

Master of Public Health
Applied Practice Experience

By

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submitted in partial fulfillment of the requirements for the degree

MASTER OF PUBLIC HEALTH

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07/13/2021 – 10/15/2021

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2022

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Chapter 1 - Introduction, Portfolio Products, and Weekly Log

Introduction to Clay County

Clay County, Missouri (MO) is located in western Missouri near the border of Missouri and Kansas. Clay County has a population of nearly 245,000 people with a median age of 37 years. Demographically, the majority (81.1%) of Clay County residents are White (non-Hispanic) followed by Black or African American and White (Hispanic). As of 2019, there were nearly 14 times more White (Non-Hispanic) residents compared to any other race or ethnicity (1). Clay County is made up of six primary cities: Gladstone, Excelsior Springs, Liberty, North Kansas City, Smithville, and Kearney.

Introduction to the Clay County Public Health Center (CCPHC)

The Clay County Public Health Center (CCPHC) is in Liberty, MO in the southeast corner of Clay County. CCPHC is the official public health department for Clay County and serves thousands of residents with a variety of health education, disease, and prevention services (2). Its official mission statement is “to deliver the essential public health services of prevention, promotion and protection to the communities of Clay County.” Within CCPHC, residents can seek dental care, Women, Infants, and Children (WIC), Tuberculosis (TB) services, Mental Health Services, sexually transmitted disease (STD) services, and Immunizations. Clay County reported a nearly 11% prevalence of diabetes, 33.3% adult obesity rate, and 486 sexually transmitted infections (STIs). During the current pandemic, a total of 26,534 COVID-19 cases have been reported with 761 hospitalizations and 330 deaths (3).

Throughout the applied practical experience (APE), I interned at the CCPHC where I served as a disease case investigator, junior data analyst, and junior epidemiologist working under the lead data analyst, Dr. Kim Trang, and lead epidemiologist, Ms. Elizabeth Yoder. Given the overwhelming and persistent presence

of COVID-19 throughout Clay County, there was an immediate need for extra project support (disease case investigation, data analysis, and field epidemiology). The APE provided an opportunity to work with many teams throughout CCPHC at every organizational level. Certain projects required a more administrative approach, such as working with the Outbreak and Disaster Relief Response Manager, Wennekota Tarama, to develop policies that ensured that personal protective equipment (PPE) was made available to clinic staff. Other projects required technical and analytical skill development, such as using programming to analyze, extract, and automate reports from the disease reporting system. As more projects emerged, I was keen to create a better way for disseminating complex public health information via visualization tools and media. This came in the form of using Power BI (a data visualization software program) to display real-time COVID-19 cases, hospitalizations, and death counts for the public to view. The aforementioned projects are included in the next subsection, "Portfolio Products." All portfolio products were developed in partnership with my preceptor, Dr. Kim Trang.

Portfolio Products

This APE gave me the opportunity to achieve the following learning objectives related to my portfolio products:

- Build visual dashboards providing clear, easy-to-follow infographics to disseminate communicable disease information to the public and provide this information in a clear, concise, and actionable form. (Portfolio Product A).
- Acquire skills that support data analysis, data mining, and data visualization using advanced statistical and epidemiological software (Portfolio Product A, B, E).
- Gain experience with policy development, program planning, and evaluation (All Portfolio Products)
- Acquire knowledge on strategies for analyzing public health data and become more familiar with state and local guidelines regarding the COVID-19 emergency response (Portfolio Products A, B, E).

Table 1.1 provides a detailed summary of my portfolio products; the actual products appear in my ILE report.

Table 1.1 Summary of Portfolio Products

Portfolio Product		Description
A	COVID-19 Communicable Disease Dashboard	An interactive dashboard published to the live CCPHC website that enables community members to evaluate and track COVID-19 cases, outbreaks, and transmission rates.
B	School and Daycare Syndromic Surveillance Analysis	Analysis using SAS and R-language programming to identify outbreaks and COVID-19 case reporting for schools and daycares throughout Clay County.
C	Foodborne Illness Investigations and Site Visits	As part of the Clay County environmental health team, site visits were randomly conducted to evaluate foodborne illness risks.
D	Annual Foodborne Illness Outbreak Assessment Presentation	An annual foodborne illness assessment was conducted throughout the county to determine which locations were more prone to foodborne illness.
E	COVID-19 Disease Case Investigation	Daily case reporting, including phone calls to suspected, probable, and confirmed COVID-19 cases, outbreak reporting, and symptom collection.

The above portfolio products (and their associated experiences) gave me a unique, experiential education about how public health practitioners can best interact with “the public.” At the core of public health is the public. Throughout the pipeline of data analytics there is a necessary component of data visualization. Communication

efforts, particularly in the public health sector, are at the mercy of data reporting and visualization. Poor communication reflects poor data visualization. As many health systems and public health departments across the country attempted to improve community relations, they turned to data visualization as a helpful communication tool. Throughout my APE, we developed the idea to build and maintain an interactive COVID-19 dashboard that could be shared with the public to learn more about community transmission rates. I had the unique experience of collecting surveillance data from disease investigations and transforming this information into our COVID-19 dashboard. We not only reported COVID-19 cases, hospitalizations, and deaths, but we also included time-series analysis, historical trends, and specific symptomology. All these visualizations were utilized as a communication tool with the public to ensure transparency, accuracy, and accountability with our COVID-19 data.

Schools and daycares throughout Clay County rely on accurate reporting from CCPHC to make data-driven decisions on closures, policies, and other administrative decisions that affect children and young-adults in the area. During my APE, we developed an easy reporting system using pre-populated excel spreadsheets into which school or daycare liaisons could input public health data. SAS and R-language programming was used to query and extract our reports, creating an efficient reporting cycle. I collected these reports weekly throughout my APE experience.

The Clay County environmental health team is responsible for conducting routine health inspections at any business that may serve food items. To ensure that businesses are following proper public health guidelines, random inspections are carried out. During my experience, I visited three unique facilities: a school, a hotel, and a nursing home. During my inspections, I collected samples from water sources, food containers, freezers/refrigerators, and cooking utensils. All results were written on a digital scorecard which determined whether the business was in violation of a protocol.

Due to frequent COVID-19 case surges, I was responsible for conducting routine disease case investigations. This involved an in-depth phone interview with residents of all ages, backgrounds, and professions. All case information was securely reported using a confidential online reporting system, EPITRAX.

The subsection “Weekly Journal” below provides additional week-by-week context for my overall APE experience.

Competencies Addressed

Table 1.2 reflects how each portfolio product previously mentioned intertwines with a competency outlined in the MPH curriculum at KSU. Chapter 2 details how each portfolio product relates to the outlined competencies.

Table 1.2 Portfolio Products and Competency Addressed

Portfolio Product		Number and Competency Addressed	
A	COVID-19 Communicable Disease Dashboard	4	Interpret results of data analysis for public health research, policy, or practice
B	School and Daycare Syndromic Surveillance Analysis	3	Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming, and software, as appropriate
C	Foodborne Illness Investigations and Site Visits	2	Select quantitative and qualitative data collection methods appropriate for a given public health context
D	Annual Foodborne Illness Outbreak Assessment Presentation	20	Describe the importance of cultural competence in communicating public health content
E	COVID-19 Disease Case Investigation	1	Apply epidemiological methods to the breadth of settings and situations in public health practice

Weekly Journal

Week 1: 07/12/21 – 07/16/21

The first week of my internship began with a basic onboarding process that covered data security, ensuring patient privacy and general housekeeping rules within the health department. The primary task for this week was to develop a standardized reporting system for schools and daycares to report new COVID-19 cases to CCPHC.

Week 2: 07/19/21 – 07/23/21

This week was a continuation of the previous week's tasks involving the standardized reporting system for community schools and daycares. During the week, we ran through several beta tests with a local school to determine what reporting tool worked the best and produced efficient reports. We determined that Microsoft forms could be utilized to fulfill their needs.

Week 3: 07/26/21 – 07/30/21

The primary tasks for this week revolved around learning Power BI. I began with a deep tutorial on how to use this visualization software and what features could be utilized for our purposes. I began importing the school syndromic data from the previous week into Power BI to create various visuals.

Week 4: 08/02/21 – 08/06/21

We successfully implemented the school syndromic dashboard and wanted to repeat this process with the local daycares. We were at the mercy of daycares who were willing to share their data with us. I created an automated dashboard that reflected changes in daycare cases, including the most commonly reported symptoms and where cases were located.

Week 5: 08/09/21 – 08/13/21

During this week's tasks, I created a mortality report that ranked the most common deaths that occurred throughout the 2020 calendar year. We decided to include a historical analysis of all-cause mortality in Clay County and compare that to COVID-19 trends. Due to various COVID-19 conspiracies regarding inaccurate mortality rates, we wanted to ensure that the community could see where deaths were coming from and what their causes were.

Week 6: 08/16/21 – 08/20/21

This week's tasks were varied and required significant flexibility. Earlier in the week, community transmission rates were elevated which required extensive case

investigation. Later in the week, we continued to work on our mortality and hospitalization reporting to ensure that our data matched with the state level data.

Week 7: 08/23/21 – 08/27/21

During this week, I had a unique opportunity to work alongside the environmental health team during their randomized site visits to local businesses and facilities. These visits were random to prevent reporting bias. Three separate visits over the course of the week were done at a long-term care facility, a hotel, and a school.

Week 8: 08/30/21 – 09/03/21

This entire week was dedicated to assisting local schools with their case reporting data. Over the course of the week, cases were significantly evaluated, and community transmission rates were high. We used our previously established reporting system to assist the school liaisons with the surplus in cases.

Week 9: 09/06/21 – 09/10/21

This week's tasks were a continuation of the previous week's tasks. School transmission rates were still high, so we had to conduct individual case investigations throughout school-aged children and daycares in Clay County.

Week 10: 09/13/21 – 09/17/21

Using my newfound knowledge of Power BI, I was directed to create an entirely new COVID-19 dashboard that we will publish to our live CCPHC website. This dashboard includes all data related to COVID-19 infections in Clay County. This includes syndromic surveillance, or the earliest health data collected, for each of the most reported COVID-19 symptoms. It also reflected any influenza illnesses in the area. Additional tabs were created to show infection rates over time and compared to regional trends.

Week 11: 09/20/21 – 09/24/21

This week was considered a “down” week. Several of my bosses were out for the week which left me with remedial tasks like data entry and case investigation. I had several meetings with various internal team members and assisted with minor tasks.

Week 12: 09/27/21 – 10/01/21

This week allowed me to begin working on a draft for my future foodborne illness presentation, taking place at the end of my APE. We are including historical outbreak trends and comparing them to our present findings. We will then highlight businesses that would be considered more vulnerable to outbreaks and target future policy and interventions to help reduce the risk of transmission.

Week 13: 10/04/21 – 10/08/21

This week required extensive preparation for next weeks foodborne illness presentation. I worked with Dr. Trang to ensure that all data being reported was accurate. Additionally, we made sure that my presentation had sufficient information to support our findings. Given that this was an internal report, it required that we incorporate high-level language to communicate to our team members.

Week 14: 10/11/21 – 10/15/21

This week’s tasks allowed me to close out any remaining case investigations that I had been working on. The primary task was giving a presentation to the entire CCPHC that highlighted our findings during our foodborne illness investigations.

Chapter 2 - Competencies

As seen in Table 1.2, I utilized five competencies throughout the course of my APE, which are reiterated in Table 2.1. I addressed an additional competency, Competency 22, by developing two systems thinking tools, Process Mapping and Stock and Flow diagrams, which are introduced in Table 2.2.

Table 2.1 Summary of MPH Foundational Competencies

Number and Competency		Description (and associated portfolio product)
1	Evidence-based Approaches to Public Health	Apply epidemiological methods to the breadth of settings and situations in public health practice
2	Evidence-based Approaches to Public Health	Select quantitative and qualitative data collection methods appropriate for a given public health context
3	Evidence-based Approaches to Public Health	Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming, and software, as appropriate
4	Evidence-based Approaches to Public Health	Interpret results of data analysis for public health research, policy, or practice
20	Communication	Describe the importance of cultural competence in communicating public health content

I attained competencies 2, 3, 4 and 20 through the development of an interactive COVID-19 dashboard using Power BI, a data visualization software tool. The primary focus of my time at CCPHC was to assist in the development of a COVID-19 dashboard alongside the lead data analyst, Dr. Kim Trang. Continuous maintenance was needed to ensure that data quality was optimized and reflected accurate COVID-19 data for community transmission levels. Competency 2 was fulfilled because the dashboard provided an opportunity to analyze quantitative and qualitative data through the various tiles available for visualization. Competency 3 was fulfilled because the dashboard was

created using Power BI, a data visualization software developed by Microsoft. Additional programming was done using SAS and R-language programming, two statistical software programs that enable the user to automate various data tasks. Competency 4 was fulfilled because the benefits of using these software programs are that it enabled us to take data from our syndromic surveillance and create a community-based visual that reflects community transmission rates, attack rates, and changes in symptomology over time. Competency 20 was specifically highlighted during the development of the dashboard as it was utilized as a communication tool for both local and state public health officials. When using a dashboard, we can see real-time changes in transmission rates that can be used by officials to determine whether schools, daycares, or businesses need to institute safeguards to protect citizens.

I attained Competency 1 during my time as a COVID-19 disease case investigator. During this time, I directly implemented epidemiological methods to carryout case investigations using a statewide database reporting system, EPITRAX. EPITRAX allowed users to input case data including syndromic surveillance, demographics, case status, and additional notes. Data was then downloaded into a large excel spreadsheet where further analysis could be done using statistical programming. Outside of individual case investigation, I made additional efforts to work with school liaisons, contracted by CCPHC, to determine whether increased case counts in certain schools met the outbreak criteria.

Competency 2 was utilized again during my time with the Clay County environmental health team, assisting in foodborne outbreak investigations. Throughout the duration of site visits, we collected and tested water and food products from businesses, schools, and long-term care facilities. We ran onsite Ph tests to ensure that water fit within a specific range to prevent bacterial growth. Additionally, we temperature tested water sources to ensure they met minimum heat requirements. A survey was developed for administrators of each facility to ensure that approved standards were being met. This created quantitative and qualitative data reports that I turned into an annual report and presented at the end of my APE. Competency 20 was highlighted again during this presentation as it gave me an opportunity to share our findings with the entire public health department during an internal meeting.

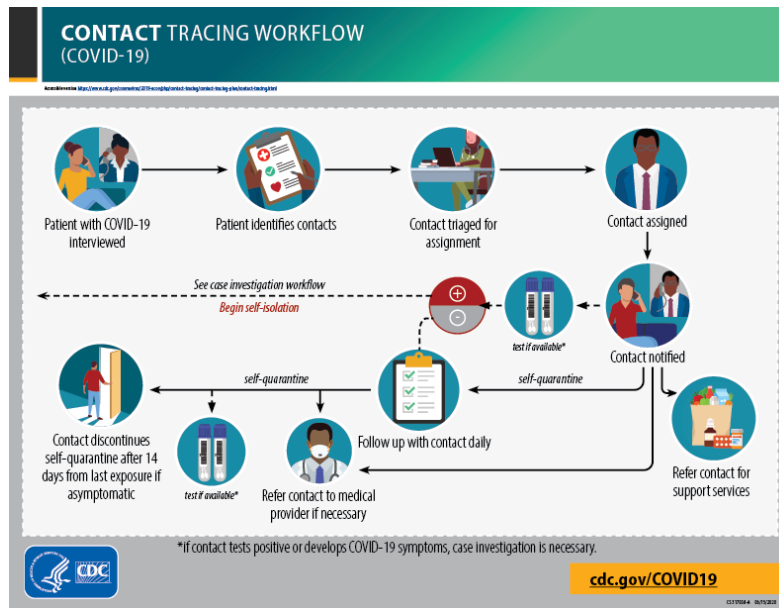
In addition to the five above competencies, I also executed Competency 22. This competency involves the use of systems thinking. Table 2.2 below summarizes the two tools I used.

Table 2.2 Application of Systems Thinking to a Public Health Issue

Systems Thinking Tool	Description
Process Mapping	Used as a tool to determine gaps in the treatment process for patients with a communicable disease
Stock and Flow diagrams	Used to describe and illustrate the transmission of communicable diseases throughout a community or population

A process map was utilized for contact tracing to determine when to investigate COVID-19 cases within the Clay County community. This tool enabled us to prioritize the most important cases based on laboratory reporting, hospitalization status, and overall symptomology. Figure 2.1 reflects this tool's application.

Figure 2.1 Contact Tracing Process Map based on CDC Guidance



Chapter 3 - References

1. Datausa.io. 2022. *Clay County, MO | Data USA*. [online] Available at: <<https://datausa.io/profile/geo/clay-county-mo/#:~:text=Health%20About%20In%202019%2C%20Clay%20County%2C%20MO%20had,grew%20from%20%2468%2C367%20to%20%2470%2C510%2C%20a%203.13%25%20increase.>>> [Accessed 7 June 2022].
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3. Experience.arcgis.com. 2022. *Clay County Public Health Center Data Hub*. [online] Available at: <https://experience.arcgis.com/experience/34f9ef5e486b4ef3a0a1364c457944bb/page/page_1/> [Accessed 7 June 2022].