Master of Public Health

Integrative Learning Experience Report

LESSONS LEARNED FROM COVID-19: HOW DATA VISUALIZATION HAS CHANGED PUBLIC HEALTH COMMUNICATION AND SURVEILLANCE

by

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submitted in partial fulfillment of the requirements for the degree

MASTER OF PUBLIC HEALTH

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Summary/Abstract

This report summarizes the virtual and field experiences captured during my tenure as an intern and employee for the Clay County Public Health Center (CCPHC) during the COVID-19 pandemic. Over the course of three months, I learned various data analytical and epidemiological skills while working under several departments within CCPHC. Dr. Kim Trang served as my site preceptor and provided me tasks during our daily check-ins. The overarching purpose of this integrated learning experience (ILE) is to reflect what working in a local public health agency looks like, along with the policies and principles that are required to run this agency from each level of service. The ILE required a hybrid approach as it took place during some of the worst months of the COVID-19 pandemic. Three days per week were spent in office, while the other two were virtual days from home.

The continued frequency and intensity of COVID-19 cases throughout Clay County led to the creation of numerous tasks. The most important task at the beginning of the ILE was carrying out disease case investigation. Disease case investigation required querying a central database that houses all laboratory data with potential positive COVID-19 cases. I assisted in updating this database daily. Investigators noted this information and then placed a phone call to each prospective case to collect further health information. Health information included anything ranging from demographics to length-of-hospital-stay to close contacts and symptomology. As case information was collected, it was entered into a separate tracking system. This system sent out automated text messages to positive patients who could report their daily symptoms into. I extracted this information and processed it in my role as the disease case investigator and data analyst.

As COVID-19 cases continued to build up, additional resources and focus were placed on ensuring that all cases were contacted and had adequate support. As more data was collected, we needed a better way to translate this information into an understandable format for public use. Due to my long-standing interest in using graphical methods to portray public health data, I enthusiastically embraced several new responsibilities that focused on data visualization and public health messaging.

I created a weekly COVID-19 dashboard that reflected real-time case counts, hospitalizations, and deaths in the community. Additional features included a historical

perspective of this information and detailed demographic and geolocation data. These metrics aided the Clay County Health Department's mission to reduce the spread of COVID-19. The secondary purpose was to combat the spread of misinformation. As dangerous as the COVID-19 pandemic has been, the rampant misinformation has been equally dangerous; therefore, the implementation of a data dashboard remedied the notion that COVID-19 impacted only the elderly and immunocompromised.

Finally, I spent time with Clay County's environmental health team where I assisted with data analytics regarding foodborne illness. We created an annual review of foodborne illness, including outbreak locations and changes over the last five years. This experience allowed me to visit restaurants, hotels, and nursing homes to evaluate their kitchens and serving areas. This provided me an opportunity to experience field epidemiology by assessing a physical location and talking with people who came down with an illness. Additionally, this opportunity provided me with knowledge on standards of care and the policies that exist to protect community health from foodborne pathogens.

I am grateful for my time at CCPHC and the mentorship that was provided. Dr. Kastner, as a mentor and supporter of my endeavors, helped me approach this experience in a reflective and thoughtful manner. Coursework completed from Kansas State University and the University of Kansas Medical Center enriched my learning throughout the ILE. Dr. Kim Trang taught me analytical skills that will greatly benefit my future career. I now have a deeper understanding of what public health looks like at the local level and how data visualization can be harnessed to improve health outcomes.

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Chapter 1 – Introduction and Literature Review: Improving Public Health Communication Through Data Visualization

Literature Review

When the first US COVID-19 case was announced on January 21, 2020, the rest of the country waited with baited, anxious breath about what would come next. Some barred their doors and left work for the final time, others scoffed at the notion of a microscopic virus cancelling their winter vacation plans, and most took this announcement as a major warning sign for protecting their families and loved ones by listening to public health officials and medical professionals. However, most citizens did not anticipate the massive toll this would take on the healthcare infrastructure paired with political divisiveness. A dual pandemic quickly emerged: one focused on the virus itself, and the other centered on issues related to public communication and the media. The public looked for a voice of reason amongst the chaos of mass media and social media outlets. Unfortunately, this voice didn't emerge until the first vaccination dose was given in December of 2020. The state of panic that emerged during this time required some form of improved communication that swayed viewers away from mass media and could encourage viewers to make data-driven health decisions for themselves and their family members. The mass media was a source of information that could sway viewers and listeners one way or the other (Anwar et al., 2020).

K-State public health faculty and students have highlighted the importance of strategic messaging and information sharing around the novel COVID-19 pandemic. In a 2020 article in the *One Health Newsletter,* they write, "While we need to be wary of the transmission of the novel coronavirus in our communities, perhaps we ought to be equally concerned about the transmission of information about it" (Kastner et al., 2021). While the virus itself was novel, misinformation and dissent against public health recommendations was not. Even with the power of the internet, misinformation spread like wildfire, creating a phenomenon of "infodemiology," leading to civil unrest and sociopolitical complications (Cuan-Baltazar et al., 2020). Since the first COVID-19 outbreak, an unprecedented social experiment also emerged. The foundation of public health is rooted in systematic evaluation of the health outcomes and drivers of a society or people group. Reports of stigmatization and discrimination rose sharply as the COVID-19

pandemic unfolded, exacerbated by claims from media outlets and political appointees, often based on fact-less claims. Bhanot et al. (2020) reported the impacts of stereotyping and categorizing COVID-19 patients throughout the pandemic. Infected persons were deemed to be negligent and ignorant for contracting the disease and, therefore, were barred entry from neighborhoods, social events, and other public places. Misinformation spread primarily through social media (Bhanot et al., 2020).

The utilization of mass media ties back to community health outcomes as information spread influences policy- and decision-making from the local to state public health level. Misinformation and conspiracy ran rampant through many states that statistically had worse health outcomes, including increased COVID-19 hospitalizations, more deaths, and lower vaccination rates (Niemiec, 2020, Barua et al., 2020). Digital dashboards answer key health questions by providing deeper insights into addressing health inequities (White et al., 2022).

Data visualization dashboards were first introduced, in the COVID-19 space, by the Johns Hopkins University Bloomberg School of Public Health at the beginning of the COVID-19 pandemic (Dong et al., 2020), when the first cases arose near Wuhan, China. This became the main surveillance metric used by mass media for relaying health information to the public. State and local health departments began implementing similar dashboards shortly thereafter (Fareed, 2022). Although dashboards were useful in disseminating important public health information, only public health departments with adequate resources were able to develop them locally (Hennessee et al., 2021).

As I began my first day (13 July 2021) at CCPHC, I found that my first task would be learning how to build a COVID-19 dashboard that reflected local health data. Its primary purpose was to provide weekly updates reflecting community transmission rates and outbreaks. This assisted schools and daycares in making informed decisions about closures and delays. Additionally, a historical perspective of COVID-19 cases, hospitalizations, and deaths was included to compare year-to-date trends. It was also used to reflect changes in symptoms as new and emerging COVID-19 variants took over one another. The learning curve I faced in using data visualization software to create this dashboard was a challenging yet rewarding task.

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 APE and ILE, 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 cases throughout Clay County, there was an immediate need for extra project support (disease case investigation, data analysis, and field epidemiology). The ILE opened the door 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.

My field experience preceptor, Dr. Kim Trang, was the lead data analyst at CCPHC and now serves as a UI/UX developer for the Health Collaborative in Columbus, Ohio. She served as a data analyst for two years at CCPHC to assist in combatting the COVID-19 pandemic relief efforts. She received her PhD from the University of Kansas in Health Communications before she transitioned into public health.

My major professor, Dr. Justin Kastner, is a MPH faculty member in the College of Veterinary Medicine's Department of Diagnostic Medicine/Pathobiology. He actively teaches courses and mentors students interested in a variety of public health domains; some students are based in Manhattan and others at K-State Olathe. He also co-directs the Frontier fieldtrip model (an example of which I experienced in October 2021 in Council Grove, Kansas). He specializes in the history of public health, international trade policy, cross-border cooperation, and multidisciplinary research and writing.

Chapter 2 - Learning Objectives, Field Experience Activities, and Portfolio Products

During the Fall of 2021, and due to the constraints of the COVID-19 pandemic, I pursued a *virtual* and *in-person* integrated learning experience. My site preceptor, Dr. Kim Trang, created a unique role for me to pursue during my time at CCPHC. I was assigned to several different positions ranging from disease case investigator to epidemiologist to data analyst, under the emergency preparedness and community health, environmental health, and communicable disease team(s). I initially served as a COVID-19 disease case investigator before transitioning into a data analyst role as my skillset and knowledge improved. I served under Elizabeth Yoder, the program director of the epidemiology and communicable disease department, and Wennekota Tarama, the program director of emergency preparedness and community health. Dr. Justin Kastner supported these endeavors under his mentorship by providing frequent check-ins and guidance for improving my thought processes throughout this experience. These mentors enabled me to pursue the following learning objectives and field experience activities:

2.1 Original Learning Objectives:

- Acquire skills that support data analysis, data mining, and data visualization using advanced statistical and epidemiological software
- Gain experience with policy development, program planning, and evaluation.
- Acquire additional knowledge on strategies for analyzing public health data and becoming more familiar with state and local guidelines regarding the COVID-19 emergency response.
- Build visual dashboards providing clear, easy-to-follow infographics to disseminate communicable disease information to the public and provide this information in a clear and concise form that supports the level of understanding of my audience.

2.2 Field Experience Activities (Reflected by Portfolio Products):

- Established a COVID-19 communicable disease dashboard that was updated weekly and utilized for public health communications (Portfolio Product A).

- Developed a standardized reporting protocol for school and daycare liaisons who served to report COVID-19 cases back to CCPHC (Portfolio Product B).
- Completed site assessments for foodborne illnesses and established outbreak protocol, as needed (Portfolio Product C).
- Completed field epidemiological tasks during visits to local nursing homes, restaurants, and hotels to assess sites for threats of foodborne illness and outbreak potential (Portfolio Product D).
- Conducted daily COVID-19 disease case investigation to collect syndromic surveillance data for further analysis (Portfolio Product E).

2.3 Summary of Portfolio Products

The portfolio products (and their associated experiences) below 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 (Portfolio Product A). Communication efforts, particularly in the public health sector, are at the mercy of high-quality data reporting and 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 ILE, 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 (Portfolio Product E). 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 (Portfolio Product B). During my ILE, I 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 reports, creating an efficient reporting cycle.

The Clay County environmental health team is responsible for conducting routine health inspections at any business that may serve food items (Portfolio Products C and D). To ensure that businesses followed proper public health guidelines, random inspections were carried out. During my experience, I visited three unique facilities: a school, hotel, and 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.

The table below, Table 2.1, reflects the portfolio products summarized in my APE. Table 2.1 is included in the Appendix below.

Table 2.1 Summary of Portfolio Products for Peter Maier's Field Experience

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.

Finally, a daily log was recorded at the end of each workday. This log (Table 2.2) was maintained from the first to final day (13 July 2021 – 14 October 2021) of the ILE.

Table 2.2 Daily Log for Peter Maier's Field Experience

Date	Activity	Location	Contact
7/13/2021	Introductions, Onboarding Process	CCPHC	Dr. Kim Trang
7/14/2021	Basic data analysis principles	CCPHC	Dr. Kim Trang
7/20/2021	Data Entry	CCPHC	Dr. Kim Trang
7/21/2021	Syndromic school data analysis	CCPHC	Dr. Kim Trang
7/22/2021	Syndromic school data analysis	CCPHC	Dr. Kim Trang
7/23/2021	Syndromic school data analysis	CCPHC	Dr. Kim Trang
7/26/2021	Developing CCPHC dashboard	CCPHC	Dr. Kim Trang
7/27/2021	Developing CCPHC dashboard	CCPHC	Dr. Kim Trang
7/28/2021	Developing CCPHC dashboard	CCPHC	Dr. Kim Trang
7/29/2021	Develop daycare contacts (excel sheet)	CCPHC	Alexis Bertacini
8/2/2021	Daycare Instructions for syndromic surveillance	CCPHC	Alexis Bertacini
8/3/2021	Daycare Instructions for syndromic surveillance	CCPHC	Alexis Bertacini
8/4/2021	Harvesters Volunteering	CCPHC	Ryan Shafer
8/5/2021	Disease Case Investigation	CCPHC	Dr. Kim Trang
8/10/2021	Daycare Syndromic surveillance follow-up	CCPHC	Elizabeth Yoder
8/11/2021	Clay County Death data	Remote	Independent
8/12/2021	R and SAS coding	CCPHC	Dr. Kim Trang
8/13/2021	Disease Case Investigation	Remote	Dr. Kim Trang
8/17/2021	Power BI/Data Visualization	CCPHC	Dr. Kim Trang
8/18/2021	12+ Vaccination rate in Clay County	CCPHC	Dr. Kim Trang
8/19/2021	Death and hospitalization pivot tables/analysis	CCPHC	Dr. Kim Trang
8/20/2021	Disease Case Investigation	Remote	Independent
8/23/2021	First day of Daycare Surveillance (sending out instructions)	Remote	Independent
8/24/2021	Introduction to Environmental health team- Foodborne illness investigation	CCPHC	Dr. Kim Trang

8/25/2021	Foodborne Illness outbreak analysis	CCPHC	Dr. Kim Trang
8/26/2021	Disease Case Investigation	Remote	Independent
8/30/2021	Daycare Syndromic surveillance follow-up	CCPHC	Dr. Kim Trang
8/31/2021	Daycare Syndromic surveillance follow-up	CCPHC	Dr. Kim Trang
9/1/2021	School and Daycare syndromic analysis (weekly report)	CCPHC	Dr. Kim Trang
9/2/2021	Harvesters Volunteering	CCPHC	Ryan Shafer
9/7/2021	Introduction to SAS	CCPHC	Dr. Kim Trang
9/8/2021	SAS coding and analysis	CCPHC	Dr. Kim Trang
9/9/2021	SOP Introduction + Meetings	CCPHC	Dr. Kim Trang
9/10/2021	School and Daycare syndromic analysis (weekly report)	CCPHC	Dr. Kim Trang
9/14/2021	Dashboard creation	CCPHC	Dr. Kim Trang
9/15/2021	Dashboard creation	CCPHC	Dr. Kim Trang
9/16/2021	SOP program directory and organization	CCPHC	Mackenzie Alguir
9/17/2021	Site visits analyzing foodborne illness outbreaks	Site Vist	Ben Massert
9/20/2021	Disease Case Investigation	Remote	Independent
9/21/2021	Random tasks/meetings	CCPHC	Dr. Kim Trang
9/22/2021	School and Daycare syndromic analysis (weekly report)	CCPHC	Dr. Kim Trang
9/23/2021	Catch-up day	CCPHC	Dr. Kim Trang
9/27/2021	Disease Case Investigation	Remote	Independent
9/28/2021	Random tasks/meetings	CCPHC	Dr. Kim Trang
9/29/2021	Foodborne Illness presentation draft	CCPHC	Dr. Kim Trang
9/30/2021	Foodborne Illness presentation draft cont.	CCPHC	Dr. Kim Trang
10/1/2021	Disease Case Investigation	Remote	Independent
10/4/2021	Foodborne Illness summary data	CCPHC	Dr. Kim Trang
10/5/2021	Foodborne Illness summary data	CCPHC	Dr. Kim Trang
10/6/2021	Foodborne Illness presentation draft cont.	CCPHC	Dr. Kim Trang
10/7/2021	Foodborne Illness Presentation	CCPHC	Environmental Health Team

10/11/2021	Community Health Assessment Overview	CCPHC	Dr. Kim Trang
10/12/2021	SAS Coding/Programming	CCPHC	Independent
10/13/2021	Disease Case Investigation	Remote	Independent
10/14/2021	SAS Coding/Programming	CCPHC	Independent

Chapter 3 – Additional Reflection on Career Development and Integrated Learning

3.1 Career Development from Mentor(s)

Dr(s). Trang and Kastner were essential for my career development over the course of the ILE. Dr. Trang specifically created opportunities for me to learn and grow as a young professional during a turbulent time in our society. My passion for learning more about infectious disease was catapulted by the information presented and knowledge gained over the three-month internship. We had a daily morning stand-up meeting that set the precedent for daily expectations and tasks. Each day was met with a different public health challenge, which required us to be flexible and innovative with our solutions. As the COVID-19 pandemic raged on, more data had to be collected and analyzed. Dr. Trang took time out of her day and away from her tasks to ensure that I was supported and actively contributing to the concerted efforts of the communicable disease team. She pushed me to explore my interests outside of COVID-19 which led me to develop an interest in how public health information was disseminated and relayed to the public. This snowballed into a passion for creating communicable disease dashboards by learning advanced statistical and visualization software. I also learned how to improve my interpersonal skills when working with internal members and outside community members with different opinions and perspectives. I worked with a slew of professionals across several departments, ranging from other young professionals to the director of the health department himself. I spent one Wednesday per month, assisting in a local food drive held at CCPHC. I gained a greater perspective on resource availability and existing gaps that exist throughout Clay County. Dr. Trang's mentorship led me to pursue new opportunities in data analytics that I would not have thought of previously.

Dr. Kastner provided a similar experience as Dr. Trang yet outside the boundaries of public health. He spent significant time teaching me how to become a better thinker by encouraging me to think constructively and historically about topics of interest. To truly understand the complexities of a pandemic, it requires a deeper understanding of past pandemics and major outbreaks. He further supported my ILE by providing instruction on how to improve my writing skills to create concise reports and formal documentation. This guidance was reflected in the reports written during my ILE as I wrote numerous COVID-19 updates via

internal and external reports that were then shared on our public health website. Additionally, as a participant in the Midwestern Public Health Training Center Field Placement Internship Program, I was required to write three blog-style reflections during my ILE. Dr. Kastner's writing instruction and guidance assisted me in creatively developing these posts.

3.2 Additional Learning Acquired During Creation of Portfolio Products

Portfolio Product A: The creation of each portfolio product helped to mold my overall ILE. Each product served a dedicated purpose and produced a beneficial product for CCPHC. As previously mentioned, the idea of creating a COVID-19 dashboard was novel at the time. There were many uncertainties behind the development of this product such as public engagement and response, along with the sharp learning curve associated with data visualization software. I spent the better half of the first month learning how to create a visual dashboard by utilizing online resources such as YouTube instructional videos and various Google websites.

I first had to learn how to create a visual display that connected to a data source and provided some type of analysis. The first dashboard I created showed simple trend changes for current and historical influenza data. There was one visual tile that contained a line chart with the last five-years of influenza data. As simple as this was, it helped to build a foundation for what this software could do. CCPHC invested in Microsoft Power BI, a leading data visualization software tool that enables users to connect directly to programs like Microsoft Excel, programming languages, and other visualization software. After completing my training, I was able to create multiple charts that reflected COVID-19 data from Clay County and surrounding areas. As seen in Figure 1, a before (left) and after (right) reveals the progress made as I tracked various COVID-19 symptoms; these were eventually published to the live website. I officially titled this webpage the "Clay County Public Health Center Data Hub," which was updated biweekly to reflect the most recent COVID-19 case counts. Ultimately, I created five dashboard pages for reporting:

1. Page 1 provided a general overview, or snapshot, of COVID-19 case counts, hospitalizations, and deaths for the county. It also provided a 7-day incidence rate (IR), or the number of new cases in a dedicated time period versus the number of people at risk for the disease, to match the Centers for Disease Control and Prevention (CDC) COVID-

19 community levels guidelines. I color-coded (Green, Yellow, or Red) this value which reflected county transmission at low, medium, or high levels.

2. Page 2 specifically highlighted COVID-19 case counts and demographic data. Included in this page was an interactive map that showed the concentration of cases and how case counts changed over time. Age, sex, race, and ethnicity were also included.
3. Page 3 specifically highlighted COVID-19 hospitalization counts and demographic data. The theme of page 2 stayed the same by providing an interactive map as well as, age, sex, race, and ethnicity.
4. Page 4 specifically highlighted COVID-19 death counts and demographic data. The theme of page 2 and 3 stayed the same by providing an interactive map as well as, age, sex, race, and ethnicity.
5. Page 5 provided a bar graph that reflected COVID-19 vaccination trends. This included a breakdown by age group for dose counts and booster shots along with unvaccinated numbers. Each variable was then compared to population per age group to determine the ratio of vaccinated versus unvaccinated.

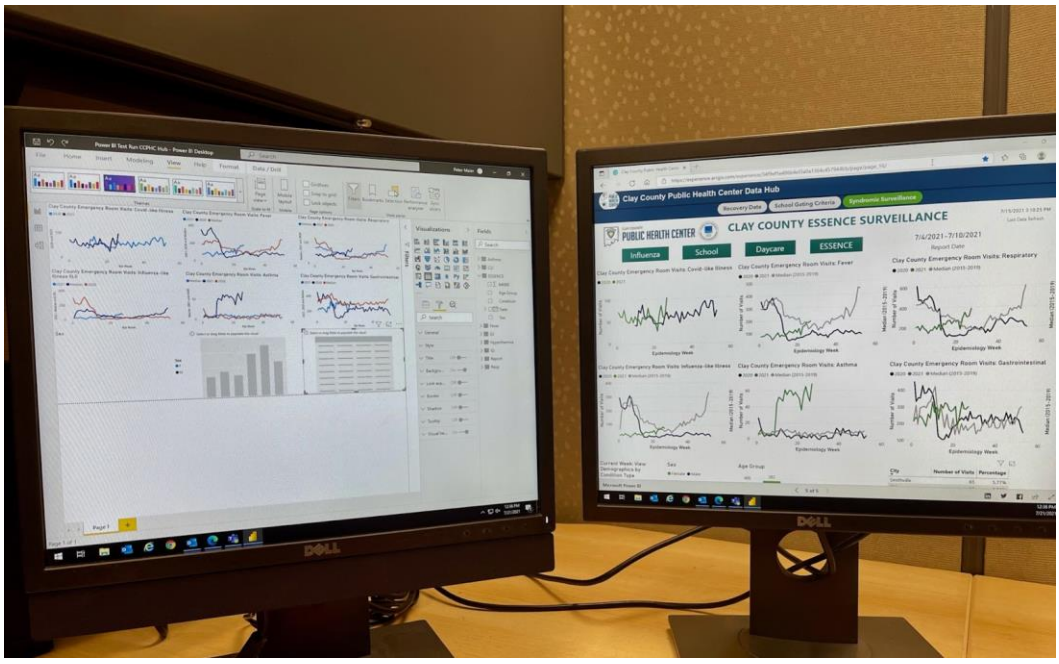


Figure 1: COVID-19 surveillance data reporting the following symptoms: covid-like illness, fever, respiratory, influenza-like illness, asthma, and gastrointestinal. Data reflects 2020, 2021, and median of 2015 - 2019.

Portfolio Product B: At the core of public health is community engagement and support. Schools and daycares were greatly impacted by the COVID-19 pandemic and required special attention. My role shifted to support data analytics focused on understanding school transmission rates and case counts. Given the sensitive nature of working with data associated with children and youth, schools and more importantly, parents, had to feel supported during this difficult time. Many daycares were left to fend for themselves since most functioned out of personal homes or small businesses, leaving room for more outbreaks. I developed an automated Microsoft Form that could be sent to schools and daycares on a weekly basis to collect in-house COVID-19 data, along with an influenza and foodborne illness symptom tracker. This allowed us to track any outbreaks that may occur at these locations while keeping schools and daycares open for business. Over 25 schools and daycares opted-in to this reporting system and a weekly report was sent back to them reflecting a trend analysis, total case counts, and most commonly reported symptoms. School administrators and daycare providers were given real-time feedback and remained supported by CCPHC.

Portfolio Product C: As COVID-19 cases ebbed and flowed throughout the community, I sought additional opportunities to advance my learning. I spent nearly three weeks working alongside the environmental health team to support their efforts investigating foodborne illness outbreaks in the community. I spent most of my time sifting through historical data to identify trends and themes for outbreaks. I looked for time periods where foodborne illnesses may have been elevated which tended to fall during the summer months when more food vendors were out at community events. I joined a colleague on several surprise site visits to hotels, schools, restaurants, and nursing homes to evaluate their kitchen and dining areas to assess their risk for transmitting foodborne illnesses. Given the hiring difficulties that COVID-19 presented to local businesses, staff shortages exacerbated public health vulnerabilities; this led to an elevated number of outbreaks, and citations were handed out more than previous years.

Portfolio Product D: Building off my experience in Portfolio C, I developed an annual foodborne illness presentation that was presented to the epidemiology and environmental health team at the end of the ILE. This presentation incorporated findings from the 2019-2020 year and

included a review of the previous five years of foodborne-related outbreaks. To no surprise, very few outbreaks were reported during the height of COVID-19 as lockdown and quarantine protocols were at their strictest levels. However, once protocols were removed, outbreaks started increasing. Figure 2 below reflects the title page of my presentation along with the main authors of the project.

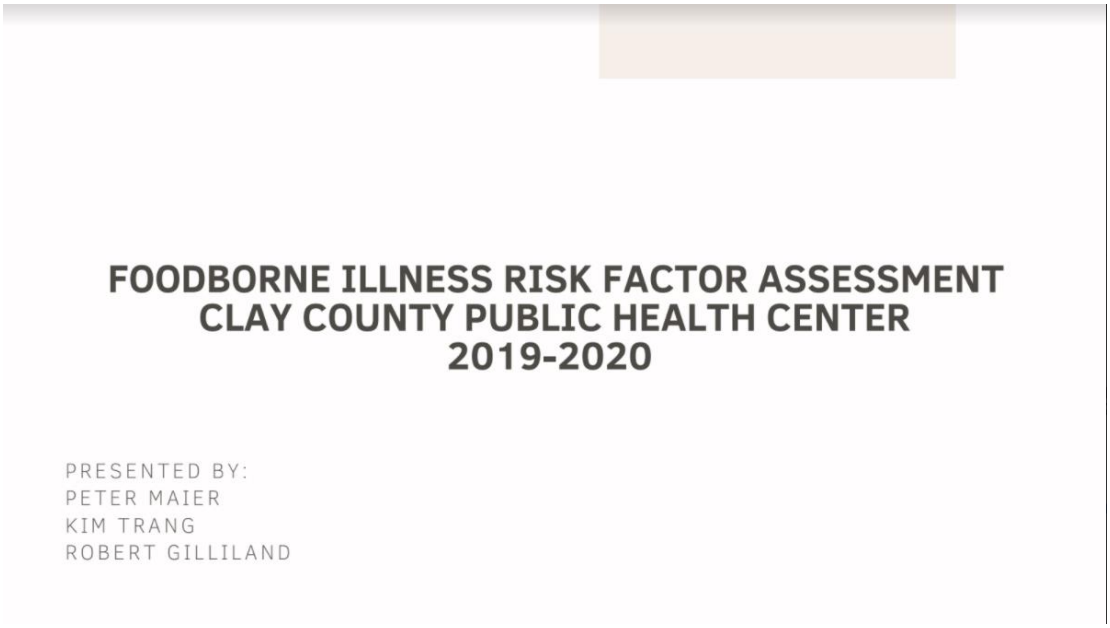


Figure 2: Presentation given to environmental health department analyzing our findings for the 2019-2020 year on foodborne illness outbreaks and associated risk factors.

Portfolio Product E: Disease case investigation is not a term the public was widely familiar with before the COVID-19 pandemic began. As cases mounted in Clay County, the health department needed an adequate response. They began hiring disease case investigators who focused solely on collecting information from COVID-19 cases in the community. I began working for CCPHC as a disease case investigator in early 2020 before beginning my ILE. I transitioned into a data analyst role and eventually became a junior epidemiologist for CCPHC. Disease case investigation requires a delicate balance between using qualitative and quantitative methods to collect information. First, to interview a probable or confirmed case, you must contact them via phone call. Then using a standardized questionnaire, you interview the individual, asking a range of questions from demographic information to close contacts to symptoms to the location of the testing center they used. Once the interview is concluded, this information was organized in a Microsoft Excel spreadsheet for further analysis. As case counts built up, more qualitative

analysis was done. I began looking for trends in reporting and visualized this information using data visualization tools from Portfolio A.

Chapter 4 - Competencies and Coursework-Related Learning

Student Attainment of MPH Foundational Competencies

The following competencies were directly and positively impacted by coursework completed during my time at KSU. Throughout my ILE, I faced many obstacles that led me to lean on the core foundation of instruction taught through KSU coursework and mentorship. Most of my time was dedicated towards competency numbers 1-4 as my daily tasks required a deeper understanding of epidemiological and analytical methods within the public health space. Daily COVID-19 case investigations relied on qualitative data collection. Once qualitative data was collected, I processed this information in a statewide database, EPITRAX, that allowed me to quantify our findings. From these findings, I interpreted the data which allowed us to make further policy changes, primarily focused on school and daycare closings when a surplus of COVID-19 cases were identified. Competency number 20 was utilized by adding this data into a data visualization program, Power BI, that created a dashboard for public viewing. Improving public health communication became one of the most relevant topics during my time at CCPHC.

Table 4.1 highlights these specific competencies completed during the ILE.

Table 4.1 Summary of MPH Foundational Competencies Table

Number and Competency		**Description**
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

Table 4.2 reflects core MPH courses that emphasized specific competencies.

Table 4.2 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

22 Public Health Foundational Competencies Course Mapping	MPH 701	MPH 720	MPH 754	MPH 802	MPH 818
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				
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

The author's emphasis area is Infectious Disease and Zoonoses in the MPH program. The APE and the ILE enhanced his learning experience regarding infectious disease and zoonoses, as well as food safety and biosecurity. He also learned about infectious disease prevention and containment measures and food safety standards essential throughout community health.

KSU's DMP 815 Multidisciplinary Thought and Presentation taught by Dr. Kastner was one of the most important courses that complemented my ILE. Building a strong foundation in writing techniques paid off during my internship as I was relied upon to create several reports, infographics, and instructional pamphlets for public use. This foundation also improved by ability to relay important health information surrounding infectious disease transmission, environmental influences, and disease surveillance to internal and external readers.

University of Kansas Medical Center's PRVM 815 Infectious Disease Epidemiology course built off basic introductory epidemiology coursework that was taught earlier on in the MPH program at KSU. This advanced-level course required a deeper understanding of the host

pathogen mechanisms and immunological response that COVID-19 and other prevalent infectious diseases presented. We discussed the impact of globalization on both the food safety and security issues and emerging infectious diseases. DMP 770 Emerging Infectious Diseases taught through K-State Olathe shed further light on the impact of globalization on disease surveillance and the potential for future pandemics given the complex mechanisms behind transmission.

The following table, Table 4.3, reflects the competencies that were incorporated in my ILE.

Table 4.3 Summary of MPH Emphasis Area Competencies

MPH Emphasis Area: Infectious Disease 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 host immune response to infection.
3	**Environmental/ecological influences**	Examine the influence of environmental and ecological forces on infectious diseases.
4	**Disease Surveillance**	Globalization enhances the growth of international trade, which can also introduce hazard.
5	**Disease vectors**	Investigate the role of vectors, toxic plants, and other toxins in infectious diseases.

References

1. Anwar A, Malik M, Raees V, et al. (September 14, 2020) Role of Mass Media and Public Health Communications in the COVID-19 Pandemic. *Cureus* 12(9): e10453. DOI 10.7759/cureus.10453.
2. Kastner, J., Eppler, M., Jojola-Mount, V., Mulcahy, E., Sanwisate, P., & Schoenberg, K. (2021, February 15). Fighting the spread of disease with...words? Retrieved July 12, 2022, from https://www.vet.k-state.edu/about/news-events-publications/OneHealth/Previous_Issues/Vol12-Iss2/fighting_spread.html.
3. Cuan-Baltazar, J. Y., Muñoz-Perez, M. J., Robledo-Vega, C., Pérez-Zepeda, M. F., & Soto-Vega, E. (2020). Misinformation of COVID-19 on the Internet: Infodemiology Study. *Journal of Medical Internet Research public health and surveillance*, *6*(2), e18444. https://doi.org/10.2196/18444.
4. Bhanot D, Singh T, Verma SK and Sharad S (2021) Stigma and Discrimination During COVID-19 Pandemic. Front. Public Health 8:577018. doi: 10.3389/fpubh.2020.577018.
5. Niemiec E. (2020). COVID-19 and misinformation: Is censorship of social media a remedy to the spread of medical misinformation?. *EMBO reports*, *21*(11), e51420. https://doi.org/10.15252/embr.202051420.
6. Barua, Z., Barua, S., Aktar, S., Kabir, N., & Li, M. (2020). Effects of misinformation on COVID-19 individual responses and recommendations for resilience of disastrous consequences of misinformation. *Progress in disaster science*, *8*, 100119. https://doi.org/10.1016/j.pdisas.2020.100119.
7. White, Brianna & Shaban-Nejad, Arash. (2022). Utilization of Digital Health Dashboards in Improving COVID-19 Vaccination Uptake, Accounting for Health Inequities. *Studies in Health Technology and Informatics*. 499 - 502.
8. Dong, E., Du, H., & Gardner, L. (2020). An interactive web-based dashboard to track COVID-19 in real time. *The Lancet. Infectious diseases*, *20*(5), 533–534. https://doi.org/10.1016/S1473-3099(20)30120-1.
9. Fareed, N., Swoboda, C. M., Chen, S., Potter, E., Wu, D., & Sieck, C. J. (2021). U.S. COVID-19 State Government Public Dashboards: An Expert Review. *Applied clinical informatics*, *12*(2), 208–221. https://doi.org/10.1055/s-0041-1723989.

10. Ian Hennessee, Julie A. Clennon, Lance A. Waller, Uriel Kitron, and J. Michael Bryan, 2021: Considerations for Improving Reporting and Analysis of Date-Based COVID-19 Surveillance Data by Public Health Agencies. *American Journal of Public Health* 111, 2127_2132, https://doi.org/10.2105/AJPH.2021.306520.

Appendix

The following documents are listed in this order:

- Portfolio Product A: COVID-19 Communicable Disease Dashboard
- Portfolio Product B: School and Daycare Syndromic Surveillance Analysis
- Portfolio Product C: Foodborne Illness Investigations and Site Visits
- Portfolio Product D: Annual Foodborne Illness Outbreak Assessment Presentation
- Portfolio Product E: COVID-19 Disease Case Investigation

CLAY COUNTY PUBLIC HEALTH CENTER

CLAY COUNTY ESSENCE SURVEILLANCE

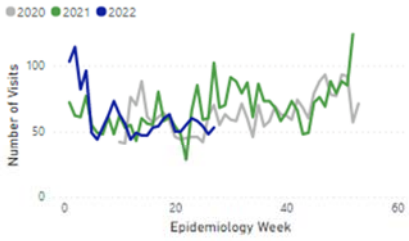
7/14/2022 1:47:44 PM
Last Data Refresh

Influenza | School | Daycare | ESSENCE

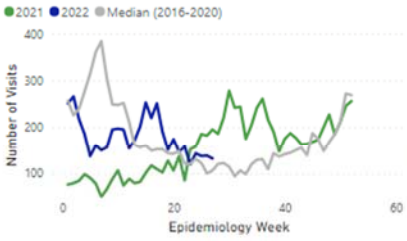
27
Epi Week

7/3/2022 - 7/9/2022
Report Date

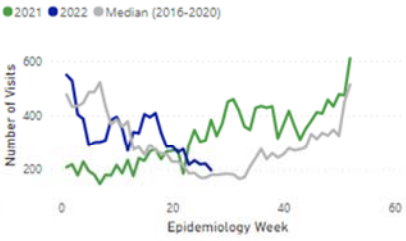
Clay County Emergency Room Visits: Covid-like Illness



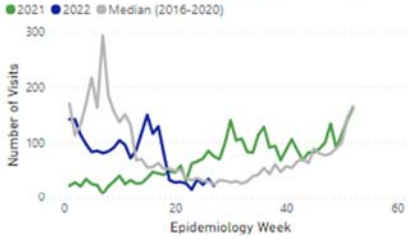
Clay County Emergency Room Visits: Fever



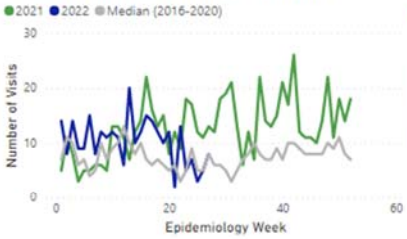
Clay County Emergency Room Visits: Respiratory



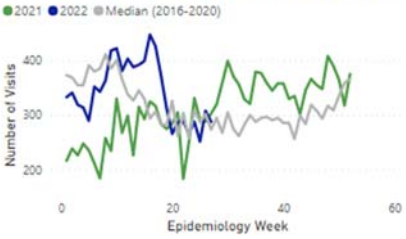
Clay County Emergency Room Visits: Influenza-like Illness



Clay County Emergency Room Visits: Asthma



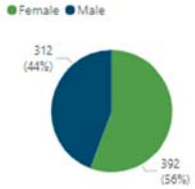
Clay County Emergency Room Visits: Gastrointestinal



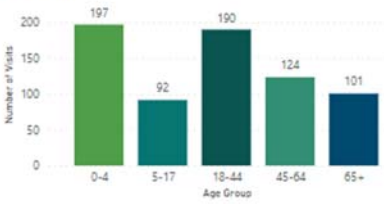
Current Week: View Demographics by Condition Type

- Select all
- Asthma
- Covid-like Illness
- Fever
- Gastrointestinal
- Hyperthermia
- Influenza-like Illness
- Respiratory

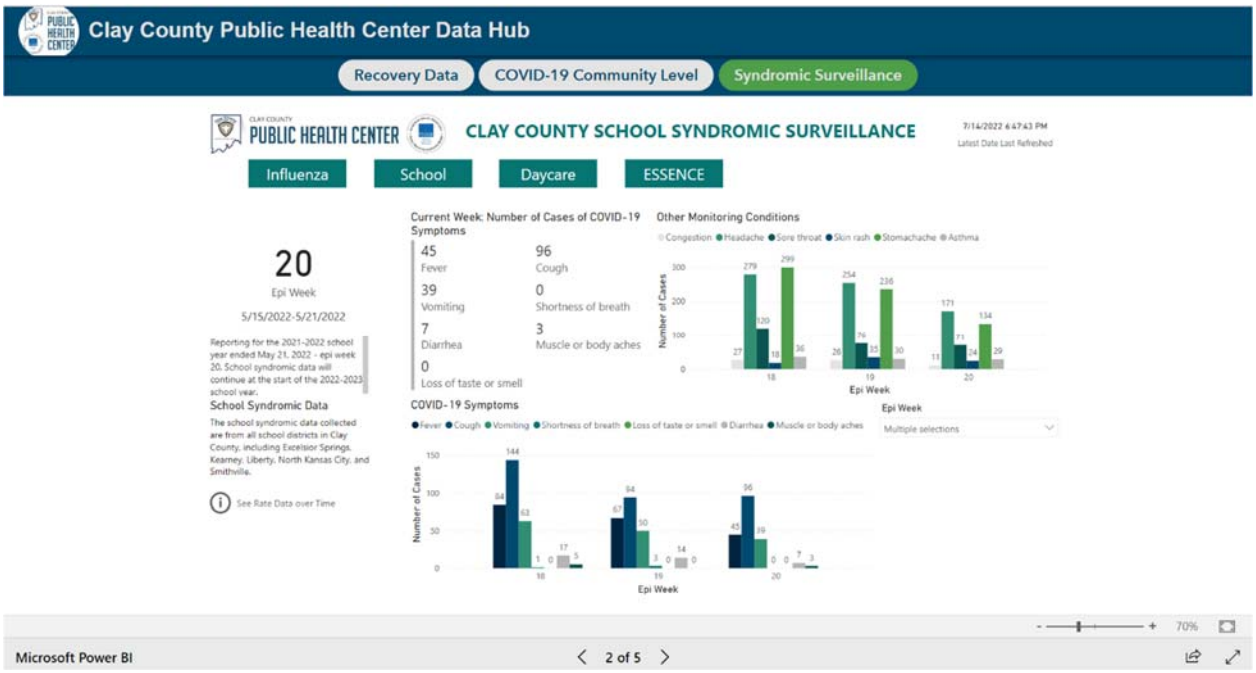
Sex

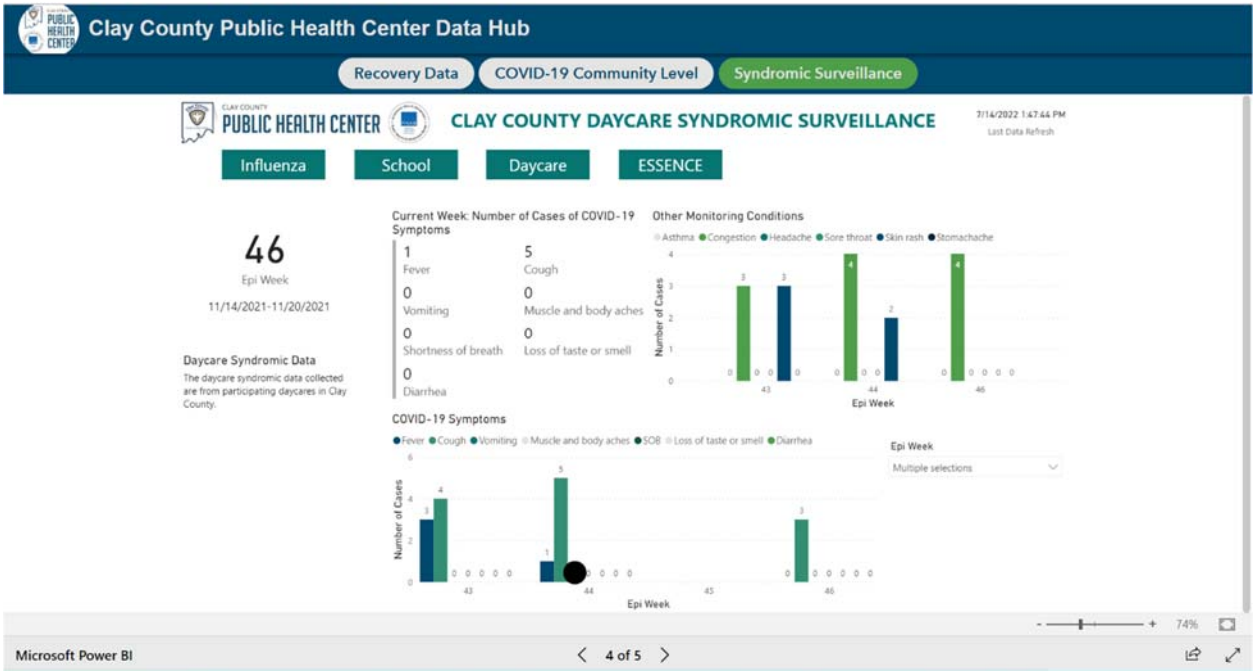


Age Group



City	Number of Visits	Percentage
Excelsior Springs	65	9.23%
Gladstone	226	32.10%
Kansas City	136	19.32%
Kearney	40	5.68%
Liberty	65	9.23%
North Kansas City	139	19.74%
Other	7	0.99%
Smithville	26	3.69%


Clay County Public Health Center Data Hub
Recovery Data
COVID-19 Community Level
Syndromic Surveillance
CLAY COUNTY PUBLIC HEALTH CENTER
CLAY COUNTY SCHOOL SYNDROMIC SURVEILLANCE
7/14/2022 6:47:43 PM
Latest Data Last Refreshed
Influenza
School
Daycare
ESSENCE
20
Epi Week
5/15/2022-5/21/2022
Reporting for the 2021-2022 school year ended May 21, 2022 - epi week 20. School syndromic data will continue at the start of the 2022-2023 school year.
School Syndromic Data
The school syndromic data collected are from all school districts in Clay County, including Excelsior Springs, Kearney, Liberty, North Kansas City, and Smithville.
See Rate Data over Time
Current Week: Number of Cases of COVID-19 Symptoms
45 Fever
96 Cough
39 Vomiting
0 Shortness of breath
7 Diarrhea
3 Muscle or body aches
0 Loss of taste or smell
Other Monitoring Conditions
Congestion Headache Sore throat Skin rash Stomachache Asthma
Number of Cases
Epi Week
COVID-19 Symptoms
Fever Cough Vomiting Shortness of breath Loss of taste or smell Diarrhea Muscle or body aches
Epi Week
Multiple selections
Number of Cases
Epi Week
Microsoft Power BI
2 of 5
70%


Clay County Public Health Center Data Hub
Recovery Data
COVID-19 Community Level
Syndromic Surveillance
CLAY COUNTY PUBLIC HEALTH CENTER
CLAY COUNTY DAYCARE SYNDROMIC SURVEILLANCE
7/14/2022 1:47:44 PM
Last Data Refresh
Influenza
School
Daycare
ESSENCE
46
Epi Week
11/14/2021-11/20/2021
Daycare Syndromic Data
The daycare syndromic data collected are from participating daycares in Clay County.
Current Week: Number of Cases of COVID-19 Symptoms
1 Fever
5 Cough
0 Vomiting
0 Muscle and body aches
0 Shortness of breath
0 Loss of taste or smell
0 Diarrhea
Other Monitoring Conditions
Asthma Congestion Headache Sore throat Skin rash Stomachache
Number of Cases
Epi Week
COVID-19 Symptoms
Fever Cough Vomiting Muscle and body aches SOB Loss of taste or smell Diarrhea
Epi Week
Multiple selections
Number of Cases
Epi Week
Microsoft Power BI
4 of 5
74%

Access to the Establishment

- An Environmental Health Inspector from the Clay County Public Health Center will present official credentials, ask to speak with the person in charge, and will inform the person in charge of the purpose of the visit
- The person in charge must allow the inspector access to the establishment to determine if the food establishment is in compliance with the Clay County Food Code

Violations During an Inspection

- Time Frame of Correction
  - **Critical Violation** – Correct the violation at the time of the inspection. If it is not able to be corrected at the time of the inspection, a re-inspection will be conducted in 10 days or less and a re-inspection fee will be assessed
  - **Non-Critical Violation** – May be corrected on site. If it is not able to be corrected on site, it must be corrected within 90 days

Food Establishment Inspections

- Food establishments must be inspected at the following frequency as determined from the Priority Risk Assessment Worksheet
  - **High Priority Assessment** - at least four (4) routine inspections per year
  - **Moderate Priority Assessment** - at least three (3) routine inspections per year
  - **Low Priority Assessment** - at least two (2) routine inspections per year

Closing an Establishment

The permit holder must immediately close the establishment and notify the Clay County Public Health Center if an imminent health hazard exists including:

- A significant lack of refrigeration
- A backup of sewage into the establishment
- An emergency, such as a fire or flood
- A significant pest infestation
- A long interruption of electrical or water service
- Misuse of poisonous or toxic materials
- Clear evidence of a foodborne illness outbreak related to the establishment
- A gross unsanitary occurrence or condition
- Any other circumstances that may endanger public health

Reopening after a closure

- The permit holder must obtain approval from the Clay County Public Health Center before resuming operations

Destroying Organisms of Public Health Concern
Cooking Temperatures

- Minimum Internal Cooking Temperature:
  - 135°F (57°C) for 15 seconds
    - Commercially processed, ready-to-eat food that will be hot-held for service (cheese sticks, chicken wings, etc.)
    - Fruits and vegetables that are cooked for hot holding

  - 145°F (63°C) or above for 15 seconds for:
    - Raw shell eggs that are prepared for immediate service
    - Steaks, chops, fillets of fish, meat, and pork

  - 145°F (63°C) for 4 minutes
    - Roasts

  - 155°F (68°C) for 15 seconds for
    - Injected meats
    - Comminuted fish, meat, or pork (such as hamburgers or crab cakes)
    - Raw eggs that are prepared and then hot held

  - 165°F (74°C) or above for 15 seconds for
    - Poultry
    - Stuffed fish, meat, pasta, poultry, vegetables, etc.
    - Anything cooked in the microwave
    - Anything that includes leftovers that were previously cooked

Microwave Cooking
Foods cooked in a microwave oven must be:

- Rotated and stirred halfway during cooking to compensate for uneven distribution of heat
- Covered to retain surface moisture
- Allowed to stand covered for 2 minutes after cooking to let the temperature even out

FOODBORNE ILLNESS RISK FACTOR ASSESSMENT
CLAY COUNTY PUBLIC HEALTH CENTER
2019-2020

PRESENTED BY:
PETER MAIER
KIM TRANG
ROBERT GILLILA

WHY IS THIS AN IMPORTANT PUBLIC HEALTH ISSUE?

01

"1 in 6 Americans (48 million people or 15% of US pop.) fall ill, 128,000 hospitalized, and 3,000 die, annually from a foodborne pathogen."

THE CENTERS FOR DISEASE CONTROL AND PREVENTION (CDC)

- POOR PERSONAL HYGIENCE
- CONTAMINATED EQUIPMENT/PROTECTIO N FROM CONTAMINATION
- APPROVED SOURCE
- IMPROPER HOLDING/TIME & TEMPERATURE
- INADEQUATE COOKING
- ACTIVE MANAGERIAL CONTROL

02

FDA HIGH-RISK CATEGORIES

466
ESTABLISHMENTS

1036
INSPECTIONS

2019

480
ESTABLISHMENTS

645
INSPECTIONS

2020*

03

04

KEY CCPHC GOALS

ASSESS

Occurrence of foodborne illness risk factors and management practices across four facility types

ESTABLISH

Baseline and assess trends over time in efforts to reduce the occurrence of foodborne illness risk factors

IDENTIFY

Risk factors and data items in need of priority attention

BUILDING A RISK FACTOR ASSESSMENT

05

IDENTIFY A PROBLEM

Selection of facility types

COLLECT DATA

Site visits paired with data collection software

ANALYZE DATA

Quantitative data analysis

BECAUSE OF YOU!

06

85%

CCPHC
TARGET

88%

2019 %
IN COMPLIANCE

88%

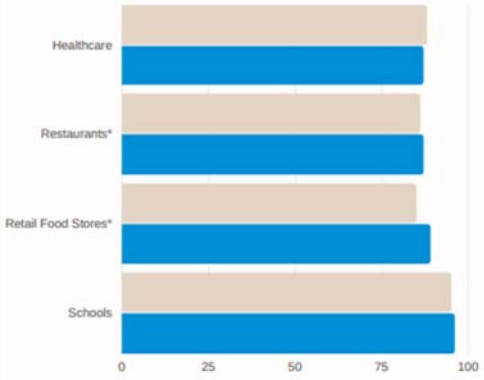
2020 %
IN COMPLIANCE

% IN COMPLIANCE BY YEAR

*Restaurants and retail food stores (RFS) produced significant differences by year

Tan = 2019
Blue = 2020

07



OUT-OF-COMPLIANCE

-15%

Supervision
Healthcare, restaurants, RFS

+2%

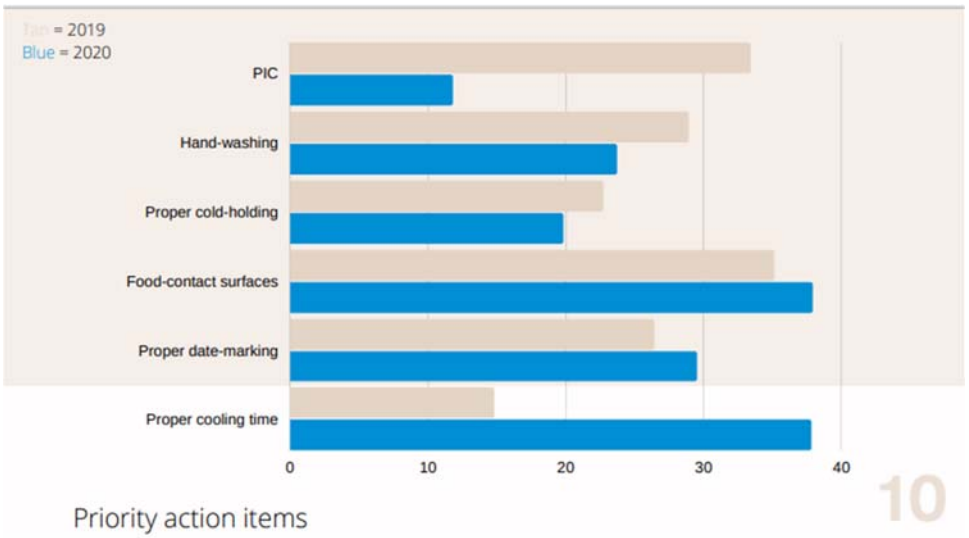
Time/Temperature Control
Restaurants and RFS

*Protection from contamination did not change from 2019-2020 (17%)

PRIORITY ACTION ITEMS

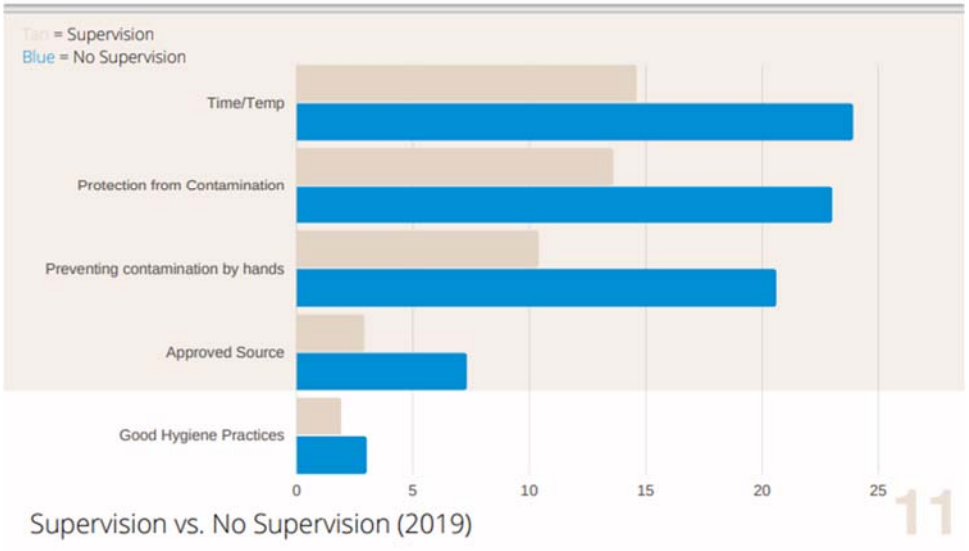
All facility types

1. PIC present, demonstrates knowledge and performs duties
2. Adequate hand-washing facilities supplied and accessible
3. Food-contact surfaces: cleaned and sanitized
4. Proper cold holding temperatures
5. Proper date marking and disposition



Priority action items

10



Supervision vs. No Supervision (2019)

11

ACTIONABLE ITEMS MOVING FORWARD

1. INCREASE STANDARDS

Raise CCPHC target goal to 90% for all facilities (High risk >10%).

2. FOCUS ON EMPLOYEE HEALTH AND CERTIFICATION

Food certification for managers and employees is essential

All facilities showed near-perfect compliance with implementing an employee health policy (1.5% OUT)

3. EDUCATE, EQUIP AND TRAIN STAFF

Food safety trainings need to be updated regularly in accordance with latest research.

QUESTIONS?

Contact Information

PHONE NUMBER

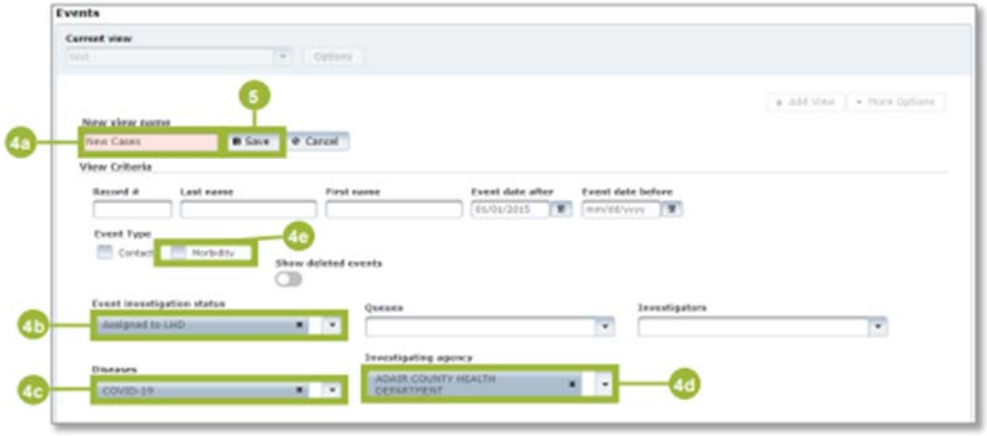
816-872-0931

EMAIL ADDRESS

pmaier@clayhealth.com

Using the Events Tab in EpiTrax

4. Make the following selections in the expanded options box:
   a) **New view name:** New Cases
   b) **Event investigation status:** Assigned to LHD
   c) **Diseases:** COVID-19
   d) **Investigating Agency:** select your agency
   e) **Event Type:** Select Morbidity
5. Click **Save.**



The **Events** list will now display all your new cases, all of which should be shaded in pink. You only need to set up and save this query once. When you want to pull your list of new cases, return to the **Events** tab and select **New Cases** from the **Current View** list.

Along the left side of each record is a color bar. Green indicates a *Morbidity* record while yellow indicates a *Contact* record.

Please review the Filtering and Exporting – Public Templates job aid to understand the export functionality to discover new cases.

Note: If a case is reassigned to a different LHD, the **Workflow Status** resets to **Assigned to LHD**, so the case will show in pink as new for the newly assigned jurisdiction. If you have any questions or issues with using this feature of EpiTrax, please reach out to the EpiTrax Help Desk by emailing epitrax@health.mo.gov.