Master of Public Health

Integrative Learning Experience Report

DESIGNING A CASPER SURVEY TOOL OPTIMIZED FOR RILEY COUNTY

by

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submitted in partial fulfillment of the requirements for the degree

MASTER OF PUBLIC HEALTH

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Abstract

The Community Assessment for Public Health Emergency Response is an epidemiological tool developed by the Centers for Disease Control and Prevention to provide household-based information regarding a community in an easy, quick, and cost-effective way. It has become a very effective tool in conducting a form of Rapid Needs Assessment in both emergency and non-emergency situations. This project involved developing a process to optimize the CASPER tool to make it suitable for use in Riley County, Kansas. My primary focus involved developing optimal cluster and household sampling methodologies for this process. The development of the sampling methodologies for Riley County, closely mirrored the process outlined in the CASPER toolkit provided by the CDC. Once our team had the process formalized, a CASPER trial-run was conducted in Riley County on four pre-selected clusters. Our experience involving the logistics of carrying out the trial-run, helped to further refine the process and add recommendations which may be useful to those who may conduct the survey in the future.

Subject Keywords: CASPER, Sampling, Cluster, Trial-run, Riley County.

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Chapter 1 - Literature Review

Community Assessment for Public Health Emergency Response (CASPER) is an epidemiological tool, developed by the Centers for Disease Control and Prevention (CDC), used to conduct a type of rapid needs assessment (RNA) at a household level in a community. The methodology originated in the 1960s, when local health departments were conducting needs assessments regarding immunization coverage in their respective communities (Kolwaite et al., 2013). It was subsequently adopted by the World Health Organization (WHO), during the implementation of the Expanded Program of Immunization (EPI) in the 1970s. The methodology was widely used in the 1990s for conducting community needs assessments and assessing community emergency preparedness plans during disasters. The CDC published the first edition of the CASPER toolkit in 2009, and a second edition was released in 2012 (Centers for Disease Control and Prevention [CDC], 2019). Although the CASPER methodology was originally developed for use in emergency situations, such as disasters, the tool is increasingly being used in non-emergency situations. There are four phases in a CASPER—preparing for the CASPER, conducting the CASPER in the field, analyzing the data, and writing the report (CDC, 2019).

According to the CDC, the CASPER methodology can be used for:

- Assessing the public perceptions regarding health issues.
- Estimating the needs within a community.
- Assisting in planning for an emergency response.
- Streamlining the process for public health accreditation.

A CASPER involves conducting door-to-door surveys of sampled households. Data is collected from each household by use of a questionnaire. Use of door-to-door surveys becomes advantageous for several reasons despite being resource intensive—better representation of the target population, better response rates compared to other survey methods, higher data quality, and better understanding amongst the public regarding the work done by the agency conducting the CASPER (Simon & Decosimo, 2014). Despite the above-mentioned advantages, bias is a potential problem that may be

encountered while doing CASPER surveys. There are several types of bias encountered while conducting surveys (Jovancic, 2019). Sampling bias refers an error in the method selection of survey respondents, such that the survey sample is not random. This type of bias can be avoided by ensuring randomness of the survey sample, by having a clear definition of the target population and the sampling frame and avoiding convenience sampling (Bhandari, 2020). Another type of bias encountered in surveys is nonresponse bias which involves the survey nonrespondents being systematically different from survey respondents. Keeping the survey response rates high can help minimize nonresponse bias. Effective communication by the survey team regarding the purpose and need of conducting the survey can improve survey response rates. The third type of bias seen while conducting surveys is response bias which occurs when survey participants provide inaccurate or false responses to survey questions. Response bias in surveys may be reduced by using audience appropriate language or vocabulary in survey questions, avoiding leading questions, providing adequate survey response options, reminding the survey respondents that they are free to skip questions or not respond to any particular question (Vaughn & Haapsaari). Question-order bias occurs when a survey respondent reacts differently to questions based on the order in which questions appear in the survey. A classic example of question order bias is described in the book “Questions and Answers in Attitude Surveys” by Howard Schuman and Stanley Presser. The scenario described is a survey conducted during the time of the Cold War, in which American and Soviet respondents were asked whether or not American and Soviet journalists should be allowed to visit the Soviet Union or United States, respectively, to write articles for newspapers in their parent countries. The order in which the questions were asked affected the responses. There was lower support for American reporters to visit the Soviet Union, among those respondents that first responded in opposition towards allowing Soviet journalists to visit the United States. However, if the question was asked in the reverse order, there would be greater support in allowing both American and Soviet journalists to cover news from the other’s nation. The rationale behind this bias involves survey respondents trying to stay consistent with their previous responses (Vannette, 2020). This type of bias can be reduced by randomizing the questions, making the interview more engaging, keeping

the survey questions around common topics, grouping related questions etc., (Vannette, 2020).

Data collected from conducting surveys, like CASPERs, can be different types and analyzed using different visualization methods (Donges, 2018). Nominal data refers to data used for naming or labelling variables. This type of data has neither quantitative value nor any order. Nominal data can be analyzed with frequencies, proportions, or percentages, and visualized using pie charts or bar charts (e.g., Are you married? Yes/No). Ordinal Data is similar to nominal variables; the difference being that there is a clear ordering of the categories. Ordinal data can be expressed in terms of frequencies, proportions, or percentages. In addition, data can be summarized in terms of percentiles, measures of central tendency, and quartiles (e.g., What is the highest level of education you have attained? 1- Elementary, 2- High School, 3- Undergraduate, 4- Graduate). Numerical data includes discrete and continuous data types. Discrete data take only certain values (e.g., the number of children at a daycare). Continuous data can take any value within a range (e.g., an individual's height or weight). Continuous data can be summarized by measures of central tendency, percentiles, quartiles, range, etc. Results can be shown using box plots or histograms.

A CASPER consists of a two-stage, thirty by seven cluster sampling methodology. According to CASPER toolkit provided by the CDC, "a cluster is a non-overlapping section in the geographical area with a known number of households (CDC, 2019)." Cluster sampling refers to the sampling from the population of interest by subdividing it into distinct geographical areas. In the first stage, thirty clusters are selected with a probability proportional to the number of households within the cluster. All clusters chosen during the first stage sampling are chosen without substitution. This means that the clusters originally selected are the ones to be accessed during the second stage sampling, with no changes (CDC, 2019). The probability of a cluster being selected during first stage sampling depends on the eligibility of that cluster to be included for first stage sampling. The eligibility of a cluster for first stage sampling depends on the background on the sampling area (number of occupied households and housing units) and insights from local leadership and authorities. Sources commonly used to obtain

clusters for the purpose of conducting a CASPER include—census blocks or block groups at a county level, or the use of Geographic Information System (GIS) software for cluster selection. Census blocks are commonly used as the source of cluster samples for most CASPERs conducted. During the CASPER second stage sampling seven households are interviewed within a cluster. The selection of seven households within the cluster is done by systematic random sampling (see appendix 2 for this procedure). The goal is to interview seven households from 30 clusters, giving a total of 210 household interviews (Simon & Decosimo, 2014). The sampling methodology has been validated for use in conducting needs assessments for different populations (Kolwaite et al., 2013).

In the United States, the state of Texas has conducted the greatest number of CASPERs. A document titled “Lessons Learned”, published in 2015 by the Texas Department of State Health Services, details the experiences of different agencies within the state of Texas that have conducted CASPERs. The document also looks at the different categories of the process within each CASPER phase, and provides concise information in bullet-points regarding each of those categories. Similar to Texas, other states have also conducted CASPERs. In 2011 a CASPER was conducted in Pike County, Kentucky in response a series of severe weather conditions that affected the area from 2009-2011. The aim of that CASPER was for future planning and to revise existing emergency response plans (Kolwaite et al., 2013). Another CASPER conducted in Richland County, Montana in 2015, gathered data on the health status of the residents, create a network of volunteers, and to perform an emergency response exercise (Richland County Health Department, 2015).

This project drew inspiration from an MPH field project conducted by a former Kansas State University MPH student in Shawnee County, Kansas in 2017. The student, Amy Worthington, was mentored by our preceptor, Edward Kalas during the field experience. The project involved conducting a CASPER survey in Shawnee County to assess the effectiveness of the Shawnee County Health Department’s

(SCHD) “Dump Day” mosquito control campaign (Worthington, 2017). The CASPER conducted at Shawnee County would be an example of conducting a CASPER in a non-emergent situation.

The agency with which I conducted my Applied Practice Experience (APE) project was the Riley County Health Department (RCHD). The department is located at 2030 Tecumseh Road, Manhattan, Kansas. According to the Riley County Health Department website, their mission is “to promote and protect the health and safety of our community through evidence-based practices, prevention, and education.” My preceptor and mentor for this project with the RCHD was Edward Kalas, who has a Master’s in Public Health degree, and served as a health educator and accreditation coordinator for the RCHD. Prior to his work with the RCHD, he worked with the Shawnee County Health Department located in Topeka, Kansas. He is well experienced with the CASPER protocol, as he oversaw the procedures of the Shawnee County Health Department CASPER conducted in 2017 (Worthington, 2017).

Chapter 2 - Learning Objectives and Project Description

Although the CASPER toolkit provided by the CDC provides a detailed methodology for conducting a CASPER, there is a significant learning curve associated with actually understanding and conducting the survey. The RCHD recognized this issue, leading to the inception of the idea to develop a simpler and user-friendly tool to conduct a CASPER survey within the community. Moreover, the RCHD had planned on conducting a Community Health Improvement Plan (CHIP) for Riley County in 2021. The RCHD intends on using the CASPER process developed through this project for conducting the CHIP.

I started my work with the RCHD from July 2020 as an intern. I was assigned to the CASPER and CHIP team along with four other MPH students—Jason DeFisher, Grace Sello, Amanda Todavchick, and Sofia Scavone. The goal of the project was to develop a process for conducting a CASPER survey optimized specifically for use in Riley County and subsequently use that process for conducting the CHIP. Although my initial assigned role was data analysis and reporting of survey data, over the course of the project my role shifted towards the development of a process for CASPER cluster sampling. Since the CASPER project took more focus during our field experience, it was decided that the CHIP project would be possibly conducted by future MPH students as a part of their field project.

The project initially started with the team members becoming familiar with the CASPER toolkit provided by the CDC (CDC, 2019). Different sections of the CASPER methodology highlighted in the toolkit were arbitrarily divided among the team members to work on. Regular weekly group meetings were held with our preceptor, Edward Kalas, where we discussed particulars on the sections we were working on.

To get a better understanding of the logistics associated with conducting a CASPER in Riley County, a CASPER trial-run was planned to be conducted over a weekend. My role in the CASPER trial-run was to provide sampling methodologies for the different stages of the CASPER sampling process.

The first stage sampling for conducting the CASPER trial-run involved obtaining a list of all the potential clusters in the sampling frame of Riley County. The most

common source used for cluster selection is census block data. For the purpose of our CASPER trial-run, census block data was used (see Appendix 1 for details regarding this procedure). The information is displayed when doing an “advanced search” in the United States Census Bureau website (Figure 2.1 below).

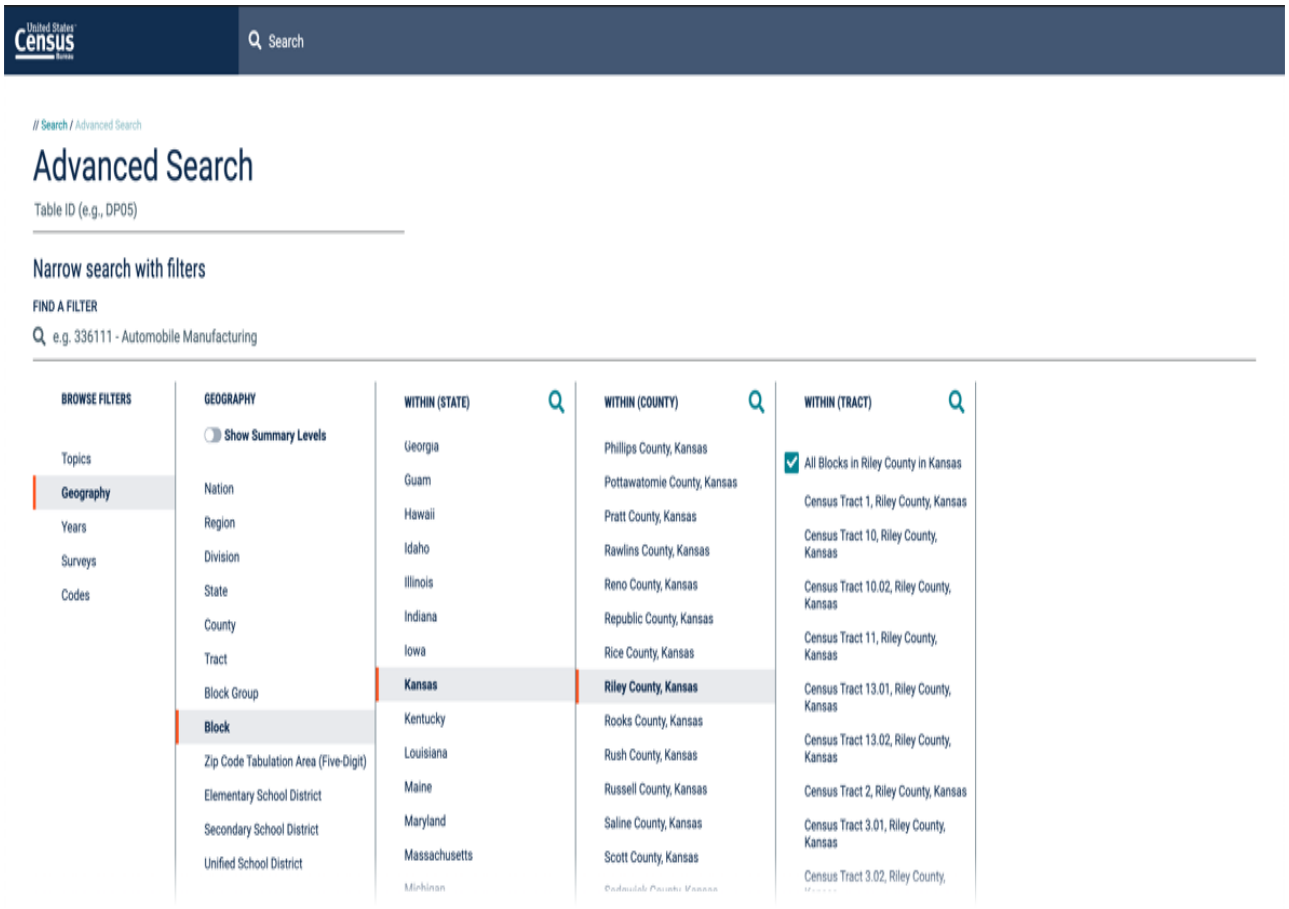
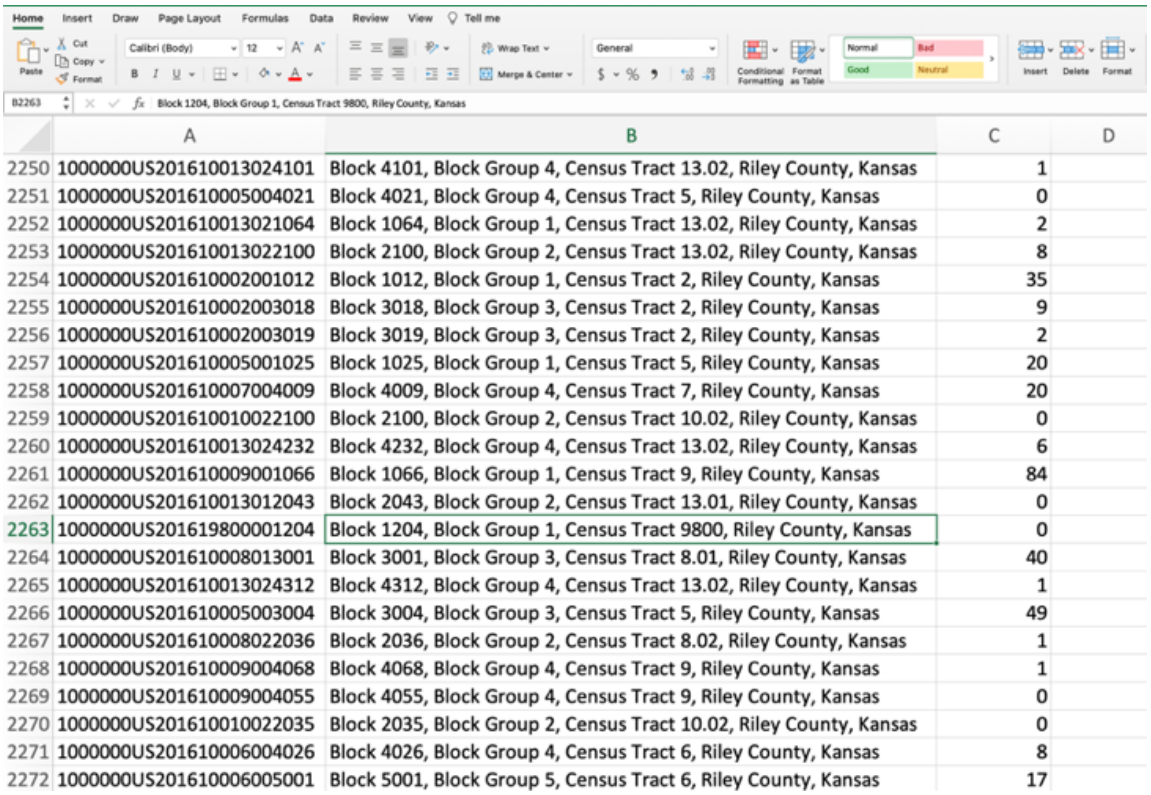


Figure 2.1: Advanced Search on the U.S. Census Bureau website

Once a list of all the clusters were obtained for Riley County, the data was exported into a Microsoft Excel file (Figure 2.2 below).



	A	B	C	D
2250	1000000US201610013024101	Block 4101, Block Group 4, Census Tract 13.02, Riley County, Kansas	1	
2251	1000000US201610005004021	Block 4021, Block Group 4, Census Tract 5, Riley County, Kansas	0	
2252	1000000US201610013021064	Block 1064, Block Group 1, Census Tract 13.02, Riley County, Kansas	2	
2253	1000000US201610013022100	Block 2100, Block Group 2, Census Tract 13.02, Riley County, Kansas	8	
2254	1000000US201610002001012	Block 1012, Block Group 1, Census Tract 2, Riley County, Kansas	35	
2255	1000000US201610002003018	Block 3018, Block Group 3, Census Tract 2, Riley County, Kansas	9	
2256	1000000US201610002003019	Block 3019, Block Group 3, Census Tract 2, Riley County, Kansas	2	
2257	1000000US201610005001025	Block 1025, Block Group 1, Census Tract 5, Riley County, Kansas	20	
2258	1000000US201610007004009	Block 4009, Block Group 4, Census Tract 7, Riley County, Kansas	20	
2259	1000000US201610010022100	Block 2100, Block Group 2, Census Tract 10.02, Riley County, Kansas	0	
2260	1000000US201610013024232	Block 4232, Block Group 4, Census Tract 13.02, Riley County, Kansas	6	
2261	1000000US201610009001066	Block 1066, Block Group 1, Census Tract 9, Riley County, Kansas	84	
2262	1000000US201610013012043	Block 2043, Block Group 2, Census Tract 13.01, Riley County, Kansas	0	
2263	1000000US201619800001204	Block 1204, Block Group 1, Census Tract 9800, Riley County, Kansas	0	
2264	1000000US201610008013001	Block 3001, Block Group 3, Census Tract 8.01, Riley County, Kansas	40	
2265	1000000US201610013024312	Block 4312, Block Group 4, Census Tract 13.02, Riley County, Kansas	1	
2266	1000000US201610005003004	Block 3004, Block Group 3, Census Tract 5, Riley County, Kansas	49	
2267	1000000US201610008022036	Block 2036, Block Group 2, Census Tract 8.02, Riley County, Kansas	1	
2268	1000000US201610009004068	Block 4068, Block Group 4, Census Tract 9, Riley County, Kansas	1	
2269	1000000US201610009004055	Block 4055, Block Group 4, Census Tract 9, Riley County, Kansas	0	
2270	1000000US201610010022035	Block 2035, Block Group 2, Census Tract 10.02, Riley County, Kansas	0	
2271	1000000US201610006004026	Block 4026, Block Group 4, Census Tract 6, Riley County, Kansas	8	
2272	1000000US201610006005001	Block 5001, Block Group 5, Census Tract 6, Riley County, Kansas	17	

Figure 2.2: Riley County Census Block Data in Microsoft Excel

In a traditional CASPER, thirty clusters (census blocks) are selected. Since the RCHD trial-run was planned for a single day, it would be impossible to interview thirty clusters. Taking advice from our preceptor, we decided to interview only four clusters, considering that interviewing four clusters would be feasible for a single day setting. I was initially asked to select any four census blocks within Riley County. I chose ten census blocks (clusters) from the census data, based on the number of housing units present in those census blocks. Eight of the clusters were selected from the Manhattan, Kansas area and two were selected from Ogden, Kansas. After discussing with the team, out of the ten census blocks, four clusters (see Appendices 4-7) were selected for the purpose of our trial-run. Cluster maps were made which would be used by the CASPER trial-run survey teams to conduct the household interviews. The U.S. Census Bureau—TIGERweb software (Figure 2.3) was used to generate cluster maps (see appendix 3 for this procedure). Additionally, cluster maps were also made using Google® Maps software (Figure 2.4) for a better view of the various landmarks.

Figure 2.3: TigerWeb Cluster 1 Map

Figure 2.4: Google® Maps Cluster 1 Map

The other team members fulfilled their respective roles, with regards to preparing a news release, preparing the “just in time training”, formulating survey questions, creating data entry sheets on Epi Info 7, etc. Fliers sent out through the Kansas State University MPH office helped in the process of recruiting volunteers for conducting the household surveys.

The CASPER trial-run was initially planned for November 29th, 2020. However due to concerns surrounding the COVID-19 pandemic and that particular weekend being Thanksgiving weekend, the trial run was postponed to January 9th, 2021. The RCHD trial-run was successfully completed on January 9th, 2021. The results, findings, and recommendations based on observations made during the trial-run were presented as a group to the Flint Hills Coalition on January 14th, 2021.

Chapter 3 - Results

The results of this project are based on observations made both during the preparation and the conduction of the CASPER trial-run. The CDC CASPER toolkit provides step by step instructions on how to obtain census block information from the U.S. Census website (https://data.census.gov/cedsci/). As the layout of the U.S. census website has changed since the last updated publication of the CDC CASPER toolkit, many of the steps described in the toolkit to obtain the census block information were outdated. Many of the weblinks provided in the toolkit were also outdated, as they do not direct users to the correct websites or do not work at all. Similar experiences were noted during the process of cluster map creation using the U.S. Census TigerWeb software. Some of the steps described for the process of map creation in the CDC CASPER toolkit were outdated, needing an independent search to arrive at the correct links. The census data used to create the cluster maps were from the year 2010. Although there was an option to use current census data, choosing that setting did not display any useful information for creating cluster maps.

After a group review of the ten cluster maps made for the first stage sampling, a few clusters were considered less suitable to conduct interviews. This was because those clusters were predominantly occupied by Kansas State University students and the timing of the first planned date of the CASPER trial-run coincided with Thanksgiving weekend. A low contact rate (see below) from these clusters was a serious concern for the team, hence those clusters were not used for the trial-run. The CDC CASPER toolkit recommends conducting systematic random sampling for CASPER first stage sampling. Ideally a full CASPER, as recommended by the CDC, involves several sessions over nearly a 3-day period or an entire weekend, the CASPER trial-run conducted with RCHD was scheduled only for a single day.

A total of 22 interviews were completed during the RCHD CASPER trial-run. A total of ten households were replaced with other households in all clusters combined. These were due to both non-responses or refusals to participate. It was noted that cluster number four (see appendix 5), of the four chosen clusters, experienced significant non-responses and refusals to participate. There were also a high number of

“no soliciting” signs in cluster four. Due to these reasons the team assigned to this cluster was asked to attempt a single round of interviews within the cluster.

After completion of the trial-run, the data obtained was cleaned and entered into data shells created in the Epi Info 7 software. Epi Info 7 is the statistical software recommended by the CDC to conduct data management for CASPER surveys. However, analysis of the trial-run data was limited due difficulty with using Epi Info 7 for doing the analysis. Importing and retrieving data into and out of Epi Info 7 were major challenges. The software was also outdated due to lack of periodic updates. The data was imported into a Microsoft Excel spreadsheet and the CASPER response rates were calculated as shown below.

Calculation of CASPER response rates help in indicating the representativeness of the sampled population to the sampling frame population (CDC, 2019). The response rates comprise of a contact rate, a cooperation rate, and a completion rate. The formulas used to calculate these rates are shown below, along with the trial-run response rates. The contact rate represents the proportion of interviews completed out of all interviews attempted. The denominator includes inaccessible households, households with no response, completed interviews, refusals, and vacant houses. Higher the contact rate, better is the representativeness of the sampled population to the target population. Lower contact rates indicate more attempts were made by the interview teams to obtain the final number of completed interviews. This makes the sampled population more of a convenience sample (CDC, 2019). The contact rate from the trial-run was 43.14%, which is towards the lower side. Cooperation rate represents the proportion of completed interviews out of all households where contact was made and represents the willingness of the public in to complete the interview. Low cooperation rates suggest a convenience sample (CDC, 2019). The cooperation rate from the trial-run was 95.65%, which is towards the higher side. The completion rate represents the proportion of completed interviews to the desired number of interviews. For a traditional CASPER, 210 (30X7) interviews are intended to be completed. According to the CDC, an 80% completion rate (168 interviews for a traditional CASPER) is required for the results to be representative for the entire sampling frame (CDC, 2019). For the trial-run, our completion rate was 78.57%.

RCHD CASPER trial-run Response Rates

- $Contact\ Rate = \frac{Number\ of\ completed\ interviews}{All\ households\ where\ contact\ was\ attempted} = \frac{22}{51} = 43.14\%$
- $Cooperation\ Rate = \frac{Number\ of\ completed\ interviews}{All\ households\ where\ contact\ was\ made} = \frac{22}{23} = 95.65\%$
- $Completion\ Rate = \frac{Number\ of\ completed\ interviews}{Number\ of\ interviews\ intended\ to\ complete} = \frac{22}{28} = 78.57\%$

Since the trial-run conducted was not a full traditional CASPER, the external validity of the above results is poor. The number of interviews we intended to complete were 28 which is well below 210 as recommended by the CDC. Both the contact rate and the completion rate took lower values in our trial-run. This means that the results obtained from the sampled population is not representative of the target population (Riley County).

From the experience gained through this project, I was able to design the following products for the RCHD for use in the upcoming Riley County CHIP planned for 2021 or future CASPERs that the department may conduct.

Riley County Health Department: Community Assessment for Public Health Emergency Response (CASPER) First Stage Sampling Methodology (see appendix 1)

This document provides a simple step-by-step methodology for conducting a CASPER first stage sampling. It is tailored specifically for use in Riley County and displays all search entries to be made into the U.S. census website to obtain block data in .csv format, which can be opened using any spreadsheet software such as Microsoft Excel. Instructions are provided in the document on how to perform systematic random sampling of the data using Microsoft Excel.

Riley County Health Department: Community Assessment for Public Health Emergency Response (CASPER) Second Stage Sampling Methodology (see appendix 2)

This document provides a simple step-by-step methodology for conducting a CASPER second stage sampling. This document is intended for use by the CASPER survey teams when they are travelling to or already at the cluster location. The document may also be used as a part of training volunteers before they travel to the survey location.

Riley County Health Department: Creating Cluster Maps for CASPER surveys (see appendix 3)

This document provides a simple methodology to create cluster maps. Once first stage sampling is conducted the census block data of the chosen clusters may be entered into the U.S. Census TigerWeb software to create cluster maps. Examples of different cluster map views are also shown in the document.

All the documents listed above contain weblinks that are current until when the documents were made. However, the weblinks are subject to change in the future.

Chapter 4 - Discussion

The RCHD CASPER team project was part of an effort to create a simplified process for conducting a CASPER in Riley County, Kansas. The main goal was to create a process in a workbook style format that would be short and user-friendly, so that users would only need to use the CDC CASPER toolkit as a reference source. During the initial phase of the project, most of the activity involved reviewing the CDC CASPER toolkit and making sense of the entire CASPER process. However, it was the process of preparing for the RCHD CASPER trial-run that provided the experience we needed to make assessments regarding the logistics of conducting a CASPER. We were fortunate to receive quality guidance and advice from our preceptor, Edward Kalas, during each step of the project. The other staff members at the RCHD were also very helpful during the preparatory phase of the trial-run. This project has provided a new learning experience for me, as it brought to my attention, some of the skillsets needed by professionals in the field of public health. The CASPER trial-run also provided a unique experience and a fresh perspective regarding the importance of coordination, communication, and cooperation for achieving specific goals, while working in a team setting. Through this project we assessed the feasibility of conducting a CASPER in Riley County and we were able to conclude that a full traditional CASPER can be conducted in Riley County taking into account some of the lessons learned from this project.

We would advise users not familiar with Epi Info 7 software, to avoid its use for conducting CASPER data management. The software is demonstrably non-user friendly and outdated. Considering the different data types that are obtained while performing a CASPER survey, it is recommended by our team to use alternative data management tools. We recommend using survey software such as Qualtrics® or Google Forms® for creating CASPER surveys. The data obtained from the survey software can be imported into a spreadsheet software such as Microsoft Excel from which CASPER response rates can be calculated. For multistage sample design weighting and analysis, we recommend using statistical software such as SAS®.

Apart from relying on Epi Info 7 for data management, there were other limitations associated with this project. One was the fact that the CASPER trial-run was not a complete traditional CASPER. The sampling methodology used in the second stage sampling process during the trial-run was convenience sampling, whereas in a traditional CASPER, the sampling process would be systematic random sampling (Su et al., 2020). The CDC CASPER toolkit recommends the 30 X 7 sampling method to obtain 210 interviews from the sampling frame (Schnall et al., 2017), however in the RCHD CASPER trial run a 4 X 7 sampling process was used. The trial-run contact rate and completion rates were on the lower side. As explained before in the results, these would not be representative of Riley County.

. It is important to keep in mind the issue of bias associated with conducting surveys, like CASPERs. During the CASPER trial-run, we noted that cluster four had high rates of refusals and non-responses. The reasons for refusals as reported back by the survey team were lack of awareness regarding the trial-run and safety concerns surrounding the COVID-19 pandemic. Taking this to account, it is recommended to devise strategies to better inform the public regarding the process of the CASPER interview, the date and timing of the interviews, and potential locations that are more likely to be surveyed. By doing so the response rates may improve. A well-timed news release, publishing information on the health department website, using social media tools for communication, involving community leaders and other stakeholders for communication with the public, will help in the process of increasing community awareness.

When planning for a CASPER, the timing for when it is planned is important, especially in Riley county. It is advisable to avoid conducting the CASPER on holiday weekends, as non-response rates are expected to increase. Consider checking the Kansas State University academic calendar for the semester breaks, as students are less likely to be at their residences during those times. Consider also checking the local calendar where the survey is taking place for local events, holidays etc. It is also advisable to avoid days when the weather conditions are unfavorable.

Overall, I consider this Applied Practice Experience a very useful learning experience for me. Almost all the activities that I was involved with were very new and

outside my past professional experiences. All of the activities were conducted in an organized and systematic manner. By conducting the RCHD CASPER trial-run, we were able understand the methods involved in making a traditional CASPER easier to conduct in Riley County. We were also able to appreciate some of the deficiencies in the process outlined by the CDC CASPER toolkit. We hope that the toolkit prepared by our team and the other products prepared from this project will be of use to the RCHD for the upcoming CHIP in 2021 and for potential future CASPERs to be conducted by the department.

Chapter 5 - Competencies

Student Attainment of MPH Foundational Competencies

Tables 5.1 and 5.2 below illustrates a summary of the MPH foundational and emphasis area competencies that I met during Applied Practice Experience (APE) and Integrated Learning Experience with the Riley County Health Department (RCHD).

Table 5.1 Summary of MPH Foundational Competencies

Number and Competency		Description
#1	Apply epidemiological methods to the breadth of settings and situations in public health practice.	Designing first and second stage sampling methodologies for conducting a CASPER in Riley County.
#3	Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming and software, as appropriate.	Analyzing the cleaned data from the RCHD trial-run and calculating CASPER response rates. Assessing Epi Info 7 software as a viable option for CASPER data analysis.
#7	Assess population needs, assets, and capacities that affect communities' health.	Part of the CASPER test-run conducted, the sole purpose of which is to assess different aspects of population needs, assets, and capacities related to the communities' health.
#9	Design a population-based policy, program, project, or intervention.	The upcoming RCHD CASPER toolkit, which is a compilation of the tools created by the MPH student team for conducting a CASPER optimized for Riley County.
#19	Communicate audience-appropriate public health content, both in writing and through oral presentation	The poster made for the Kansas State University MPH department, which addresses the issue of mental health in the context of the COVID-19 pandemic.

Competency one involves the use of epidemiological methods in relation to public health practice. This competency was achieved during the process of designing the Riley County Health Department: Community Assessment for Public Emergency response (CASPER) First Stage Sampling Methodology; the Riley County Health Department: Community Assessment for Public Emergency response (CASPER) Second Stage Sampling Methodology; and the Riley County Health Department: Creating Cluster Maps for CASPER surveys documents see appendices 1-3). These documents were designed to make cluster sampling, cluster map creating, and cluster navigating processes easier by providing step-by-step instructions towards performing these tasks.

Competency three focuses on different methods to analyze qualitative and quantitative data. This objective was met by calculating the three CASPER response rates (shown in the “Results” chapter) from the data obtained from the RCHD CASPER trial-run. We attempted to conduct a weighted analysis of the data using Epi Info 7 software, however the trial was unsuccessful due to limitations in the functionality and compatibility of the software, with other data management tools.

Competency seven involves the assessment of population needs, assets, and capacities, as related to public health. The entire purpose of conducting a CASPER are to achieve these goals. Although the RCHD CASPER trial-run was primarily conducted to understand the logistics related to conducting a CASPER in Riley County, we were able to appreciate a sense of concern regarding safety issues surrounding the COVID-19 pandemic among the residents of Riley County. We took those concerns into consideration while deciding to postpone the date of trial-run from the initial planned date.

Competency nine focuses on designing a population-based project, program, or intervention. The RCHD CASPER toolkit is a compilation tools designed by the team of MPH students for the purpose of conducting a CASPER survey in Riley County in a simple and systematic manner. My part in the process was in the development of sampling tools and a cluster sampling methodology necessary for conducting the trial-run.

Competency nineteen involves communication of audience-appropriate public health content, both in writing and through oral presentation. The poster titled “Mental Health during COVID-19” (see appendix 8) which was made for the Kansas State University MPH Department provides public health information and tips to improve mental health during times of distress (the COVID-19 pandemic).

Table 5.2 MPH Foundational Competencies and Course Taught In

22 Public Health Foundational Competencies Course Mapping	MPH 701	MPH 720	MPH 754	MPH 802	MPH 818
Evidence-based Approaches to Public Health					
1. Apply epidemiological methods to the breadth of settings and situations in public health practice	x		x		
2. Select quantitative and qualitative data collection methods appropriate for a given public health context	x	x	x		
3. Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming and software, as appropriate	x	x	x		
4. Interpret results of data analysis for public health research, policy or practice	x		x		
Public Health and Health Care Systems					
5. Compare the organization, structure and function of health care, public health and regulatory systems across national and international settings		x			
6. Discuss the means by which structural bias, social inequities and racism undermine health and create challenges to achieving health equity at organizational, community and societal levels					x
Planning and Management to Promote Health					
7. Assess population needs, assets and capacities that affect communities' health		x		x	
8. Apply awareness of cultural values and practices to the design or implementation of public health policies or programs					x
9. Design a population-based policy, program, project or intervention			x		
10. Explain basic principles and tools of budget and resource management		x	x		
11. Select methods to evaluate public health programs	x	x	x		
Policy in Public Health					
12. Discuss multiple dimensions of the policy-making process, including the roles of ethics and evidence		x	x	x	
13. Propose strategies to identify stakeholders and build coalitions and partnerships for influencing public health outcomes		x		x	
14. Advocate for political, social or economic policies and programs that will improve health in diverse populations		x			x
15. Evaluate policies for their impact on public health and health equity		x		x	
Leadership					
16. Apply principles of leadership, governance and management, which include creating a vision, empowering others, fostering collaboration and guiding decision making		x			x
17. Apply negotiation and mediation skills to address organizational or community challenges		x			
Communication					
18. Select communication strategies for different audiences and sectors	DMP 815, FNDH 880 or KIN 796				
19. Communicate audience-appropriate public health content, both in writing and through oral presentation	DMP 815, FNDH 880 or KIN 796				

22 Public Health Foundational Competencies Course Mapping	MPH 701	MPH 720	MPH 754	MPH 802	MPH 818
20. Describe the importance of cultural competence in communicating public health content		x			x
Interprofessional Practice					
21. Perform effectively on interprofessional teams		x			x
Systems Thinking					
22. Apply systems thinking tools to a public health issue			x	x	

Student Attainment of MPH Emphasis Area Competencies

Table 5.3 Summary of MPH Emphasis Area Competencies

MPH Emphasis Area: Infectious Diseases and Zoonoses		
Number and Competency		**Description**
1	Pathogens/pathogenic mechanisms	Evaluate modes of disease causation of infectious agents.
2	Host response to pathogens/immunology	Investigate the response to infection.
3	Environmental/ecological influences	Examine the influence of environmental and ecological forces on infectious diseases.
4	Disease surveillance	Analyze disease risk factors and select appropriate surveillance.
5	Disease vectors	Investigate the role of vectors, toxic plants, and other toxins in infectious diseases.

Several aspects of the competencies listed under my emphasis area were indirectly addressed during this project.

Competency one focused on evaluation of modes of disease causation of infectious agents. During my MPH coursework, the Fundamentals of Emerging Infectious Diseases (DMP 770) class provided insight as to why new or previously known infectious agents emerge or re-emerge in populations. The Introduction to Global Health (DMP 844) class explained the epidemiological profiles of infectious diseases and how globalization influences public health. During my field experience, we had group discussions regarding issues surrounding the COVID-19 pandemic. As a part of the RCHD trial-run we discussed the possibility of including questions that assess the general publics' knowledge regarding the mechanism of transmission of the SARS CoV-

2 virus. We also discussed including questions into the survey regarding compliance with the use hand sanitizers, face masks or coverings, and social distancing measures.

Competency two focused on the host response to pathogens. The Principles of Veterinary Immunology class (DMP 705) class was very helpful in understanding the immune response to infectious agents. The course also explained the basis of vaccine development and immune mechanisms involved in response to vaccine administration. During the field experience we had discussions regarding the timeline of COVID-19 vaccine roll-out in Kansas, the side-effect profile of the vaccines, and the issue of vaccine refusal. The RCHD was in the initial stages of COVID-19 vaccine role out during the time of the RCHD CASPER trial-run. There were plans to include questions in the trial-run regarding symptoms related to natural history of COVID-19 for survey respondents who have had the infection.

Competency three focused on environmental and ecological factors that have a significant impact on infectious diseases. Disasters, natural or man-made, may lead to outbreaks of infectious diseases such as diarrheal diseases, acute respiratory infections, leptospirosis, meningitis, etc. Factors attributing to the rise of these infections include large-scale displacement of the population resulting in higher chances of exposure to the risk factors associated with these infections (Kouadio et al., 2012). An important aspect of disaster management is disaster response preparedness. The CASPER process was originally designed for use in emergent situations like natural or man-made disasters (CDC, 2019), and can be a very useful tool in assessing a community's' preparedness in the wake of such an event.

Competency four focused on analysis of risk factors for diseases and surveillance aspects. Throughout the project, we discussed how to use the CASPER tool to evaluate of the health status of the residents of Riley County. If a CASPER is conducted to evaluate risk factors within a community for a particular disease or several diseases, the subsequent data analysis involved will provide a weighted analysis of how these risk factors relate to the different strata of the community. Furthermore, the Riley County CHIP planned for 2021 will utilize the information derived from the CASPER to devise strategies to improve the health status of residents of Riley County.

Competency five focused on the role of disease vectors in the transmission of infectious diseases. The Introduction to One Health course (DMP 710) addressed the complex interrelationships between humans, animals, and the environment. Vectors and the role they play in the transmission of zoonotic diseases were discussed comprehensively during the course. During the field experience group discussions, we discussed possibility of transmission of the SARS CoV-2 virus through inanimate objects or fomites. There were plans to include questions into the trial-run questionnaire as to whether Riley County residents were regularly washing their hands; using hand sanitizer, using gloves while cleaning or disinfecting their homes, and while caring for someone sick; and improving the air ventilation at their homes.

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Appendix

Appendix 1- Riley County Health Department: Community Assessment for Public Health Emergency Response (CASPER) First Stage Sampling Methodology document

Riley County Health Department

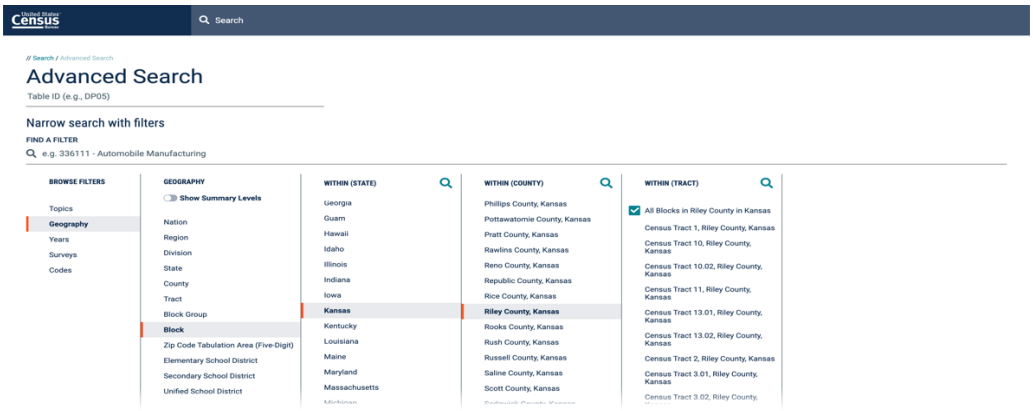
Community Assessment for Public Health Emergency Response (CASPER) First Stage Sampling Methodology[1]

Obtain a list of all the census blocks in Riley County from the U.S Census website (https://data.census.gov/cedsci/)

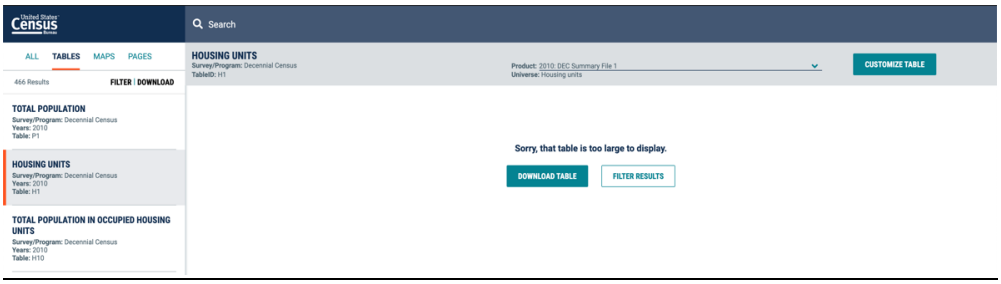
- First go to the US Census website (https://data.census.gov/cedsci/) and select "Advanced Search".

- Under advanced search, select "Geography" under "Browse Filters"; "Block" under "Geography"; "Kansas" under "Within (State)"; "Riley County, Kansas" under "Within (County)"; and "All Blocks in Riley County in Kansas" under "Within (Tract)". Click "Search".

[1] This methodology was adapted from the Centers for Disease Control and Prevention (CDC) Community Assessment for Public Health Emergency Response (CASPER) toolkit, third edition, 2019. Available at https://www.cdc.gov/nceh/casper/default.htm



- Under “Tables”, select “Housing Units”.

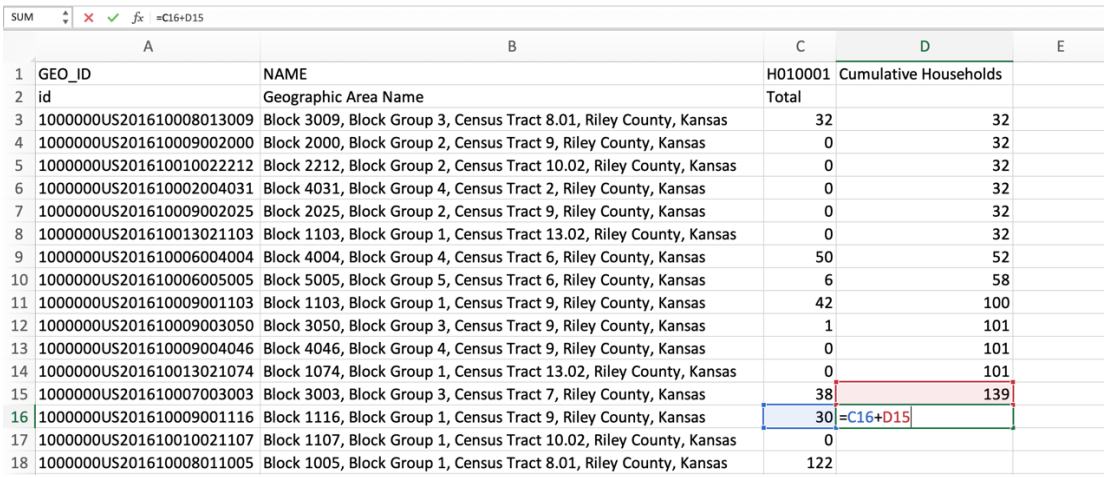


- Click “Download Table”. The file will be a zipped folder, which when extracted will have text (.txt) and comma-delimited (.csv) files.

Cluster Selection

- Open the larger .csv file, downloaded from the steps mentioned above, using a spreadsheet software such as Microsoft Excel. The spreadsheet will contain the list of all census blocks of Riley County.

- Create a new variable column titled “Cumulative Households” and populate that column, as shown in the spreadsheet below. The last cell of the “Cumulative Households” variable will give the total number of households within the sampling frame.



SUM =C16+D15

	A	B	C	D	E
1	GEO_ID	NAME	H010001	Cumulative Households	
2	id	Geographic Area Name	Total		
3	1000000US2016100008013009	Block 3009, Block Group 3, Census Tract 8.01, Riley County, Kansas	32	32	
4	1000000US2016100009002000	Block 2000, Block Group 2, Census Tract 9, Riley County, Kansas	0	32	
5	1000000US2016100010022212	Block 2212, Block Group 2, Census Tract 10.02, Riley County, Kansas	0	32	
6	1000000US2016100002004031	Block 4031, Block Group 4, Census Tract 2, Riley County, Kansas	0	32	
7	1000000US2016100009002025	Block 2025, Block Group 2, Census Tract 9, Riley County, Kansas	0	32	
8	1000000US2016100013021103	Block 1103, Block Group 1, Census Tract 13.02, Riley County, Kansas	0	32	
9	1000000US2016100006004004	Block 4004, Block Group 4, Census Tract 6, Riley County, Kansas	50	52	
10	1000000US2016100006005005	Block 5005, Block Group 5, Census Tract 6, Riley County, Kansas	6	58	
11	1000000US2016100009001103	Block 1103, Block Group 1, Census Tract 9, Riley County, Kansas	42	100	
12	1000000US2016100009003050	Block 3050, Block Group 3, Census Tract 9, Riley County, Kansas	1	101	
13	1000000US2016100009004046	Block 4046, Block Group 4, Census Tract 9, Riley County, Kansas	0	101	
14	1000000US2016100013021074	Block 1074, Block Group 1, Census Tract 13.02, Riley County, Kansas	0	101	
15	1000000US2016100007003003	Block 3003, Block Group 3, Census Tract 7, Riley County, Kansas	38	139	
16	1000000US2016100009001116	Block 1116, Block Group 1, Census Tract 9, Riley County, Kansas	30	=C16+D15	
17	1000000US2016100010021107	Block 1107, Block Group 1, Census Tract 10.02, Riley County, Kansas	0		
18	1000000US2016100008011005	Block 1005, Block Group 1, Census Tract 8.01, Riley County, Kansas	122		

- Using a random number generator (see notes), obtain 30 numbers between 1 and the total number of households within the sampling frame. Match each random number to the "Cumulative Households" row in which the random number would fall. In the example above if a random number was 53, then census block 5005 would be selected as one of the 30 clusters since 53 is greater than 52 (row 9) and less than 58 (row 10).

- Repeat the procedure until all 30 census blocks have been selected. Note that using this technique may result in a particular census block getting selected more than once.

- Increase the number of selected clusters a priori, in case some of the chosen clusters turn out to be inaccessible. Visit all the chosen clusters (including the extra selected clusters) when out in the field.

Notes

- Use block groups (as clusters) instead of census blocks in case there are many clusters with small number of households.

- GIS (Geographic Information System) software can be used instead of the U.S. Census website for cluster sampling.

- Microsoft Excel has the function to produce random numbers. Suppose we need random numbers between 1 and 500, enter the following formula into a selection of cells on the spreadsheet:

  =INT(500*RAND())+1

  This will populate the selected cells with random numbers between 1 and 500.

Appendix 2- Riley County Health Department: Community Assessment for Public Health Emergency Response (CASPER) Second Stage Sampling Methodology document

Riley County Health Department

Community Assessment for Public Health Emergency Response (CASPER) Second Stage Sampling Methodology[2]

The CASPER interview teams are responsible for selecting the seven households within each cluster.

Steps of CASPER Second Stage Sampling

Prior to arriving at a chosen cluster, select a random starting point for the first interview by using a printed CASPER map or GIS (Geographic Information System) device.

Estimate the total number of households within the cluster.

Divide the total number of households by 7. This will give "n".

[2] This methodology was adapted from the Centers for Disease Control and Prevention (CDC) Community Assessment for Public Health Emergency Response (CASPER) toolkit, third edition, 2019. Available at https://www.cdc.gov/nceh/casper/default.htm

Travel through the cluster in a serpentine method to select every n^{th} household for interview.

Select and interview every n^{th} house in the cluster until 7 completed interviews are obtained.

Note: If seven households are not selected by the end of the cluster, proceed through a second or third round of the cluster, to replace households identified as vacant, in case of a refusal to participate in a selected household, or in case of an unsuccessful third attempt. Select every n^{th} household, avoiding those that have already completed an interview or have been replaced.

Appendix 3- Riley County Health Department: Creating Cluster Maps for CASPER surveys document

Riley County Health Department

Creating Cluster Maps for CASPER surveys[3]

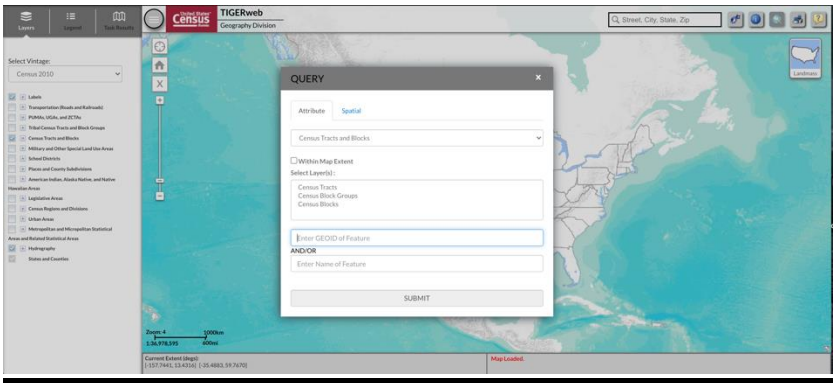
1. After selecting 30 census blocks as detailed in the Riley County Health Department "CASPER First Stage Sampling Methodology" document, create cluster maps by using U.S. Census TigerWeb at https://tigerweb.geo.census.gov/tigerweb/.

2. On the left-hand toolbar, under "Select Vintage" choose "Census 2010."

3. On the top right of the gray toolbar, click on the "Query" globe → under "Attribute" select "Census Tracts and Blocks" → In "Select Layer(s)" highlight "Census Blocks."

[3] This methodology was adapted from the Centers for Disease Control and Prevention (CDC) Community Assessment for Public Health Emergency Response (CASPER) toolkit, third edition, 2019. Available at https://www.cdc.gov/nceh/casper/default.htm

4. The GEOID of a selected census block can be located in the Microsoft Excel file obtained from the CASPER first stage sampling process (please refer to the Riley County Health Department "Community Assessment for Public Health Emergency Response [CASPER] First Stage Sampling Methodology" document). Enter the GEOID of the selected cluster in the "Enter GEOID of Feature" box, within "Query." Click "SUBMIT."



5. Once the selected block is displayed, click the "Print" icon. Provide a title for the map in the "Map Title" box. Make preferred selections in the "Map Layout" and "Map Format" boxes. Click "Generate Map." Print or save the generated map. See Figure 1 and Figure 2 below for types of map views.

6. Repeat the process until all 30 selected cluster maps are printed and/or saved.

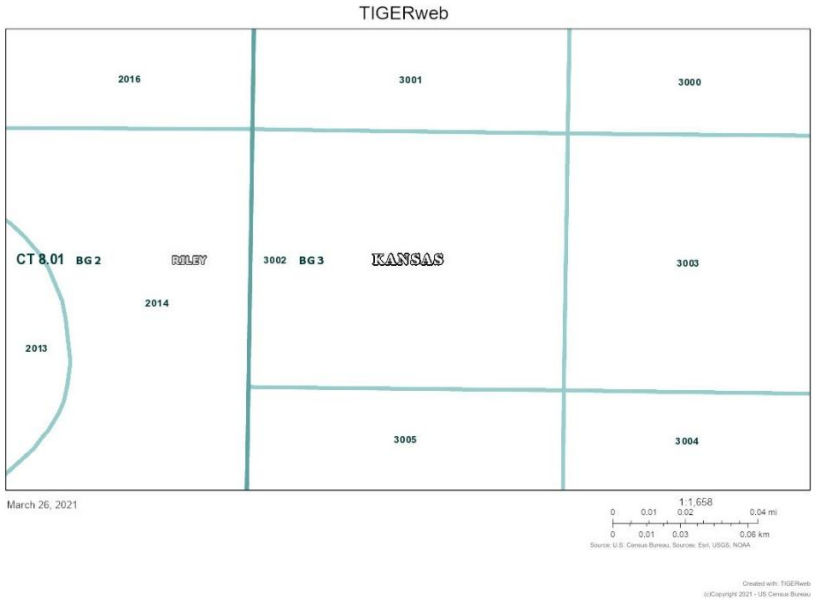


Figure 1: Census Block map in landmass view.

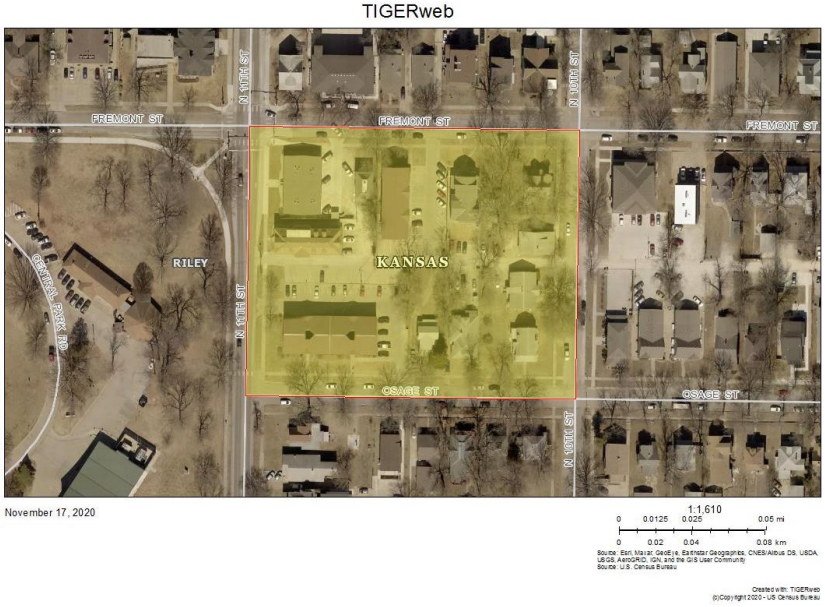


Figure 2: Census Block map in satellite view

<u>Appendix 4</u>- Riley County Health Department: CASPER trial-run Cluster 1 Maps

Cluster 1 Map- TigerWeb landmass view

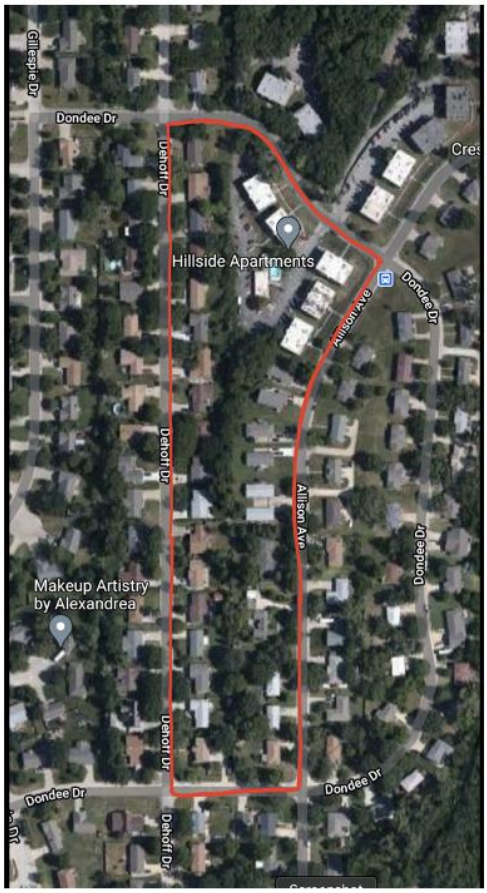
Cluster 1 Map- TigerWeb satellite view

Cluster 1 Map- Google® Maps

<u>Appendix 5</u>- Riley County Health Department: CASPER trial-run Cluster 4 Maps

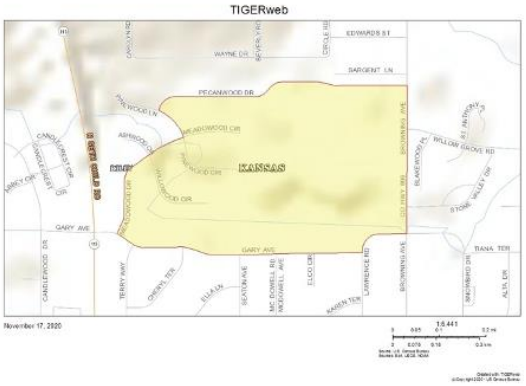
Cluster 4 Map- TigerWeb landmass view

Cluster 4 Map- TigerWeb satellite view



Cluster 4 Map- Google® Maps

<u>Appendix 6</u>- Riley County Health Department: CASPER trial-run Cluster 6 Maps

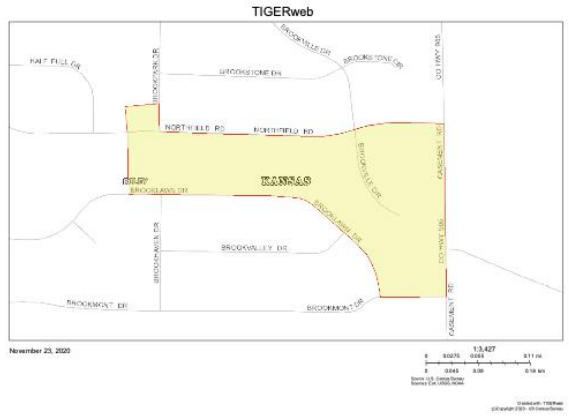


Cluster 6 Map- TigerWeb landmass view

Cluster 6 Map- TigerWeb satellite view

Cluster 6 Map- Google® Maps

<u>Appendix 7</u>- Riley County Health Department: CASPER trial-run Cluster 8 Maps



Cluster 8 Map- TigerWeb landmass view

Cluster 8 Map- TigerWeb satellite view

Cluster 8 Map- Google® Maps

Appendix 8- Academic poster regarding improvement of mental health during the COVID-19 pandemic

Mental Health during COVID-19

By Ganesh Kumar
Contact:- gkumar@ksu.edu

- Mental health includes our emotional, psychological, and social well-being[1].
- Anxiety, stress, and fear related to the COVID-19 outbreak can be overwhelming. Isolation and social distancing measures can accentuate these symptoms and make coping with stress more challenging.
- Potential mental health conditions related to the COVID-19 outbreak include ***anxiety***[3]***, depression***[3]***, PTSD***[4]***, and substance use disorders***[2]. Those with pre-existing mental health conditions may experience worsening of symptoms[2].

Some tips to improve mental health during times of distress:-

- Try to get enough sleep[3].
- Keep to a regular routine[3].
- Engage in regular physical activity and meditation[2].
- Stay in contact with friends and loved ones[2].
- Keep a positive mindset and be supportive to others[3].
- Have a healthy and nutritious diet[3].
- Avoid tobacco, alcohol, and drugs[3].
- Limit exposure to news and social media. Get news from trustworthy sources[2,3].
- Call your primary care provider or mental health care provider in case you require professional help[3].
- Explore resources from institutions and organizations such as Pawnee Mental Health Services[5] (Manhattan, Kansas), National Alliance on Mental Illness (NAMI)[3] , or the Substance Abuse and Mental Health Services Administration (SAMHSA)[3].

References and Resources
1. https://www.mentalhealth.gov/basics/what-is-mental-health
2. https://www.cdc.gov/coronavirus/2019-ncov/daily-life-coping/managing-stress-anxiety.html
3. https://www.mayoclinic.org/diseases-conditions/coronavirus/in-depth/mental-health-covid-19/art-20482731
4. https://www.uptodate.com/contents/coronavirus-disease-2019-covid-19-psychiatric-symptoms-and-disorders
5. https://www.pawnee.org/

Image Sources
https://www.independent.co.uk/extras/indybest/zoom-video-chat-alternatives-best-app-conference-call-privacy-security-a9446241.html
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https://www.pngfuel.com/free-png/aauoi