the health care workers who administer DOT and the TB patients. Therefore, as the fieldwork's primary objective, a TB protocol manual was developed, using adapted literature review, to cater to the Saline County Health Department's Communicable Disease/TB Program and other local Kansan health departments if they choose to adopt the manual.

Comprised in this report are the learning objectives and competencies required for the culminating experience, all relevant data visualizations and analyses, and the document produced (SCHD Guidelines for the Prevention, Diagnosis, and Treatment of Tuberculosis 2017), completed in partial fulfillment of the requirements for the Master of Public Health degree from Kansas State University. The field experience was conducted at the Saline County Health Department, a county-level health agency serving the residents of Salina and several neighboring communities.

**Subject Keywords:** TB Mycobacterium Tuberculosis Prevention Diagnosis Treatment

# Table of Contents

# Chapter 1 - Field Experience: Saline County Health Department

## 1.1) Scope of Work

Many opportunities were made available to me during my fieldwork experience at the Saline County Health Department (SCHD), a county-level health agency that serves the city of Salina (population ~55,000) and its neighboring communities. Jason Tiller, the director of the SCHD, served as my mentor and helped to provide ample learning opportunities that involved both hands-on and observational activities throughout the health department.

The SCHD is comprised of seven different departments that work both independently and collaboratively to increase the health of Saline County's citizens: 1) Women Infants & Children (WIC), 2) Maternal and Child Health (MCH), 3) Home Health, 4) Child Care Licensing, 5) Health Education, 6) Nursing Clinic, and 7) Public Health Emergency Preparedness (PHEP). I was fortunate enough to either observe or gain direct experience with several of the departments' daily functions. In addition, I increased my knowledge of diseases and gained experience with the disease reporting process through the use and observation of Epitrax, the electronic disease surveillance system for Kansas.

After conversing with the communicable disease/TB program manager (Maria Shoultys, RN), about the potential helpfulness of a customized TB manual as part of a health department's TB protocol for response and prevention, I decided to develop such a document as my capstone project. After graphically and statistically analyzing CDC WONDER (public data) as well as Kansas TB datasets, the manual was further developed to be customizable to the analysis-observed underserved subpopulations of Kansas.


***Figure 1.1 The Saline County Health Department Logo***

# Chapter 2 - Objectives, Activities, and Products

## 2.1) Learning Objectives *(3)*:

***1)*** *Broaden experiences in a local health department setting to become better acquainted with different aspects of public health.*

***2)*** *Learn how the different branches of a health department work together to improve the health of the community it serves.*

***3)*** *Broaden knowledge and experiences pertaining to infectious diseases/zoonoses.*

## 2.2) Activities Performed:

***1) "****Attend meetings/conferences that pertain to public health."*

- ***Central Kansas Region for PHEP (Public Health Emergency Preparedness):*** A meeting between health department directors from central Kansan counties (Stafford, Barton, Pawnee, Rice, and Saline) to discuss current public health events, grant spending, and issues regarding emergency preparedness.
- ***KAHLD (Kansas Association of Local Health Departments):*** A nonprofit conference, hosting mainly local health department directors, designed to strengthen public health in Kansas. Lectures about bioinformatics, public health modernization, and health communication using multiple platforms.
- ***LiveWell Saline County:*** A meeting between 5 different local organization representatives to discuss Saline County wellness plans regarding healthy eating habits, LiveWell grant funding, and Food Systems Assessments.
- ***Kansas Healthy Living:*** A meeting between about 15 representatives from different organizations in Salina, KS (e.g. the Salvation Army, Heartland Early Education, Saline Family Health Care, etc.) to discuss county health issues.
- ***Becoming a Mom Series:*** An educational series of meetings presented by the Maternal and Child Health (MCH) department, for new mothers to promote health pregnancies.

***2) "****Become familiar with all aspects of a local health department (Finance, WIC, MCH, Home Health, Child Care Licensing, Health Education, Nursing Care, and PHEP)."*

- Gained experience with Epitrax (KDHE's Electronic Disease Surveillance System).
- Researched current events (e.g. lead poisoning) that apply to Saline county as well as other relevant, common infectious diseases.
- Observed procedures in the Communicable Disease department.

- D.O.T. treatment for extrapulmonary TB / LTBI cases
- TB skin testing preparation and procedure
- Participated in health education outreach with children attending HYPE (Helping Youth Pursue Excellence) to promote handwashing and other healthy behaviors.

***3)*** *"Work on research project."*

- Performed data analyses and statistical tests and produced graphic visualizations with public CDC WONDER TB data (years 1993-2015) and Kansas TB data (years 2012-2017) using R to better understand disease trends.
- Developed a TB protocol manual that caters to the needs of SCHD's Communicable Disease/Tuberculosis Program and customized the manual for health care workers to better serve the more critically-affected subpopulations of TB patients in Kansas.


***Figure 2.1 Attending the KALHD Conference***

***Figure 2.2 Testing PPE (PHEP Meeting)***

***Figure 2.3 LiveWell Saline County Meeting***

***Figure 2.4 Preparation and delivery of healthy behavior education (promoting handwashing) to children attending HYPE in Salina, KS***

## 2.3) Products Developed:

After discovering the need for a TB protocol manual that can be utilized by the health care workers at the SCHD, I developed one such manual that is adapted to the needs of Saline County and possibly to other local health departments in Kansas. The focus of this manual was to be concise and understandable without compromising the quality of information. It is further explained in Chapter 3 and included in the Appendix.

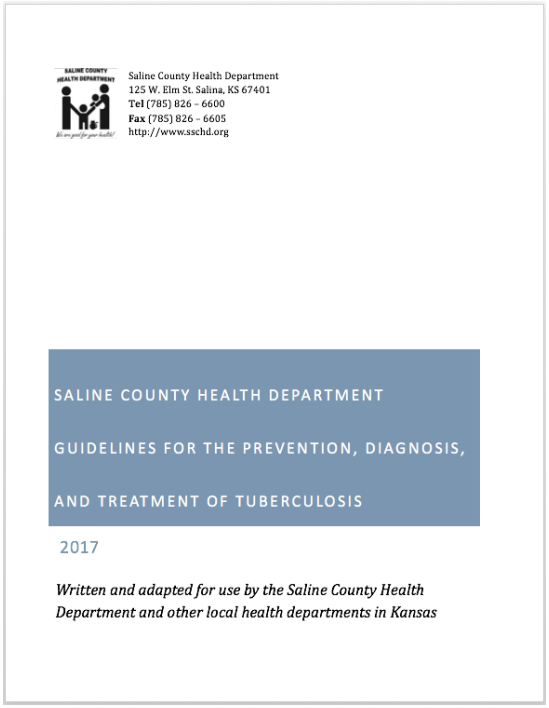



***Figure 2.5 The SCHD Guidelines for the Prevention, Diagnosis, and Treatment of Tuberculosis (2017)***

## Chapter 3 - Capstone Project

# MPH Competencies *(5):*

The 5 competencies that must be met via a culminating experience *(integrating knowledge acquired in MPH coursework and applying theory and principles in situations that approximate an aspect of professional practice)* are outlined below.

## *1) Biostatistics*

Basic techniques of descriptive and inferential statistical methods such as sampling distributions for hypothesis testing are covered in MPH biostatistical coursework and first influenced my interest in data analysis. During my MPH training, I was exposed to statistical analysis programs (e.g. SAS) from various courses, and it opened my eyes to the endless applications that epidemiological data analysis could have for public health outcomes and decision making. During my fieldwork at the SCHD, I performed statistical analyses on public TB data from CDC WONDER and visualized TB trends with descriptive graphs in R using package 'ggplot2' to assist with the customizable production of my capstone project.

## *2) Environmental Health Sciences*

Environmental impacts as it relates to public health outcomes is very important, especially in respect to TB control and management. During the fieldwork, I attended a Central Kansas PHEP meeting in Lyons, KS, where I met with the health directors from 5 different counties. Some of the issues that were addressed included the necessity to purchase certain PPE equipment and what to do with expired equipment that could no longer serve its purpose.

During the researching of TB protocols, I found that personal protective equipment (PPE), medical waste, and airborne infection isolation (AII) were critically underappreciated, yet important aspects of TB management and control. By researching the various, unique requirements that Kansas had for its adult care homes, correctional facilities, and hospital care settings, I gained a deeper appreciation for the impact that disease control can have upon the environment.

## *3) Epidemiology*

Epidemiologic coursework taken for the MPH degree (e.g. Epidemiology, Virology, Toxicology, Immunology, etc.) all revolved around how to recognize and understand how disease affects both individuals and populations alongside the methods for management and control of

these diseases. While producing the TB protocol manual, I found that much of the CDC-based TB control methods were created with respect to the epidemiological triad (Host, Agent, & Environment). By using the principles and theory gained from coursework, I developed my capstone project to address all aspects of management and control for TB's host (humans or animals), agent (*M. tuberculosis* and its pathogenic mechanisms), and Environment (settings for optimal TB control). In addition, when learning about various infectious disease outbreaks by utilizing the electronic disease surveillance system for Kansas (Epitrax), I utilized epidemiological theory to view the outbreaks from unique perspectives.

## *4) Health Services Administration*

Health service administration is very important to public health outcomes, as it brings about policies that govern how certain situations are handled. During my fieldwork, I attended many meetings and found that the primary focus of many of these meetings entailed how grants could better be obtained or allocated. For example, in Kansas, the allocation of governmental funds for local health departments are passed down via many upper-level bodies of government and ordinances such as the state health department and county commissioners. I learned about the importance of good health communication strategies as it relates to Community Health Assessments and need-based reports for grants to support effective health outcomes.

In addition, I researched the significant costs of TB treatments and realized that policy regulation and prevention is important for mitigating expenditures. In the TB protocol manual, a section titled "Managing Non-Adherence" was included, which entails the state ordinances (Kansas State Statutes) that dictate the rules that must be followed during investigation or control of a TB case/outbreak.

## *5) Social and Behavioral Sciences*

For TB contact investigations and various cultural sensitivity issues, I found that proper application and understanding of social and behavioral sciences is critical in TB management. After realizing that TB is a highly stigmatizing disease in many cultures, I decided to promote a fostering of good cultural issue awareness for health care workers utilizing the SCHD TB manual by including a section titled "Promoting Cultural Sensitivity". The contact investigation section of the manual also addresses social and behavioral issues by promoting good rapport with interviewed TB patients to increase compliance and mitigate future outbreaks.

*"Developing a Tuberculosis Protocol Manual for the SCHD"*

# Part 1: Introduction

## *3.1.1) Needs of the SCHD:*

The inspiration for this capstone project arose when SCHD's needs were discussed between the Communicable Disease / TB Program Manager (Maria Shoultys, RN) and myself. ***The Kansas Department of Health and Environment (KDHE) currently has a tuberculosis control program and offers helpful links on their webpage to obtain information, but does not offer a TB protocol manual that local health departments can utilize for TB management and control.*** Maria stated that the policies and procedures that she implements for TB case managements are based primarily off CDC recommendations and occasionally, TB manuals from other states (Nebraska & Maryland) are utilized.

## *3.1.2) Capstone Project Objective:*

After careful consideration of the requirements needed for a comprehensive and accurate TB protocol manual, the objective of the capstone project was formulated: ***Create a comprehensive and accurate TB protocol manual that caters to health care workers treating TB in Kansas as well as any underserved Kansan subpopulations.***

# Part 2: Methods

## *3.2.1) Qualitative Research:*

To begin the process of developing a customized TB protocol manual for local health departments in Kansas, qualitative information regarding the pathological agent, current TB protocol manual information, economic impacts, and CDC guidelines were reviewed.

### *Tuberculosis Literature Review*

**Background:**

Tuberculosis (TB) is a communicable disease in humans caused most commonly by *Mycobacterium tuberculosis* and less commonly by other bacterial species in the *Mycobacterium tuberculosis* complex (*Africanum, bovis, microti,* etc).[30] The WHO estimates that yearly, about 9 million people get sick with TB and about 2 million lives are claimed by this devastating disease.[4]

Before the discovery of the microbial causes of TB in 1882 by German microbiologist, Robert Koch, a TB epidemic plagued most parts of the world and killed 1 out of 7 people living in the United States and Europe. After Koch's discovery, vaccines and drug treatments were developed to address the TB epidemic and although the World Health Organization (WHO) declared TB as a global emergency in 1993, cases have since decreased through exercise of proper disease prevention, management, and control.

**Transmission:**

Airborne (droplet nuclei) particles expelled (via coughing, sneezing, speaking, or singing) by a person with infectious, or active TB is the primary mode of transmission of TB. The particles are 1-5 microns in diameter and depending on the environment, may remain suspended in the air for hours. The probability of TB transmission directly increases with an increase in the following factors: **1)** susceptibility of the exposed individual, **2)** infectiousness of the person with TB disease, **3)** environmental factors that affect the concentration of *M. tuberculosis* organisms, and **4)** the level of exposure (proximity, frequency, & duration) to the infected individual.[30]

Stopping transmission of TB is best done by promptly identifying and isolating patients with infectious TB and starting appropriate treatment. The level of infectiousness will decrease once the prescribed regimen is adhered to. This is most commonly done via Directly Observed Therapy (DOT), where a health care worker physically observes a TB patient ingest his or her medication.

**Pathogenesis:**

When a person inhales air containing the droplet nuclei containing tubercle bacilli, the alveolar macrophages within the lung's alveoli ingest and inhibit most tubercle bacilli, but some bacilli are able to replicate in the host macrophage. After replicating intracellularly, the bacilli are released when the macrophages die and can travel via lymphatic channels to regional lymph nodes or via the bloodstream to other locations such as the kidneys, brain, and bone, although in most cases, the infection remains localized to the apices of the lungs.[30]

When a person is infected with TB bacilli but is asymptomatic, isn't contagious, and returns a positive reaction on the tuberculin skin test (TST), they have **latent TB infection (LTBI)**. It is estimated that without treatment, about 5 to 10% of those with LTBI eventually develop **active TB disease**, which is characterized by morbidity, contagiousness, and indicative chest x-ray (CXR) findings or positive TB diagnostic tests. Immunocompromised individuals (e.g. HIV/AIDS patients) have a considerably higher risk of developing active TB disease.[29]

Multi-drug resistant TB, or MDR-TB, is caused by an organism that is resistant to at least isoniazid and rifampin, the two most potent TB drugs. These drugs are used to treat all persons with TB disease. Extensively drug resistant TB, or XDR-TB, is a rare type of MDR-TB that is resistant to isoniazid and rifampin, along with any fluoroquinolone and at least one of three injectable second-line drugs such as amikacin, kanamycin, or capreomycin. Patients infected with XDR-TB strains have a high chance of developing TB disease and have high mortality rates.[16]

## *Review of TB Protocol Manuals from Other States*

To gain a general idea of how a TB protocol manual is structured, different manuals were accessed and reviewed. Among them are protocols from Nebraska Department of Health and Human Services, Maryland Department of Health and Hygiene, Washington State Department of Health, and the County of Los Angeles Tuberculosis Control Program. Among those manuals, I decided to compare the manuals that SCHD's Communicable Disease / TB Program manager referred to most frequently: Nebraska and Maryland. *(See Table 1.)*

Upon comparing Nebraska and Maryland's TB protocol manuals, the decision to include detailed CDC-based instructions and graphics for the Tuberculin Skin Test procedure was made. Also, the logical order for the different parts of the CDC manual was decided: **1)** Introduction to TB, **2)** Latent TB Infection Management, **3)** Active TB Management, **4)** Adherence Promoting Strategies, **5)** Contact Investigations / Infection Control, and **6)** References and Appendices.

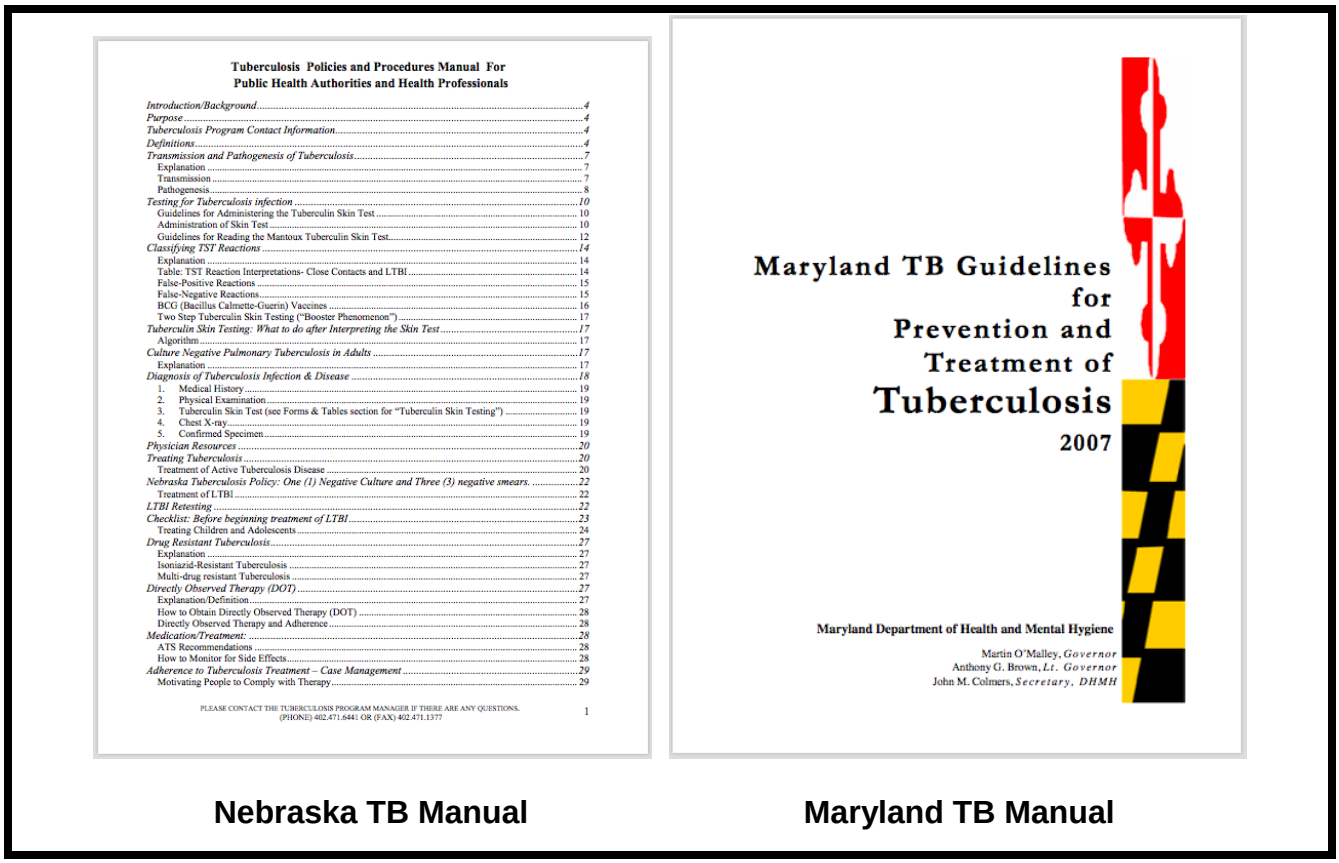



***Figure 3.1 A comparison of TB protocol manuals from Nebraska and Maryland***

| **Table 1. Comparison of Pros & Cons for TB Manuals for Nebraska & Maryland** | | | |
|---|---|---|---|
| **Nebraska** | | **Maryland** | |
| **Pros:** | **Cons:** | **Pros:** | **Cons:** |
| *Logical order of presentation.* | *No graphics, figures, tables, or cover page.* | *Some graphics and includes cover page.* | *No Tuberculin Skin Test instructions.* |
| *Includes very detailed TB Skin Test instructions.* | *Some aspects are not explained in enough detail (e.g. "Treatment of TB" section- had little to no explanation.* | *Very thorough and includes a logical order of presentation that is easy to follow.* | *Some of the guidelines are too study-focused instead of practice-focused. Not ideal for a health care worker to follow and implement.* |
| *Brevity of Information where it is needed.* | *Small font and no distinguishable spacing between the sections.* | *Includes many customizable factors that relate to Maryland.* | *No graphics to help in understanding certain procedures.* |

## *Economic Impacts of TB Treatment*

The Communicable Disease / TB Program Manager created an opportunity for me to shadow her for a trip to observe the process of treating an elderly patient with extrapulmonary tuberculosis. This case was managed every day and the case manager travelled to the patient's house daily to provide DOT. The total time expended from start to finish, including travel time (due to relative closeness of the patient to the health department), took about 30 minutes.

The cost of TB treatment is mostly borne by the public sector. According to a study done by the American Thoracic Society, the total monthly costs of treating a LTBI case were as follows: 9H: $26.37, 9H-DOT: $204.56, 3HP (with DOT): $167.82, and 4R: $53.07. Toxicity monitoring costs, which included lab monitoring, costs $158.36, and in the case of 7-day hospitalizations, the average cost estimate was $5,320.77, with the range being from $4250-$8000.[58]

Active TB case management costs are even greater than LTBI treatment. For a 6-month treatment regimen, the total cost average was $12,511.71, and for a 9-month treatment regimen the total cost average was $13,246.57. In cases of drug resistance, care is even more complex and treatment is even more expensive. According to the CDC, the direct costs of treatment averaged $134,000 per MDR-TB patient and $430,000 per XDR-TB patient.[58]

When observing the significant costs and time expenditures associated with TB treatment on the public sector, I realized that prevention is the best way to mitigate economic strains. Therefore, I decided to customize the manual to stress better methods for cost-control.

## *CDC-Recommended Guidelines for TB Management/Control*

The Centers for Disease Control and Prevention (CDC) provides a rich array of information on its website pertaining to TB. The website's main page provides information on TB management and control strategies as well as current publications. Most of the information used in creating the TB manual was either extracted directly from the CDC or otherwise, fact-checked based on CDC protocols. The main page pertaining to TB can be accessed at *https://www.cdc.gov/tb*.

Upon review of the CDC website, a relatively new practice called "Electronic Directly Observed Therapy (e-DOT)" was encountered. This practice allows for the remote administration of DOT via use of electronic video-sharing devices. After observing the economic health care strains of TB treatment and for the purposes of keeping the product relevant for future use, the e-DOT program implementation instructions were incorporated into the manual.

## *3.2.2) Research Question:*

Upon literature review of TB, comparing the current TB protocol manuals, witnessing and studying the economic impacts of TB treatment, and extracting information from the CDC, one question remained: ***What are the specific needs of Saline County or Kansas local health departments as it relates to TB management and control?***

## *3.2.3) Quantitative Research:*

To answer the research question, I decided to observe data pertaining to TB in Kansas as well as public CDC TB data. Additionally, to better implement customized strategies (e.g. e-DOT, Google Translate), a survey was conducted among health care workers at the SCHD.

### *Data Visualization (KS Active TB Case Data 2012-2017)*

From SCHD's Communicable Disease / TB Manager, I obtained case files for all Kansan active TB cases from 2012- 2017. Detailed on those case files were patients' demographic information and various patient risk factors. Anonymity of cases was strictly respected.

Initially, the data was organized and manipulated to see if there was an observed trend that I could find via predictive modelling: risk factors causing resistance status (linear/polynomial regression), county class influencing percent chance of risk factors (logistic regression), and risk factors influencing count data (Poisson regression). However, due to an insufficient sample size, there was not a significantly producible model. Therefore, I decided to descriptively visualize the data with using package 'ggplot2' in R.

After visually observing TB data from Kansas, I observed the following points for future analysis: **1)** Kansas has a high amount of foreign-born active TB cases, and **2)** drug resistance (to at least one first-line TB drug) among foreign-born cases was more frequently observed.

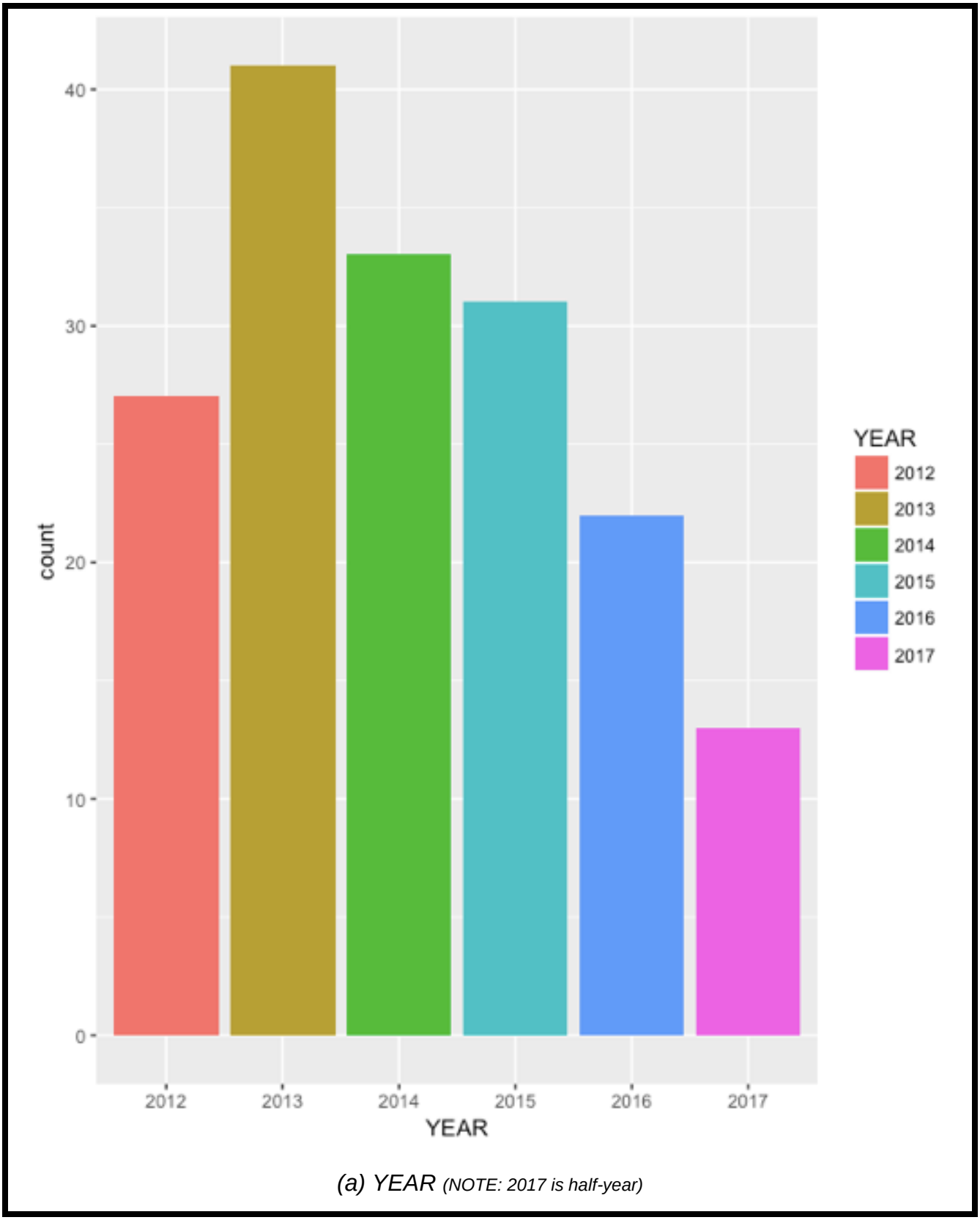
## *Demographic Visualization:*

Upon visualizing the 167 Kansan active TB case files from 2012-2017, I obtained summaries of demographic information that allowed me to visualize exactly which populations were being most heavily afflicted. Descriptions of the observational summaries with their associated demographic variables are outlined in Table 2.

The observations of most significance involved ethnicity and country of birth of the cases. Kansan TB cases were predominantly born in the USA and countries closely following were Mexico, and India. However, ethnicity-wise, there was a predominance in the Asian community. This is further seen by looking at the numerous amounts of Asian countries of origin that contribute to the TB burden in Kansas.

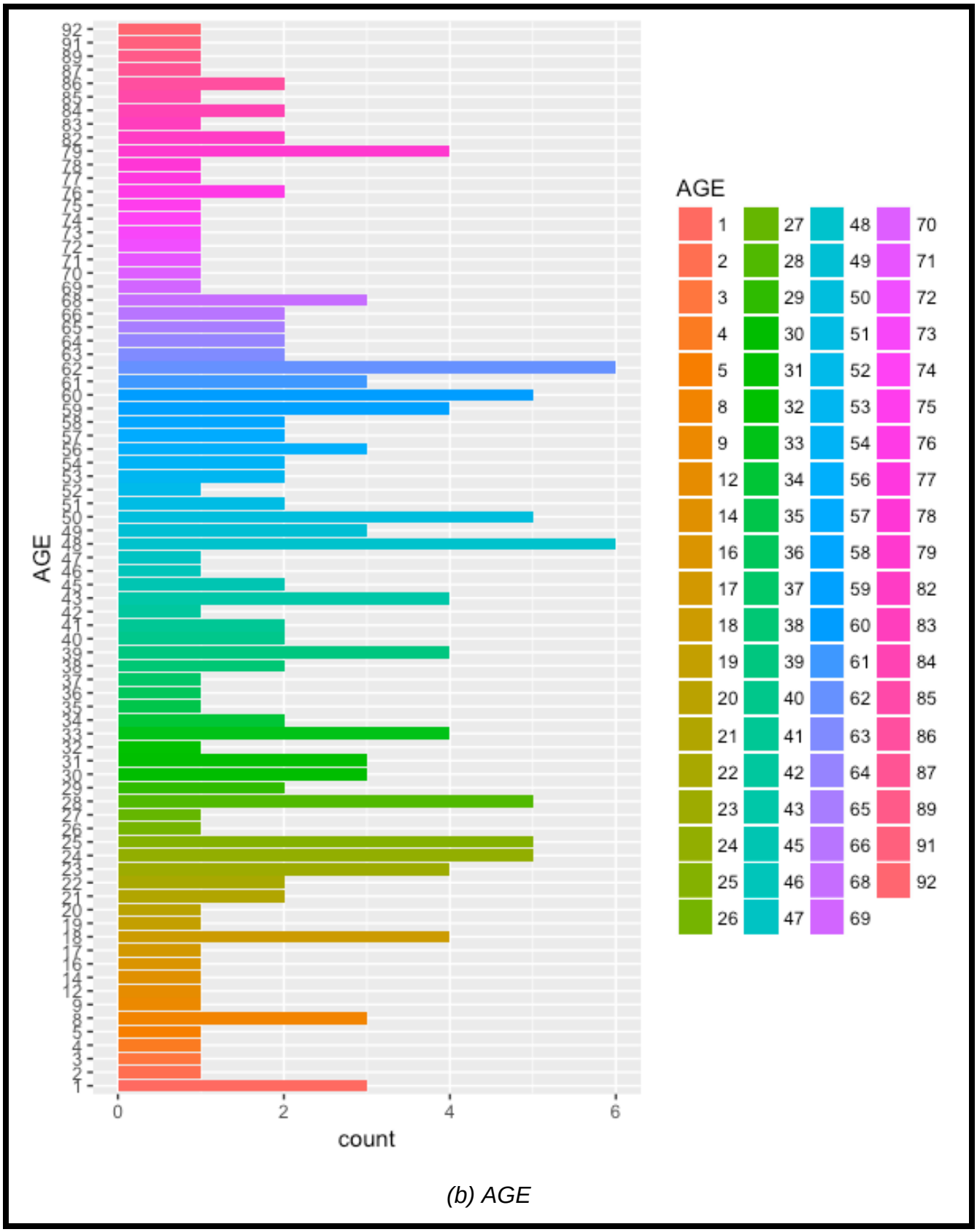
***TABLE 2. Demographic Visualizations (Key for Figures 3.2 (a-j))***

| **FIGURE 3.2:** | **RANGE OF VALUES:** | **OBSERVATIONS:** |
|---|---|---|
| (a) YEAR | 2012 – 2017 *(NOTE: 2017 is for a half-year)* | There was an observed spike in active TB cases in Kansas in 2013, but case counts have diminished in subsequent years. |
| (b) AGE | 1 – 92 | The age range of active TB in Kansas appears to be fairly uniformly distributed. Mean and median age are around 48 with a standard deviation of about 10 years. |
| (c) ETHNICITY | Asian, Black, Hispanic, Native American, White | Kansas active TB cases are most likely to be associated with Asian ethnicity. The next most common is White, closely followed by Hispanic and Black. |
| (d) GENDER | Female, Male | Roughly 2 in 3 cases of active TB in Kansas are male. |
| (e) ETHNICITY BY GENDER | Female, Male // Asian, Black, Hispanic, Native American, White | When looking at the ethnicity breakdown by gender, it is observed to be generally uniform. Proportionally, White and Black males have a slightly greater proportion of incidences than their female counterparts. |
| (f) COUNTRY OF BIRTH | Afghanistan – Vietnam (Alphabetical) | The country of birth of Kansas active TB cases is predominantly the USA. The next three most common countries of birth are Mexico, India, and Vietnam. |
| (g) COUNTY OF INCIDENCE | Atchison – Wyandotte<br>(Alphabetical) | Sedgwick, Johnson, and Wyandotte counties are observed to have a higher active TB case count than any other Kansan county and these three counties have the highest populations in the state. |
| (h) COUNTY POPULATION DENSITY (CPD) CLASSIFICATION | MAP – Counties Classified By Population Density (ppsm) Values: Frontier, Rural, Densely-Settled Rural, Semi-Urban, Urban | This is a breakdown of Kansan counties, categorized by their population densities (in persons per square mile). The 5 classifications are given values of 1-5, with 1 being Frontier (least dense), and 5 being Urban (most dense) and is used for viewing the graphs of parts (c) and (d). |
| (i) CPD CLASSIFICATION BREAKDOWN | Reference: Figure 3.2 (h)<br>Values: 1=Frontier, 2=Rural, 3=Densely-Settled Rural, 4=Semi-Urban, 5=Urban | We observe the significant majority of Kansan active TB cases to be from 1=Urban counties, with the second-most to be from 3=Densely-Settled Rural counties, closely followed by 4=Semi-Urban counties. Frontier and Rural counties don't have many incidences of active TB. |
| (j) CPD CLASS BROKEN DOWN BY ETHNICITY | Reference: Figures 3.2 (h, i) | When breaking down each county population density classification by ethnicity, it is observed that in classification 5 (Urban counties), there is a very high level of Asian TB cases. |



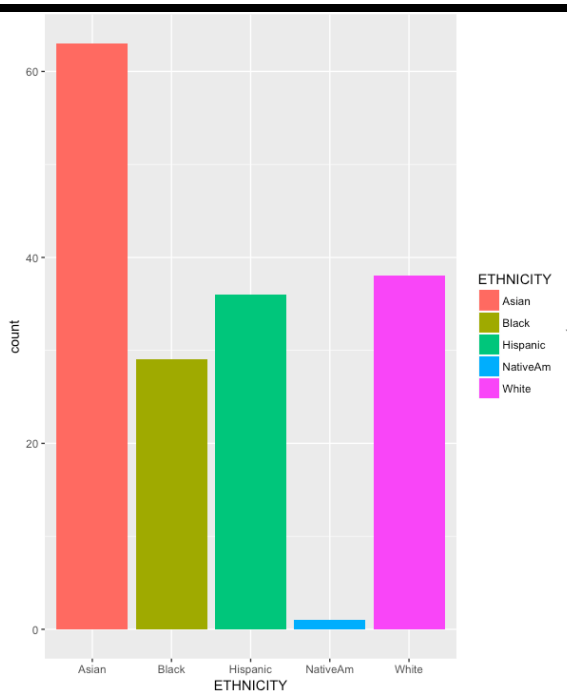

*(a) YEAR (NOTE: 2017 is half-year)*

***Figure 3.2 (a) Visualizing Demographics by (a) Year of Incidence***

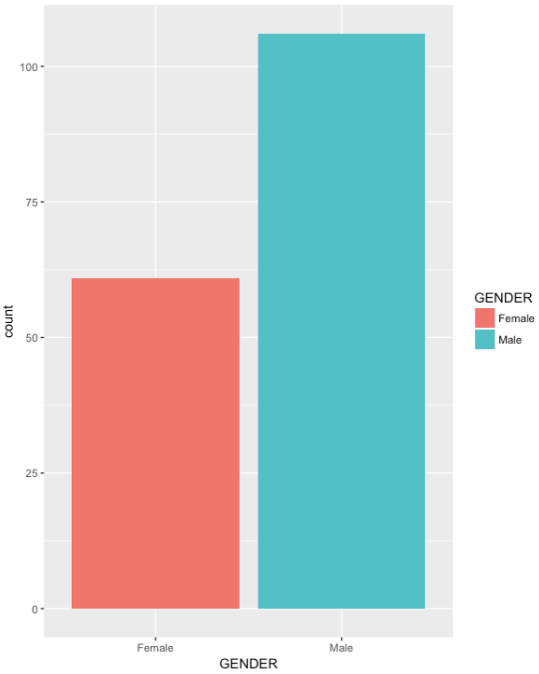



*(b) AGE*

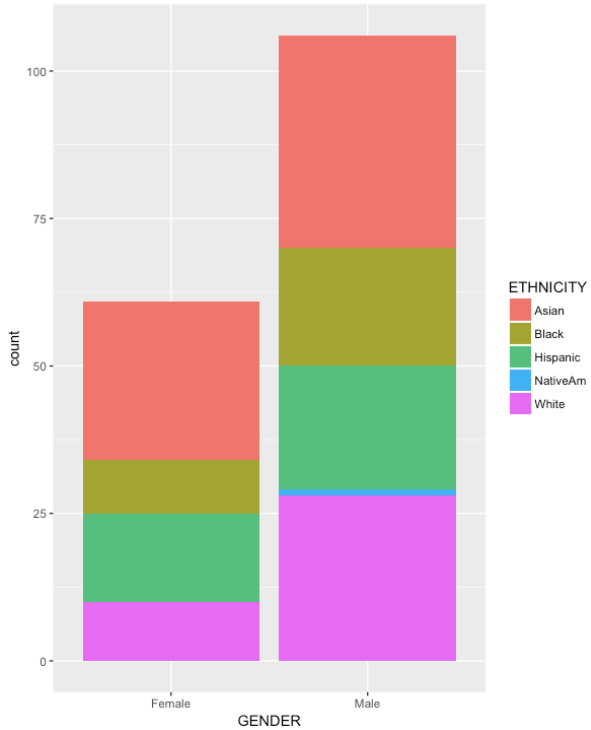
***Figure 3.2 (b) Visualizing Demographics by (b) Age of Patient***




*(c) ETHNICITY*

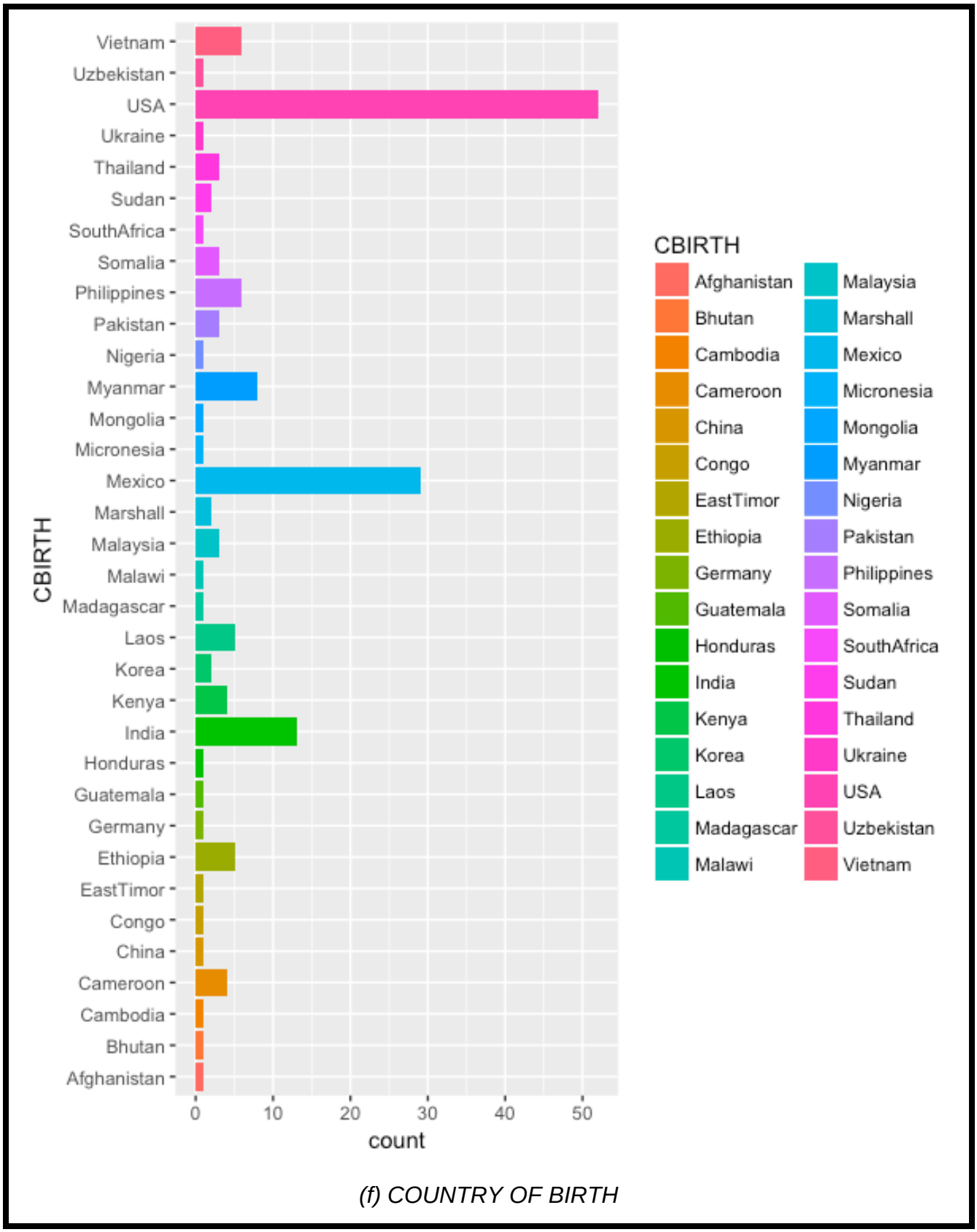



*(d) GENDER*



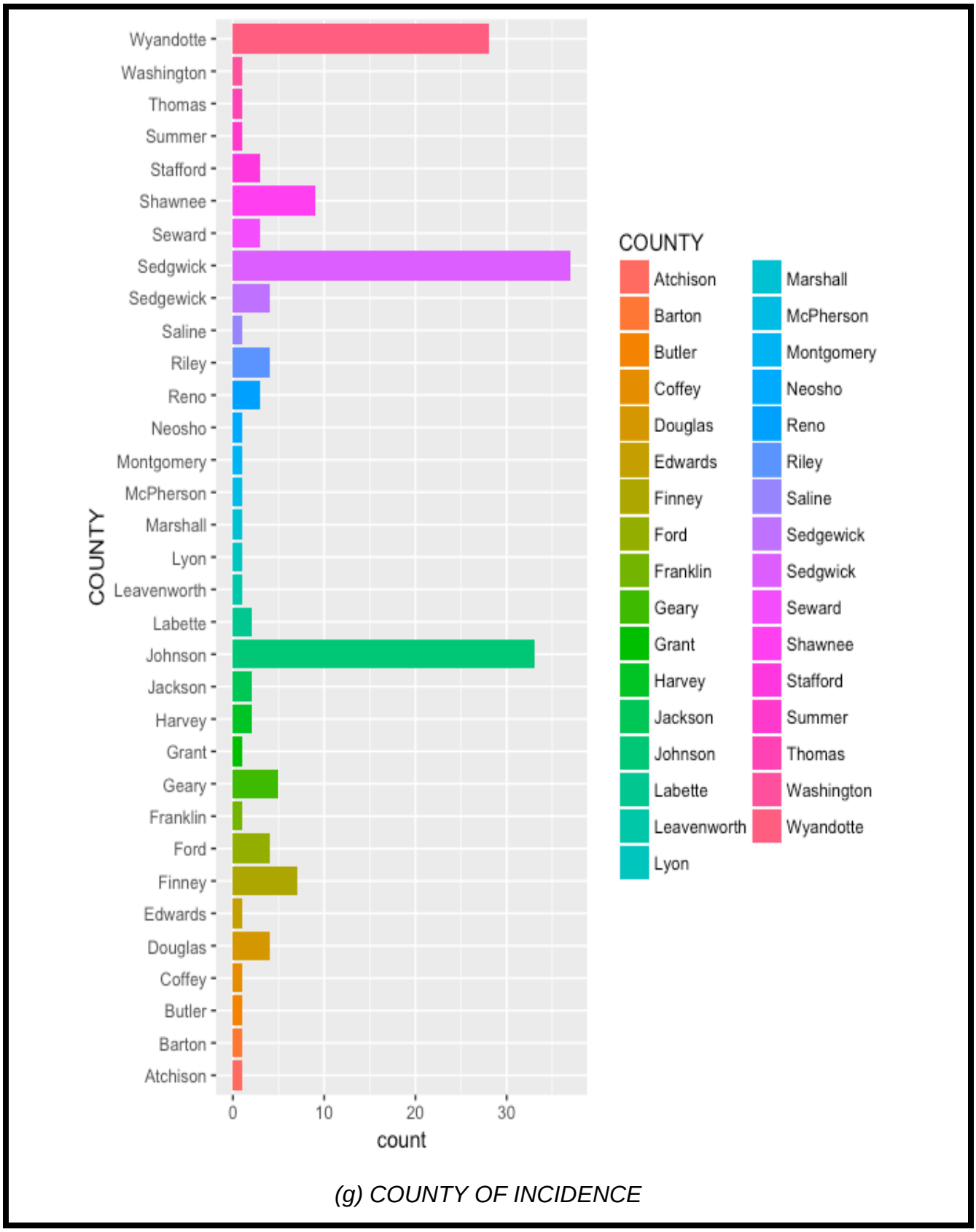

*(e) ETHNICITY BY GENDER*

***Figure 3.2 (c, d, e) Visualizing Demographics by (c) Ethnicity, (d) Gender, and (e) Gender Broken Down by Ethnicity***



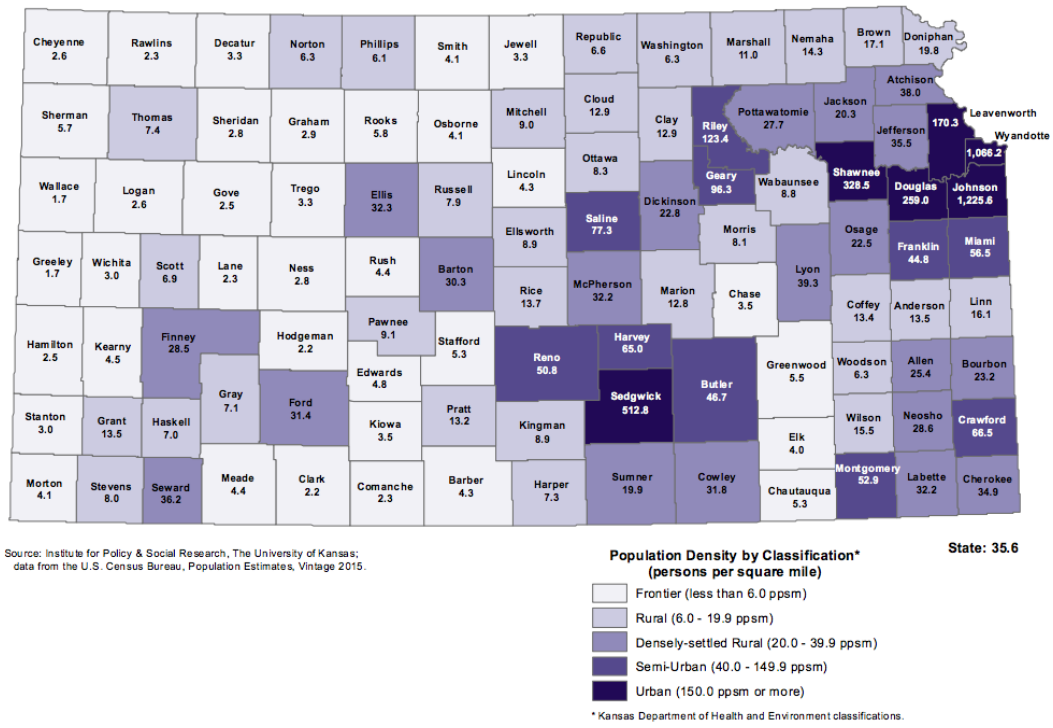

*(f) COUNTRY OF BIRTH*

***Figure 3.2 (f) Visualizing Demographics by (f) Country of Birth***

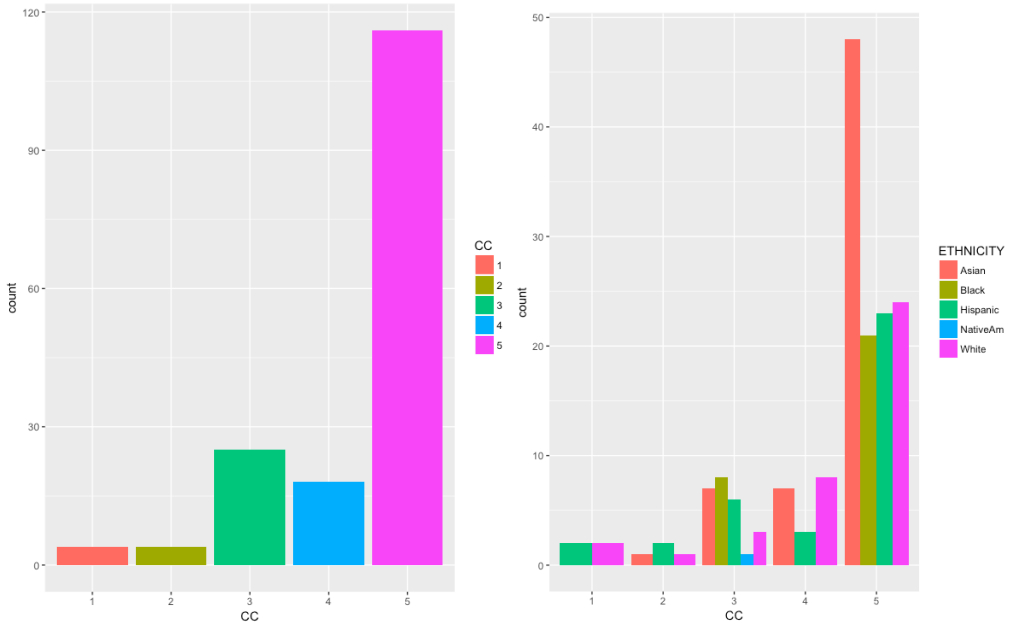



*(g) COUNTY OF INCIDENCE*

***Figure 3.2 (g) Visualizing Demographics by (g) County of Incidence***




*(h) COUNTY POPULATION DENSITY (CPD) CLASS*




*(i) CPD CLASS* *(j) ETHNICITY BY CPD CLASS*

***Figure 3.2 (h, i, j) (h) Classifying Counties by Population Density (CPD) and Visualizing Demographics by (i) CPD Class and (j) CPD Class broken down by Ethnicity***

## *TB Risk Factor Visualization:*

After obtaining the demographic information for the cases, the cases were also stratified further by known TB risk factors and observed for significant trends, as outlined in Table 3.

Certain risk factors were more predominantly observed than others. The most important observation taken from this visualization was that roughly over 2 in 3 Active TB cases in Kansas were foreign-born (as compared to U.S.-born). Also, when plotting sensitivity status (resistance to at least one first-line anti-TB drug) against U.S. or foreign-born status and stratifying those data points by cases' ethnicities, we can see that a predominant number of the resistant cases are foreign-born with Asian ethnic backgrounds.

Upon seeing these risk factor visualizations in addition to the demographic visualizations, I decided to customize the manual to address the needs of foreign-born subpopulations in Kansas.

***TABLE 3. Risk Factor Visualizations (Key for Figures 3.3 (a-k))***

| **FIGURE 3.3:** | **RISK FACTOR:** | **OBSERVATIONS:** |
|---|---|---|
| *(a) LTC* | *Long Term Care Facility Usage* | *No definitive observations. (**Very few** Active TB cases in KS were in LTC settings.)* |
| *(b) JAIL* | *Incarceration History* | *No definitive observations. (**Very few** Active TB cases in KS were had incarceration histories.)* |
| *(c) HOMELESS* | *Homelessness History* | *Roughly **1 in 13** Active TB cases in KS were homeless.* |
| *(d) HIV* | *HIV Status* | *Roughly **1 in 20** Active TB cases in KS were HIV positive.* |
| *(e) IV DRUG* | *IV Drug Usage* | *Roughly **1 in 20** Active TB cases in KS abused IV drugs.* |
| *(f) NON-IV DRUG* | *Non-IV Drug Usage* | *Roughly **1 in 13** Active TB cases in KS abused non-IV drugs.* |
| *(g) ALCOHOL* | *Alcohol Abuse* | *Roughly **1 in 5** Active TB cases in KS abused alcohol.* |
| *(h) CIGARETTES* | *Smoking Status (Cigarettes)* | *Roughly **1 in 3** Active TB cases in KS smoked cigarettes.* |
| *(i) SENSITIVITY* | *Sensitivity/Resistance (to at least one first-line TB drug)* | *Roughly **1 in 7** Active TB cases in KS were resistant to at least 1 First-Line TB drug.* |
| *(j) USAORFOR* | *USA/Foreign-Born Status* | ********Roughly **2 in 3** Active TB cases in KS were foreign-born.* |
| *(k) SENSITIVITYxUSAORFOR* | *Sensitivity Projected Across USA/Foreign-Born Status and classified by Ethnicity* | ********When plotting Sensitivity status across U.S./Foreign-born status, roughly **4 in 5 (or 80%)** of "Resistant" cases were foreign-born.*<br>********Additionally, when looking at Ethnicity classifications (by color), **23 in 26 (or 88.5%)** of "Resistant" cases were non-white.* |

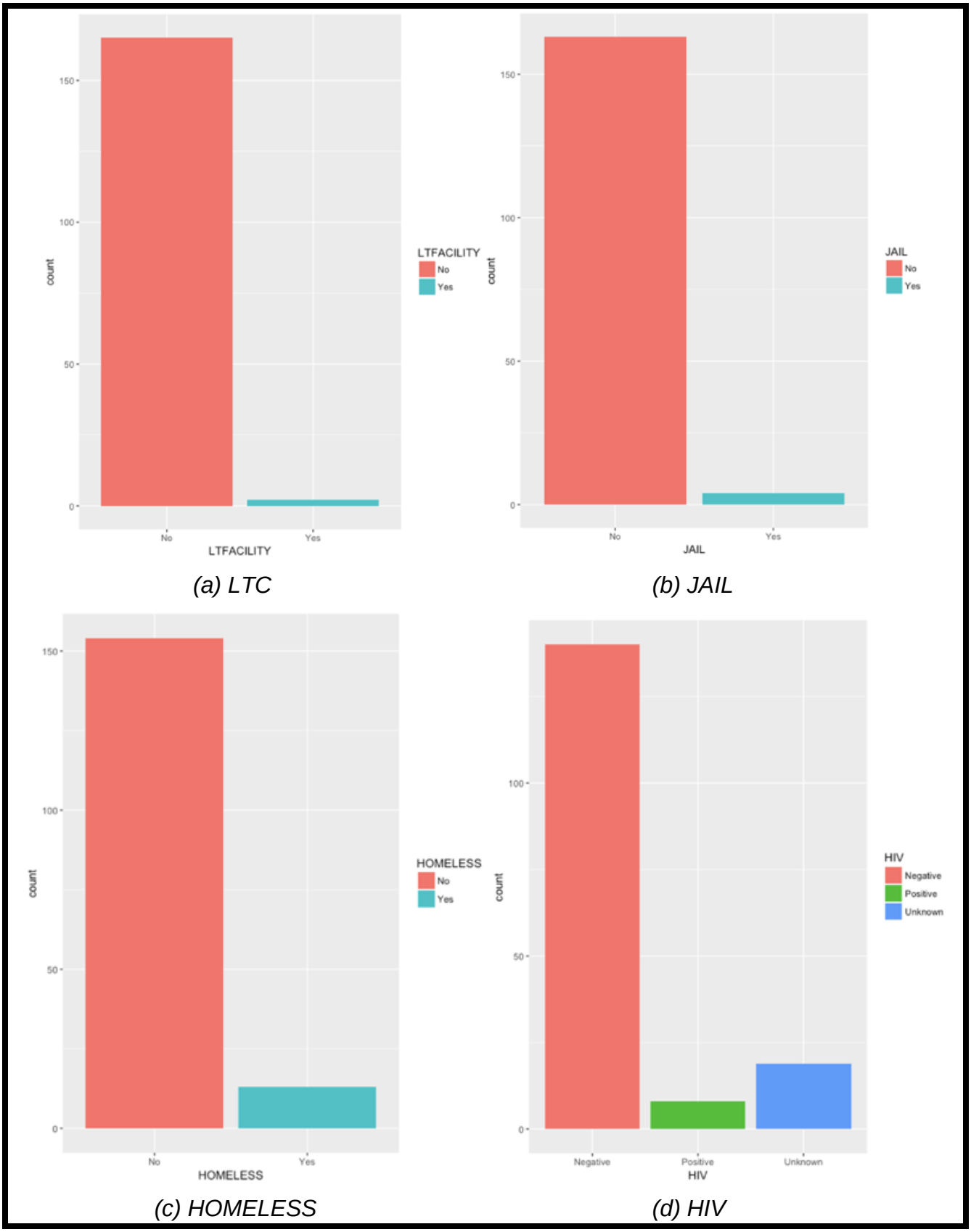



***Figure 3.3 (a, b, c, d) Risk Factor Visualizations by (a) LTC, (b) Jail, (c) Homeless, and (d) HIV***

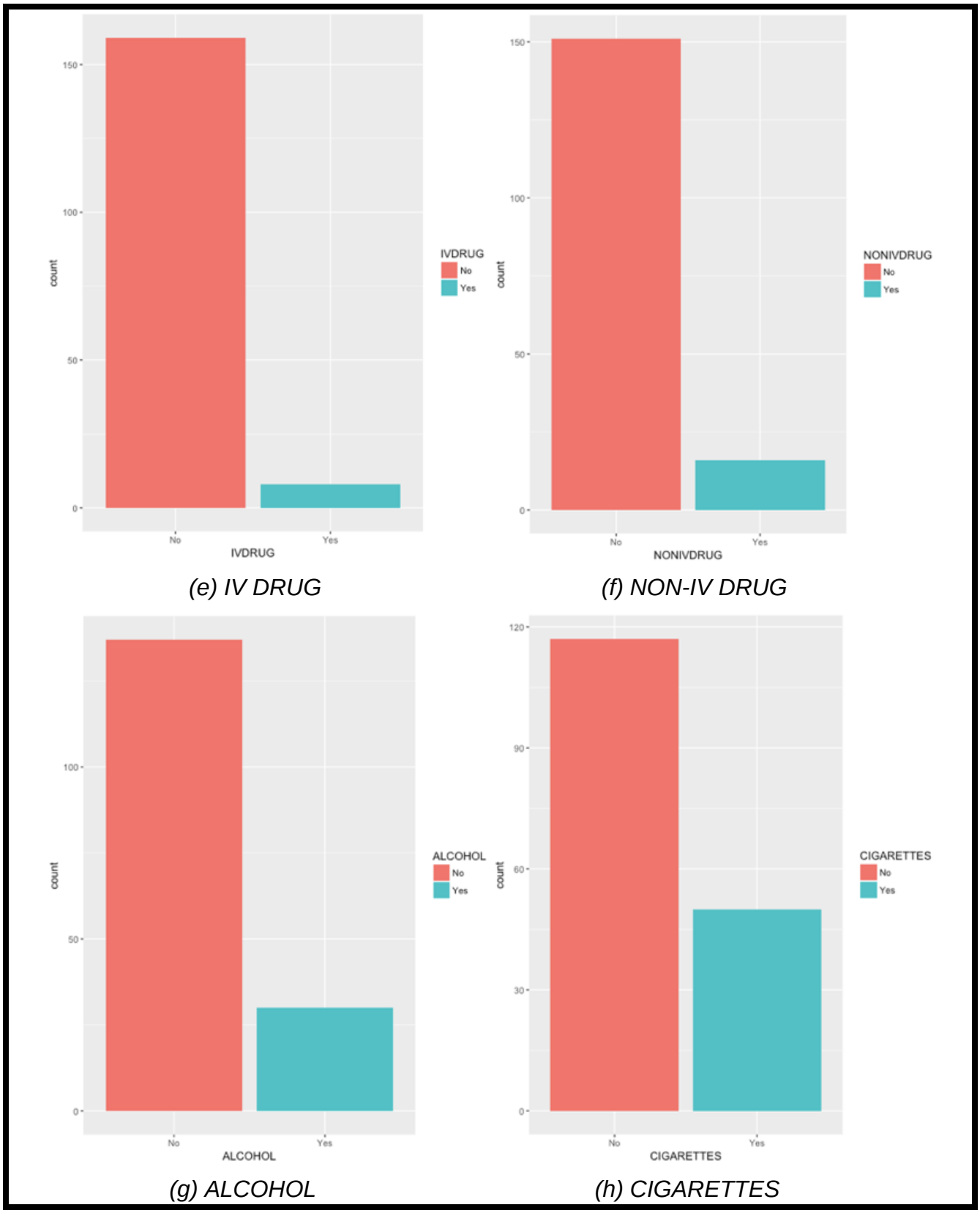
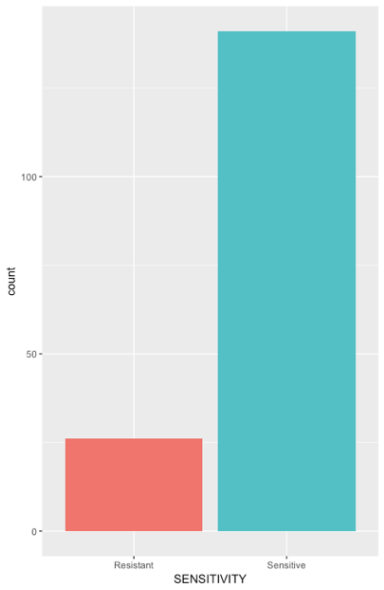
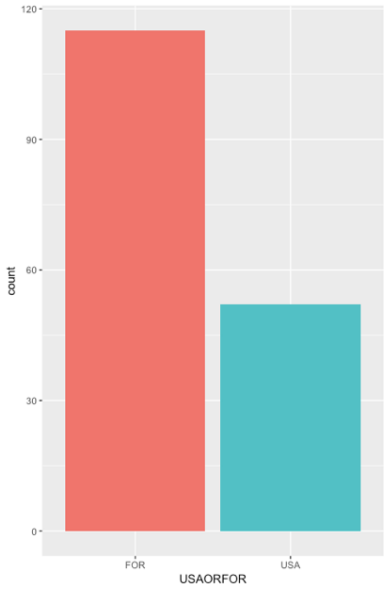


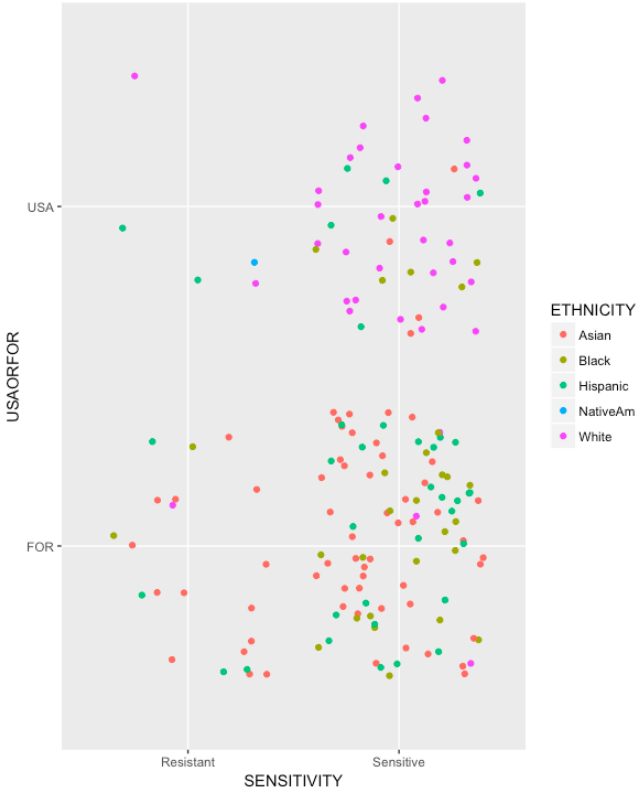

***Figure 3.3 (e, f, g, h) Risk Factor Visualizations by (e) IV-Drug Use, (f) Non IV-Drug Use, (g) Alcohol Abuse, and (h) Cigarette Use***




*(i) SENSITIVITY*




*(j) USAORFOR*




*<u>Foreign-Born, Resistant Cases:</u>*

*14/21 (66%) are Asian, 4/21 (19%) are Hispanic, 2/21 (10%) are Black, and 1/21 (5%) are White*

*(k) SENSIVITIYxUSAORFOR*

***Figure 3.3 (i, j, k) TB Risk Factor Visualizations by (i) Sensitivity, (j) U.S. or Foreign-Born Status, and (k) Sensitivity Plotted Against U.S. or Foreign-Born Status, Stratified by Ethnicity***

## *CDC WONDER Active TB Case Data (1993-2015)*

The CDC has an online ad-hoc query system called WONDER, that is utilized for disseminating public health data and information for analysis. For the purposes of this project, WONDER's Online Tuberculosis Information System (OTIS) data was used to extract data on Kansas and USA active TB data from years 1993-2015.

Upon viewing the KS data in the TB Risk Factor Visualization section, we observed that there was a high incidence of foreign-born cases of active TB in Kansas. When a foreign-born immigrant, traveler, student, or refugee arrives in the U.S. from a TB high-burden country, it is observed from literature that they have a significantly higher rate of developing active TB than those who are born in the U.S. In addition, drug resistance was more commonly seen in foreign-born individuals.

### *Question Formulations:*

These observations led to the asking of the following question: ***(1) Is the relative proportion of foreign-born cases of active TB greater in Kansas than the true proportion or overall burden of foreign-born cases (proportion of foreign-born cases in the U.S.)?*** Thereby, exploring the need for a greater focus to be made on the foreign-born subpopulations of TB cases in Kansas. In addition, to address the issue of drug resistance among these foreign-born individuals, a second question based on risk factors was formulated: ***(2) Is country of birth (U.S. vs foreign-born status) independent of multi-drug resistance?*** Finally, because multi-drug resistance is often correlated to therapy noncompliance, (cases where treatment regimens are not adhered to), a final question was made: ***(3) Is TB therapy administration method (self-administered vs. DOT vs. both) independent of completion of therapy in Kansas TB cases?***

### *Testing of Questions:*

To test these questions, three separate hypothesis tests were conducted: ***Test 1*** *– A one-sample Z-test to compare proportions //* ***Tests 2 & 3*** *– Chi-square tests to test independence of categorical variables with associated odds ratio calculations.*

### *Results, Conclusions, and Discussion:*

From the result of the first test, it was found that **the proportion foreign-born active TB cases in Kansas were higher than in the general U.S. population *(p-value = 0.001962)***. Although the reasoning for this proportional imbalance (e.g. higher rate of immigrants or refugee placements in Kansas or bad case managements) cannot be determined from this information, the findings led me to believe that a potentially helpful customization of the SCHD TB protocol manual can address cultural sensitivity issues (from CDC's *Promoting Cultural Sensitivity* series).

From the results of the second and third tests, it was found that **multi-drug resistance was not independent of U.S. or foreign-born status *(p-value = 0.002951)*** and **therapy administration methods were not independent of completion of therapy in Kansas *(p-value = 0.001591)***. The respective odds ratio calculations returned *found that* ***foreign-born TB cases in Kansas were 24 times more likely to be MDR-TB cases than U.S.-born TB cases in Kansas*** *and that* ***active TB cases in Kansas who had some sort of DOT were 2.2 times more likely to finish therapy within 1 year as those who only self-administered their TB therapy.***

After seeing these results, it occurred to me that increased health communication and adherence to treatment by foreign-born individuals can drastically reduce cases of TB spreading in Kansas and mitigate state spending on TB treatment costs. Therefore, I decided to implement a translation service method utilizing technology (Google Translate) into the manual to potentially increase health communication between the health care worker and the foreign-born TB patient.

## *Hypothesis Testing:*

### Test 1 (One-Sample Z-test for Proportions):

**Question:** *Is the relative proportion of foreign-born cases of TB greater in Kansas than the true proportion or overall burden of foreign-born cases (proportion of foreign-born cases in the U.S.)?*

$\boldsymbol{H_0}$**:** $P_{KS} \leq P$, *(where* $\mu$ *represents the true proportion of active TB Cases that are foreign-born)*

$\boldsymbol{H_a}$**:** $P_{KS} > P$

**Significance Level:** $\alpha$ = 0.05

**Decision Rule:** Reject $H_0$ if Z > Critical Value (1.645).

**Test Statistic**: *n = 1471*

$$\hat{p} = \frac{\#\ of\ Foreign\text{-}Born\ Cases\ of\ Active\ TB\ in\ KS}{Total\ \#\ of\ Active\ TB\ Cases\ in\ KS} = \frac{764}{1471} = 0.5194$$

$$p_0 = \frac{\#\ of\ Foreign\text{-}Born\ Cases\ of\ Active\ TB\ in\ the\ U.S.}{Total\ \#\ of\ Active\ TB\ Cases\ in\ the\ U.S.} = \frac{169{,}127}{351{,}029} = 0.4818$$

$$Z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}} = \frac{0.5194 - 0.4818}{\sqrt{\frac{(0.4818)(1-0.4818)}{1471}}} = \mathbf{2.8861} > 1.645\ (Critical\ Value)$$

*From Standard Normal Table: P(Z≤2.8861) = Φ(2.9) = 0.9984*

*p-value: 1 – Φ(2.9) = 1 – 0.9984 =* ***0.0016***

**Decision:** Reject $H_0$ in favor of $H_a$.

**Conclusion:** The proportion of active TB cases that are foreign-born is greater in Kansas than the proportion of active TB cases that are foreign-born in the U.S (0.4818). (p-value: 0.0016)

| ***TABLE 4. KS vs U.S. TB Cases (Broken down by U.S.-Born vs. Foreign-Born Status) (1993-2015)*** | | |
|---|---|---|
| | ***Kansas*** | ***USA*** |
| ***U.S.-Born*** | *689* | *180,591* |
| ***Foreign-Born*** | *764* | *169,127* |
| ***Not Reported*** | *18* | *1,311* |
| ***TOTAL*** | *1471* | *351,029* |

### Test 2 (Chi-Square Test of Independence and Odds Ratio Calculation):

**Question:** *Is U.S./foreign-born status independent of multi-drug resistance?*

$\boldsymbol{H_0}$**:** U.S./Foreign-Born Status is independent of Multi-Drug Resistance Status

$\boldsymbol{H_a}$**:** U.S./Foreign-Born Status is not independent of Multi-Drug Resistance Status

**Significance Level:** $\alpha$ = 0.05

**Decision Rule:** Reject $H_0$ if $\chi^2$ > Critical Value

**Test Statistic:** df = (r-1)(c-1) = (2-1)(2-1) = 1

From $\chi^2$ Distribution Table: $\chi^2_{(df=1,\alpha=0.05)}$ = 3.84 (Critical Value)

$$\chi^2 = \sum \frac{(|Observed-Expected|-0.5)^2}{Expected}$$ *(With Yates' Continuity Correction)*

$$= \frac{(|13.5-7.4866|-0.5)^2}{7.5} + \frac{(|586.5-592.5134|-0.5)^2}{592.5} + \frac{(|0.5-6.5134|-0.5)^2}{6.5} + \frac{(|521.5-515.4866|-0.5)^2}{515.5}$$

= **8.84** > 3.84 (Critical Value)

**Decision:** Reject $H_0$ in favor of $H_a$.

**Conclusion:** U.S./foreign-born status is not independent of MDR status (P-Value: 0.002951).

### ODDS RATIO CALCULATION (Test 2):

Odds of Risk Factor (MDR-TB) in Foreign Born: 13.5/586.5 = 0.2302

Odds of Risk Factor (Foreign-Born) in Controls (Not MDR-TB): 0.5/521.5 = 0.0009588

**Odds Ratio:** (13.5/586.5) / (0.5/521.5) = **24.0077**

**Conclusion:** *The foreign-born TB cases in Kansas were 24 times more likely to be MDR-TB cases than U.S.-born TB cases in Kansas.*

***TABLE 5. U.S./FOREIGN-BORN STATUS vs. MDR-TB STATUS (Kansas 1993-2015)***
***[Haldane's Correction (+0.5) // Expected Values in Parenthesis for $\chi^2$ Calculations]***

| | **Yes** | **No** | **TOTAL:** |
|---|---|---|---|
| **Foreign-Born** | ***13.5 (7.4866)*** | ***586.5 (592.5134)*** | *600* |
| **U.S.-Born** | ***0.5 (6.5134)*** | ***521.5 (515.4866)*** | *522* |
| **TOTAL:** | *14* | *1108* | *1122* |

### Test 3 (Chi-Square Test of Independence and Odds Ratio Calculation):

**Question:** *Is TB therapy administration method (self-administered vs. DOT vs. both) independent of completion of therapy in cases of active TB in Kansas?*

$\boldsymbol{H_0}$**:** Treatment Administration Method is independent of Therapy Completion Status.

$\boldsymbol{H_a}$**:** Treatment Administration Method is not independent of Therapy Completion Status.

**Significance Level:** $\alpha$ = 0.05

**Decision Rule:** Reject $H_0$ if $\chi^2$ > Critical Value

**Test Statistic:** df = (r-1)(c-1) = (3-1)(2-1) = 2

From $\chi^2$ Distribution Table: $\chi^2_{(df=2,\alpha=0.05)}$ = 5.9915 (Critical Value)

$$\chi^2 = \sum \frac{(Observed-Expected)^2}{Expected} = \frac{(812-799.45)^2}{799.45} + \frac{(71-77.48)^2}{77.48} + \frac{(86-92.07)^2}{92.07} + \frac{(65-77.55)^2}{77.55} + \frac{(14-7.52)^2}{7.52} + \frac{(15-8.93)^2}{8.93}$$

= **12.887** > 5.9915 (Critical Value)

**Decision:** Reject $H_0$ in favor of $H_a$.

**Conclusion:** Treatment method is not independent of therapy completion (P-Value: 0.001591).

### ODDS RATIO CALCULATION (Test 3):

Odds of Therapy Completion in Cases with some sort of DOT: 898/80 = 11.2250

Odds of Therapy Completion in Cases without any sort of DOT: 71/14 = 5.0714

**Odds Ratio:** (898/80) / (71/14) = **2.2134**

**Conclusion:** *The active TB cases in Kansas who had some sort of DOT were 2.2 times more likely to finish therapy within 1 year as those who only self-administered their TB therapy.*

| ***TABLE 6. Treatment Method vs. Completion of Therapy (Kansas 1993-2015) (Rearranged as 2x2 Table for Odds Ratio)*** | | | |
|---|---|---|---|
| | **Yes** | **No** | **TOTAL:** |
| **Some Sort of DOT** | ***898*** | ***80*** | *978* |
| **Self Only (No DOT)** | ***71*** | ***14*** | *85* |
| **TOTAL:** | *969* | *94* | *1063* |

## *Additional Data Collection via SurveyMonkey*

E-DOT implementation was thought to be a potentially helpful way to mitigate costs of TB treatment and the translation service methods utilizing technology (Google Translate) was an idea for potentially lessening the burden of foreign-born cases of active TB in Kansas by increasing TB treatment adherence and health communication.

A survey of health care workers at the SCHD was conducted via *SurveyMonkey* over 2 weeks to assess general knowledge of video-communication and translation services and to gain their feedback about e-DOT and Google Translate. Of about 30 staff, there were 19 responses.

### *Health Communication Survey Results:*

***Regarding e-DOT:***

- **7/19, or roughly 37%** of respondents had never used video-communication before.
    - After respondents were introduced to DOT and its associated time/monetary costs, they were introduced to the e-DOT method. **17/19, or roughly 89.5%** of respondents thought that e-DOT would be a good way of providing remote therapy.
        - Very valid concerns of the two respondents that didn't think it was a good idea were: ***1) manipulation of e-DOT observation and 2) lost client-caregiver connection and other observations without direct contact.***

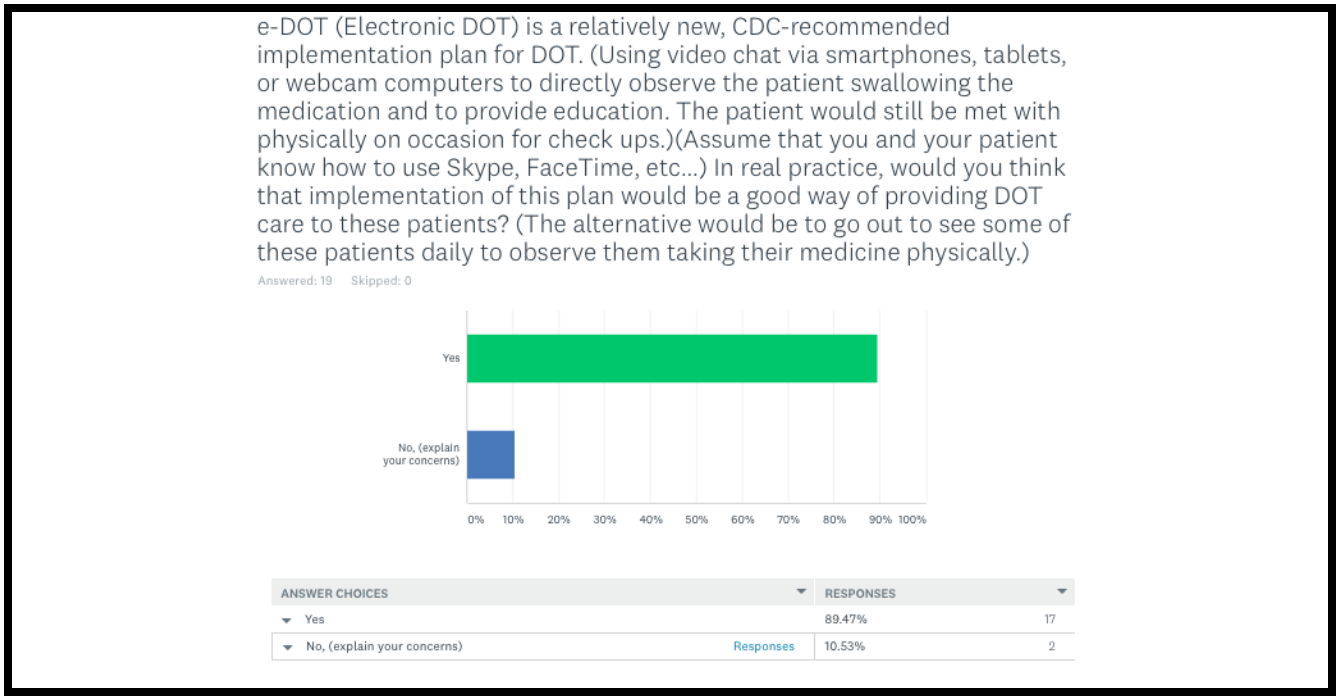



*Figure 3.4(a) eDOT Survey Results*

***Regarding Google Translate Usage:***

- **17/19, or roughly 89.5%** of respondents claimed to be “very familiar” or “decently familiar” with using a smartphone or tablet to seek answers to questions and **11/19, or roughly 58%** of respondents stated that they were familiar with Google Translate.
    - After being presented a scenario where patient translation was critical and given directions for utilizing Google Translate to help with translation, **16/19, or roughly 84%** of respondents found the instructions easy and useful to follow/implement.
        - The concerns of the 3 respondents who replied “no” were the same: ***“could not get the “speaker” to work”*.** This is because Google translate currently only offers 32 of 100+ languages in “conversation mode”.
            - To address this confusion, instructions in the manual were clarified: *“**if available**, press the speaker icon ( )…”*


***Figure 3.4(b) Google Translate Survey Results***

# *3.2.4) Producing the Product:*

After the culmination of qualitative and quantitative research along with the addressing of the research question for customizing the manual to fit the needs of SCHD and Kansas, the TB manual writing commenced. From observing the necessities of the manual, I decided to organize the manual into **6 parts**:

***MANUAL PARTS:***

***1)*** *Introduction*

***2)*** *LTBI Management*

***3)*** *Active TB Management*

***4)*** *Adherence Promoting Strategies*

***5)*** *Contact Investigations & Infection Control*

***6)*** *References & Appendices*

Additionally, there were **5 customizations** outlined in the previous research sections that were included in the manual:

***CUSTOMIZATIONS:***

***1)*** *Use of graphics and visually pleasing tables to accompany procedures (e.g. Tuberculin Skin Test section and TB)*

***2)*** *Electronic DOT (e-DOT) Implementation*

***3)*** *Promoting Cultural Sensitivity*

***4)*** *Translator Services & Google Translate Implementation*

***5)*** *Other Relevant SCHD/KS Customizations (e.g. KS State Statutes, KS TB Infection Control Measures, SCHD TB forms).*

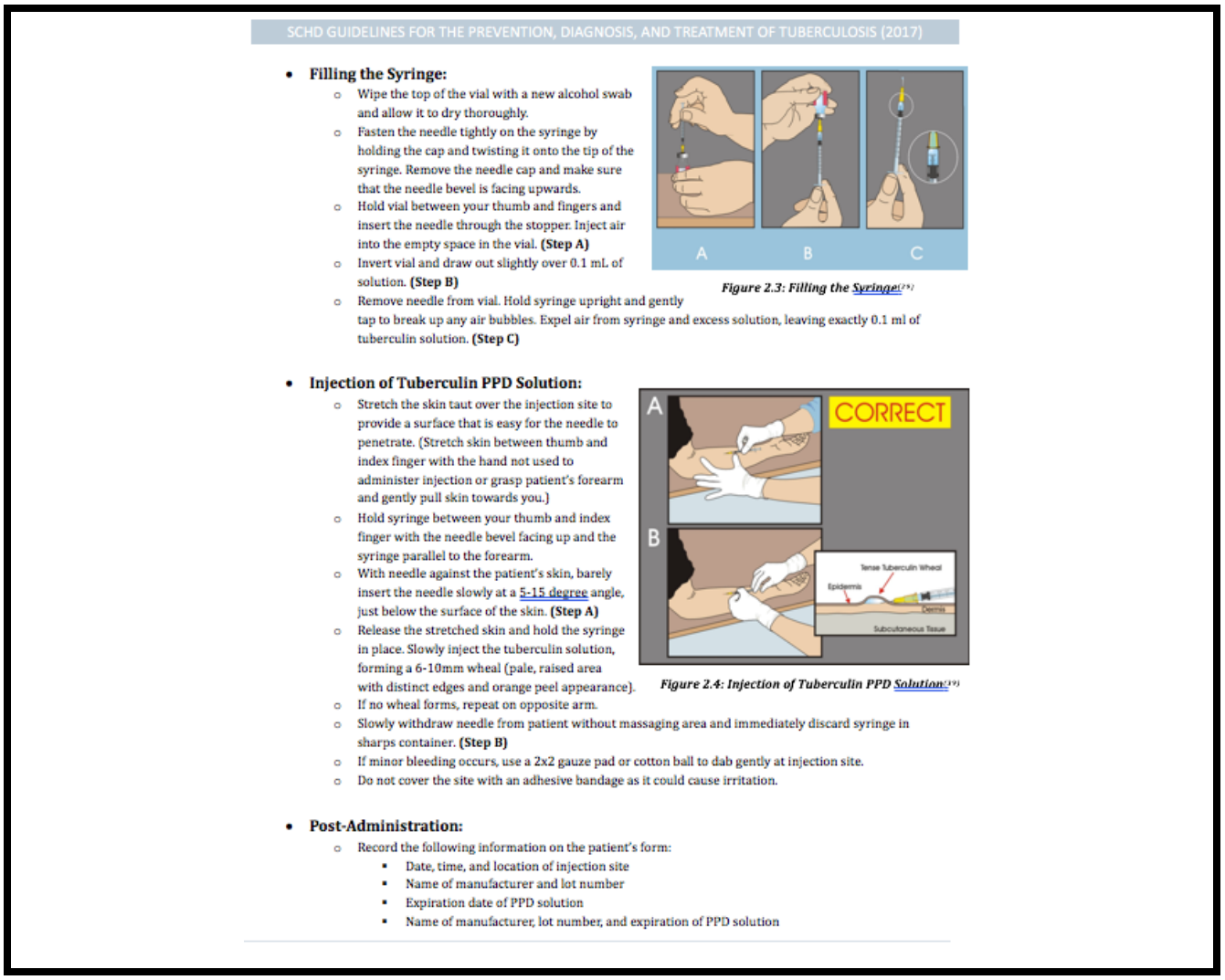
## SCHD TB Protocol Manual Navigation *(6 Parts, 14 Sections):*

**Part 1: *An Introduction to Tuberculosis Control***

- I. Introduction
- II. Effective TB Control Programs
- III. Pathogenesis of Tuberculosis

**Part 2: *Latent Tuberculosis Infection Management***

- IV. Targeted Tuberculin Testing & IGRA
    - ***CUSTOM:*** *Graphics accompanying procedures (e.g. Tuberculin Skin Test section)*



SCHD GUIDELINES FOR THE PREVENTION, DIAGNOSIS, AND TREATMENT OF TUBERCULOSIS (2017)

- **Filling the Syringe:**
    - Wipe the top of the vial with a new alcohol swab and allow it to dry thoroughly.
    - Fasten the needle tightly on the syringe by holding the cap and twisting it onto the tip of the syringe. Remove the needle cap and make sure that the needle bevel is facing upwards.
    - Hold vial between your thumb and fingers and insert the needle through the stopper. Inject air into the empty space in the vial. **(Step A)**
    - Invert vial and draw out slightly over 0.1 mL of solution. **(Step B)**
    - Remove needle from vial. Hold syringe upright and gently tap to break up any air bubbles. Expel air from syringe and excess solution, leaving exactly 0.1 ml of tuberculin solution. **(Step C)**



*Figure 2.3: Filling the Syringe*

- **Injection of Tuberculin PPD Solution:**
    - Stretch the skin taut over the injection site to provide a surface that is easy for the needle to penetrate. (Stretch skin between thumb and index finger with the hand not used to administer injection or grasp patient's forearm and gently pull skin towards you.)
    - Hold syringe between your thumb and index finger with the needle bevel facing up and the syringe parallel to the forearm.
    - With needle against the patient's skin, barely insert the needle slowly at a 5-15 degree angle, just below the surface of the skin. **(Step A)**
    - Release the stretched skin and hold the syringe in place. Slowly inject the tuberculin solution, forming a 6-10mm wheal (pale, raised area with distinct edges and orange peel appearance).
    - If no wheal forms, repeat on opposite arm.
    - Slowly withdraw needle from patient without massaging area and immediately discard syringe in sharps container. **(Step B)**
    - If minor bleeding occurs, use a 2x2 gauze pad or cotton ball to dab gently at injection site.
    - Do not cover the site with an adhesive bandage as it could cause irritation.



*Figure 2.4: Injection of Tuberculin PPD Solution*

- **Post-Administration:**
    - Record the following information on the patient's form:
        - Date, time, and location of injection site
        - Name of manufacturer and lot number
        - Expiration date of PPD solution
        - Name of manufacturer, lot number, and expiration of PPD solution

***Figure 3.5 (a) Graphics to Accompany TST Procedures***

- V. Treatment of Latent TB Infection

## Part 3: *Active Tuberculosis Disease Management*

- VI. Diagnosis of Tuberculosis
- VII. Treatment of Tuberculosis
    - ***CUSTOM:*** *Colorful TB Treatment Regimen Tables*

SCHD GUIDELINES FOR THE PREVENTION, DIAGNOSIS, AND TREATMENT OF TUBERCULOSIS (2017)

**STANDARD DRUG-SUSCEPTIBLE TB DISEASE TREATMENT REGIMENS**

| INITIAL PHASE (8-9 WEEKS) | | CONTINUATION PHASE**** (18 WEEKS) | | | |
|---|---|---|---|---|---|
| REGIMEN # & DRUGS | INTERVAL***/DOSE (MINIMUM DURATION) | REGIMEN # & DRUGS | INTERVAL/DOSE (MINIMUM DURATION) | TOTAL DOSES | COMMENTS |
| (1) INH, RIF*, PZA, EMB** | 7 days/week for 56 doses (8 weeks) OR 5 days/week for 40 doses (8 weeks) ***** | (1) INH, RIF | 7 days/week for 126 doses (18 weeks) OR 5 days/week for 90 doses (18 weeks) | 130-182 | - Preferred regimen for patients with newly diagnosed Pulmonary TB. - Most effective regimen. |
| (2) INH, RIF*, PZA, EMB** | 7 days/week for 56 doses (8 weeks) OR 5 days/week for 40 doses (8 weeks) | (2) INH, RIF | 3 times weekly for 54 doses (18 weeks) | 94-110 | - Preferred alternative regimen in situation in which frequent DOT during continuation phase proves difficult. |
| (3) INH, RIF*, PZA, EMB** | 3 times weekly for 24 doses (8 weeks) | (3) INH, RIF | 3 times weekly for 54 doses (18 weeks) | 78 | - Use regimen 3 with caution in patients with HIV and/or cavitary dz. Missed treatments can lead to treatment failure, relapse, and drug resistance. |
| (4) INH, RIF*, PZA, EMB** | 7 days/week for 14 doses, then twice weekly for 12 doses | (4) INH, RIF | Twice weekly for 36 doses (18 weeks) | 62 | - Do NOT use 2x-weekly regimen in HIV patients or patients w/ smear (+) and/or cavitary dz. - Least effective. |

** HIV-infected patients on certain antiretroviral drugs may need medication adjustment because of drug interactions with rifampin. HIV-infected patients with <100 CD4+ cells/μl should be given daily therapy for the first 8 weeks and daily or three times weekly for the remaining 18 weeks. Consult a HIV/TB expert.*

*** EMB can be discontinued (prior to 8 weeks) once sensitivity to INH, RIF, & PZA are known.*

****** ALL Regimens (1x, 2x, & 3x weekly and 5 days/week) must be administered via DOT (Directly Observed Therapy).***

***** Treatment should be extended in certain circumstances. (See "Minimum TB Treatment Duration by Case Characteristics" below.)*

****** The weekend doses are supplied to the patient to take on his or her own self. They are self-administered, so they are not really considered a part of the DOT.*

***MINIMUM TB TREATMENT DURATION BY CASE CHARACTERISTICS***

| TB Diagnosis (Case Characteristics) | Minimum Months of Treatment |
|---|---|
| Standard drug sensitive TB disease | 6 |
| Culture negative (abacillary) pulmonary disease | 4 |
| Drug resistance / Intolerance | |
| Without INH | 6 |
| Without PZA (pregnancy & M. bovis) | 9 |
| Without RIF | 9-12 |
| Without INH / RIF ± other drugs | 18-24 |
| Cavitary Chest X-ray / Culture Positive @ 2 months | 9 |
| Extrapulmonary | |
| CNS | 9 |
| Bone joint | 9 |
| Miliary | 9 |
| Other | 6 |

***Table 6: Standard TB Disease Treatment Regimens***[12]

***Figure 3.5 (b) Colorful TB Treatment Regimen Tables***

## Part 4: *Adherence Promoting Strategies*

- VIII. Promoting Treatment Adherence
    - ***CUSTOM:*** *Electronic DOT (e-DOT) Implementation Instructions*

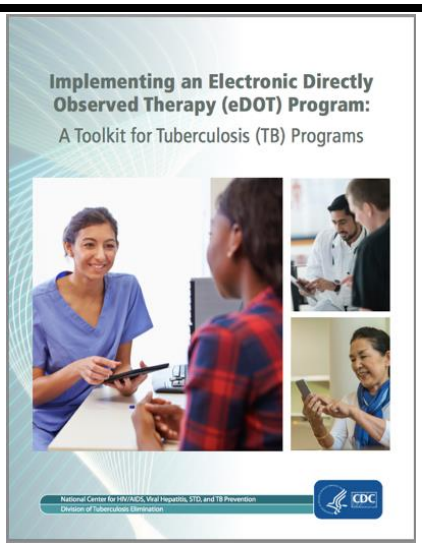



***Figure 3.5 (c) E-DOT Implementation Instructions (CDC)***

- IX. Managing Non-Adherence
    - ***CUSTOM:*** *Kansas State Statutes*

**KANSAS STATE STATUTES[43] (KSA 65-129, 65-301, 65-302)**

**Chapter 65.--PUBLIC HEALTH**
**Article 1.--SECRETARY OF HEALTH AND ENVIRONMENT, ACTIVITIES**

**65-129. Penalties for unlawful acts.** Any person violating, refusing or neglecting to obey any of the rules and regulations adopted by the secretary of health and environment for the prevention, suppression and control of infectious or contagious diseases, or who leaves any isolation area of a hospital or other quarantined area without the consent of the local health officer having jurisdiction, or who evades or breaks quarantine or knowingly conceals a case of infectious or contagious disease shall be guilty of a class C misdemeanor.

**History:** L. 1917, ch. 205, § 2; R.S. 1923, 65-129; L. 1974, ch. 352, § 12; L. 1976, ch. 262, § 8; July 1.

**Chapter 65.--PUBLIC HEALTH**
**Article 1.--SECRETARY OF HEALTH AND ENVIRONMENT, ACTIVITIES**

**65-129a. Definitions.** As used in K.S.A. 2005 Supp. 65-129b to 65-129d, inclusive, and amendments thereto:

(a) "Infectious or contagious disease" has the meaning ascribed thereto by subsection (b) of K.S.A. 65-128, and amendments thereto, but the infectious or contagious disease acquired immune deficiency syndrome or any causative agent thereof shall not constitute an infectious or contagious disease for the purposes of K.S.A. 2005 Supp. 65-129b and 65-129c, and amendments thereto.
(b) "Secretary" means the secretary of health and environment.

**History:** L. 2005, ch. 122, § 1; Apr. 21.

**Chapter 65.--PUBLIC HEALTH**
**Article 1.--SECRETARY OF HEALTH AND ENVIRONMENT, ACTIVITIES**

**65-129b. Infections or contagious diseases; authority of local health officer or secretary; evaluation or treatment orders, isolation or quarantine orders; enforcement.**

(a) Notwithstanding the provisions of K.S.A. 65-119, 65-122, 65-123, 65-126 and 65-128, and amendments thereto, and any rules or regulations adopted thereunder, in investigating actual or potential exposures to an infectious or contagious disease that is potentially life-threatening, the local health officer or the secretary:

(1) (A) May issue an order requiring an individual who the local health officer or the secretary has reason to believe has been exposed to an infectious or contagious disease to seek appropriate and necessary evaluation and treatment;

***Figure 3.5 (d) Inclusion of Kansas State Statutes***

- X. Promoting Cultural Sensitivity
    - ***CUSTOM:*** *Promoting Cultural Sensitivity (CDC series adaptation)*

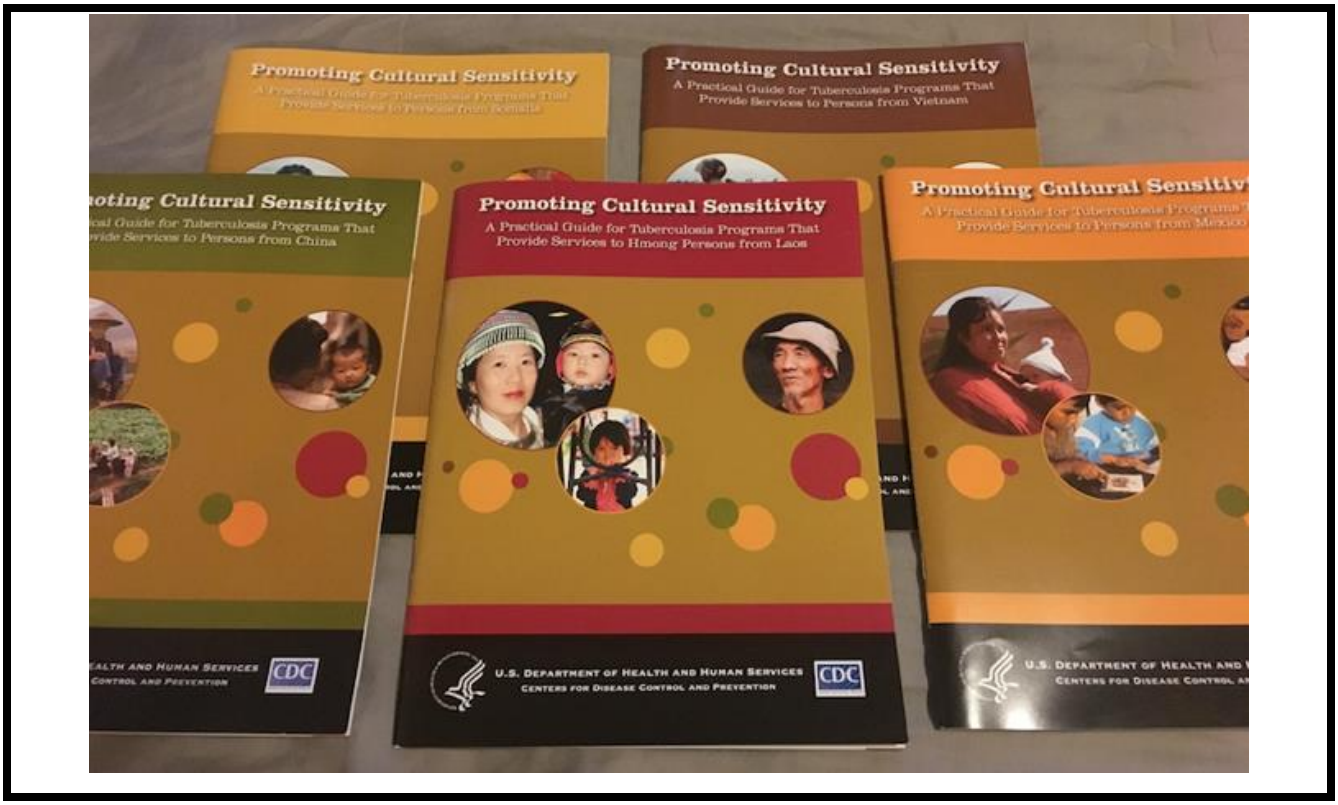



***Figure 3.5 (e) Promoting Cultural Sensitivity Booklets (CDC)***

- ***CUSTOM:*** *Translator Services & Google Translate Implementation Instructions*

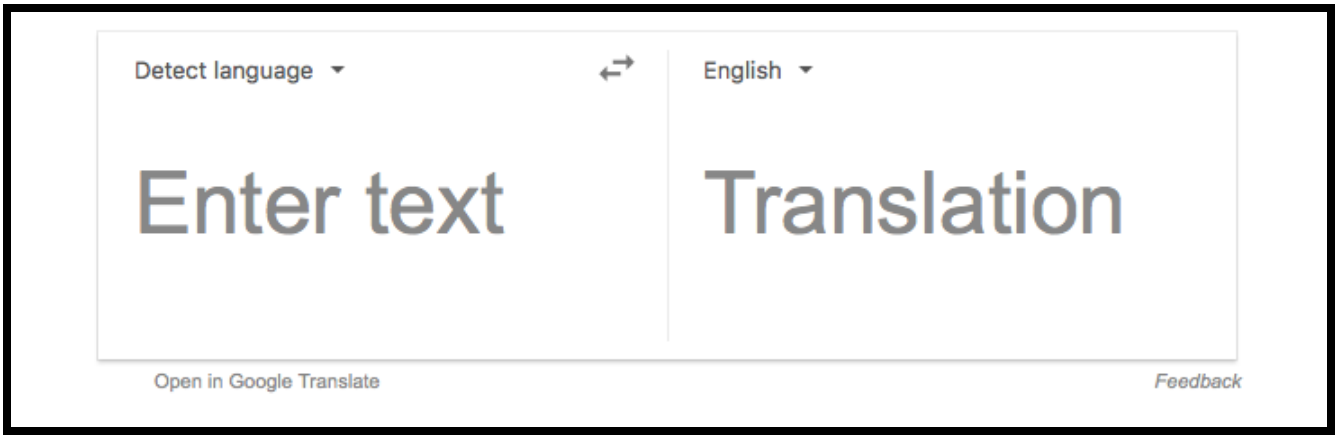
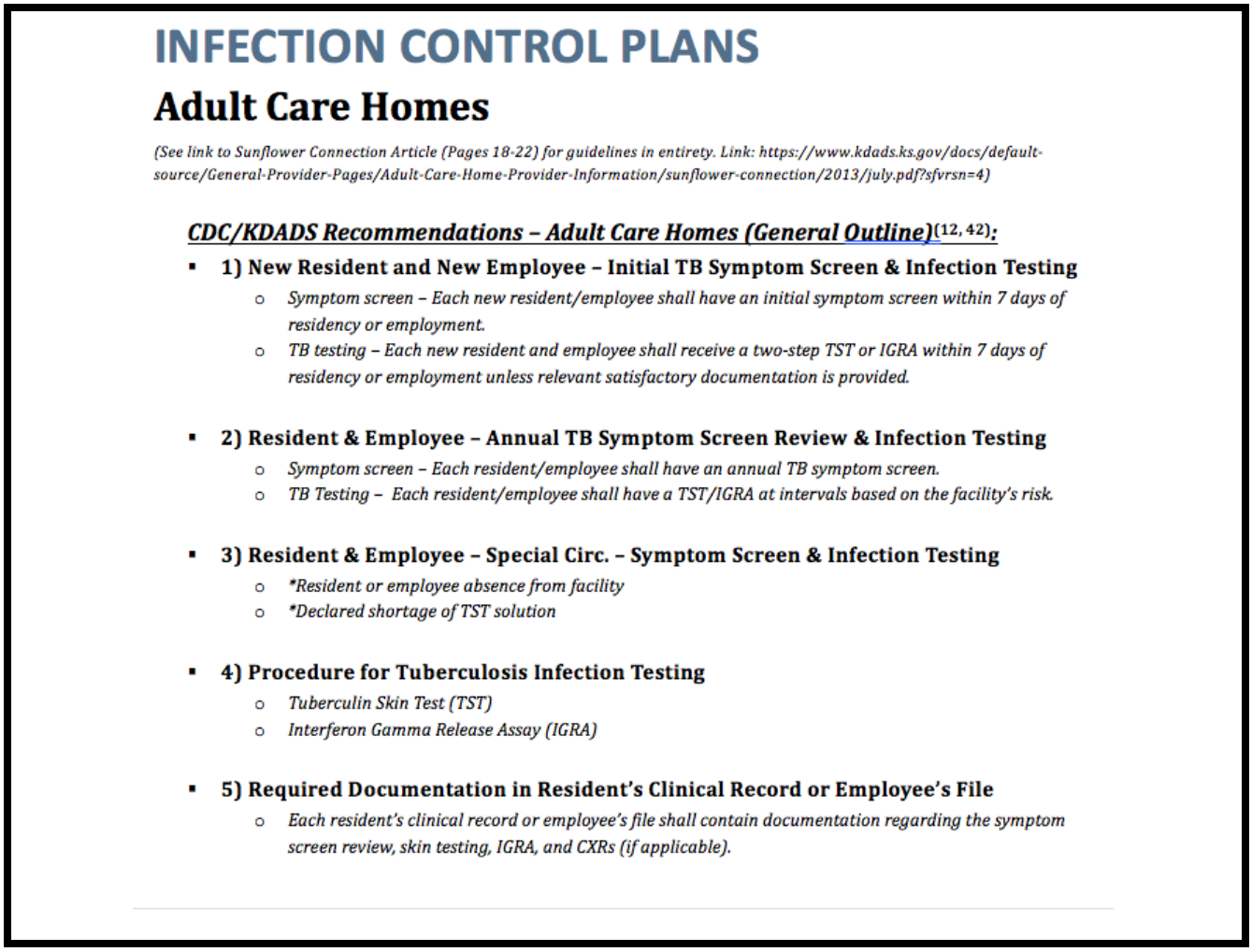



***Figure 3.5 (f) Google Translate***

**Part 5: *Contact Investigations & Infection Control***

- XI. Contact Investigations
- XII. Infection Control
    - ***CUSTOM:*** *Kansas TB Infection Control Measures*



# INFECTION CONTROL PLANS

## Adult Care Homes

*(See link to Sunflower Connection Article (Pages 18-22) for guidelines in entirety. Link: https://www.kdads.ks.gov/docs/default-source/General-Provider-Pages/Adult-Care-Home-Provider-Information/sunflower-connection/2013/july.pdf?sfvrsn=4)*

***CDC/KDADS Recommendations – Adult Care Homes (General Outline)***[12, 42]***:***

- **1) New Resident and New Employee – Initial TB Symptom Screen & Infection Testing**
    - *Symptom screen – Each new resident/employee shall have an initial symptom screen within 7 days of residency or employment.*
    - *TB testing – Each new resident and employee shall receive a two-step TST or IGRA within 7 days of residency or employment unless relevant satisfactory documentation is provided.*
- **2) Resident & Employee – Annual TB Symptom Screen Review & Infection Testing**
    - *Symptom screen – Each resident/employee shall have an annual TB symptom screen.*
    - *TB Testing – Each resident/employee shall have a TST/IGRA at intervals based on the facility's risk.*
- **3) Resident & Employee – Special Circ. – Symptom Screen & Infection Testing**
    - **Resident or employee absence from facility*
    - **Declared shortage of TST solution*
- **4) Procedure for Tuberculosis Infection Testing**
    - *Tuberculin Skin Test (TST)*
    - *Interferon Gamma Release Assay (IGRA)*
- **5) Required Documentation in Resident's Clinical Record or Employee's File**
    - *Each resident's clinical record or employee's file shall contain documentation regarding the symptom screen review, skin testing, IGRA, and CXRs (if applicable).*

***Figure 3.5 (g) Customized Infection Control Plans as recommended by the KDADS***

**Part 6: *References & Appendices***

- XIII. References
- XIV. Appendices
    - ***CUSTOM:*** *SCHD TB Forms (SCHD Treatment Agreement Forms, SCHD Medication Administration Record (MAR) Form, SCHD Contact Investigation Form, & KDHE Interpreter/Translator Vendor List)*

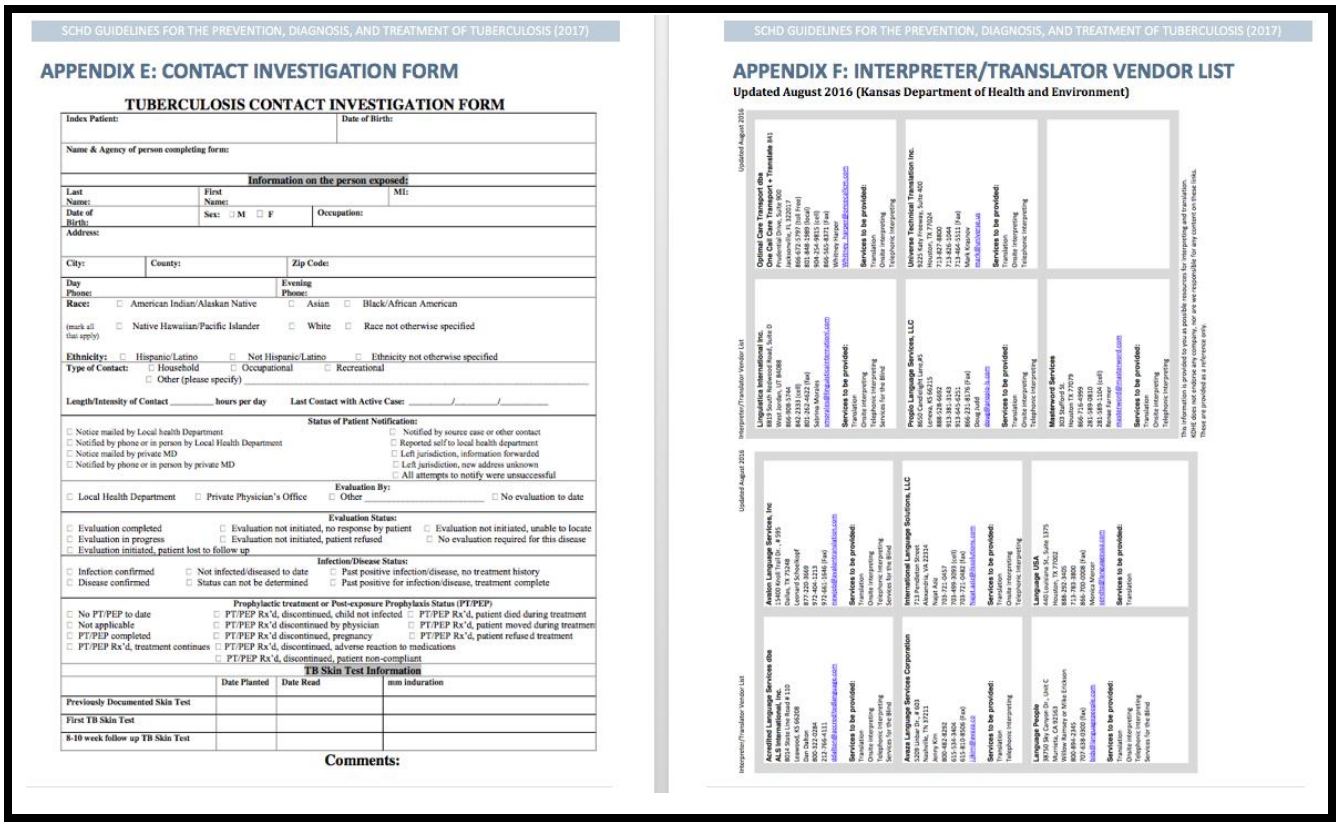



***Figure 3.5 (h) Appendices Including Forms Used by the SCHD***

# *3.2.5) External Review:*

Upon completion of the TB protocol manual, review of the manual's content by external sources was necessary for validation. The manual contents, especially the tables with critical information involving medical dosing for TB treatments, were reviewed in detail and compared alongside CDC recommendations with both SCHD's Communicable Disease / TB Program Manager (*Maria Shoultys, RN*) and a Stanford University School of Medicine resident physician (*Joseph Tseng, MD - Department of Radiology*). Adjustments found from the reviews were made accordingly.

# Part 3: Results / Discussion

## *3.3.1) Document Produced*

The final document produced for this capstone project is the ***Saline County Health Department Guidelines for the Prevention, Diagnosis, and Treatment of Tuberculosis (2017) (written and adapted for use by the Saline County Health Department and other local health departments in Kansas)***.

After the inclusion of page breaks, the TB protocol manual is 89 pages long (83 pages when not including the cover page, preface, and table of contents).

## *3.3.2) Potential Areas of Improvement*

The 2 areas of potential improvement for this TB protocol manual are **1)** even more picture graphics to aid in procedural instructions (e.g. Contact Investigation and Infection Control sections), and **2)** more information on Second-Line TB drugs and the ways to implement anti-TB drugs in the case of MDR or XDR-TB.

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# Appendix

***(SCHD Guidelines for the Prevention, Diagnosis, and Treatment of Tuberculosis)***

**Attached in a "4-pages per page" format. Request the full-page pdf document from either the author or SCHD's Communicable Disease / TB Program Manager**