



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

Peter Maier
MPH Candidate
Clay County Public Health Center
(CCPHC)
07/13/2021 – 10/15/2021

About me

- Originally from Lafayette, IN
 - Manhattan → Lawrence → Kansas City → Tacoma, Washington!
- Graduated from:
 - University of Kansas (BS)
 - University of Kansas Medical Center (MS)
 - Kansas State University (MPH)
- Midwestern Public Health Training Center Awardee
- Graduate Student Leadership Development Awardee
- Since my graduate studies began, I've worked for:
 - Clay County Public Health Center → Disease Case Investigator, Data Analyst
 - AFFIRM at the Aspen Institute → Program Manager
 - CDC Foundation → Data Analyst, Epidemiologist
 - CDC NHSN → Public Health Data Analyst (Informatics)



Introduction to Clay County

- 81.1% White (non-Hispanic) followed by Black and White (Hispanic).
 - 14x White (Non-Hispanic) residents vs. any other race or ethnicity.
- Located in northwestern Missouri near the border of Missouri and Kansas.
 - Six primary cities: Gladstone, Excelsior Springs, Liberty, North Kansas City, Smithville, and Kearney.
- Population of roughly 250k people.
 - Median age of 37 years.



Prevent. Promote. Protect.

Introduction to Clay County Public Health Center (CCPHC)

- “[To deliver the essential public health services of prevention, promotion and protection to the communities of Clay County.]”
- Services include dental care, Women, Infants, and Children (WIC), Tuberculosis (TB) services, Mental Health Services, sexually transmitted disease (STD) services, and Immunizations.
- **COVID-19: 26,534 cases, 761 hospitalizations and 330 deaths.**



Mentorship

Dr. Kim Trang

- PhD Health Communications (KU).
- Lead data analyst at CCPHC.
- UI/UX developer for the Health Collaborative in Columbus, Ohio.



Dr. Justin Kastner

- Teaches and mentors students interested in a variety of public health domains; Manhattan and Olathe.
- Specializes in history of public health, international trade policy, cross-border cooperation, and multidisciplinary research and writing.
- Co-directs the Frontier fieldtrip model (Council Grove, KS).



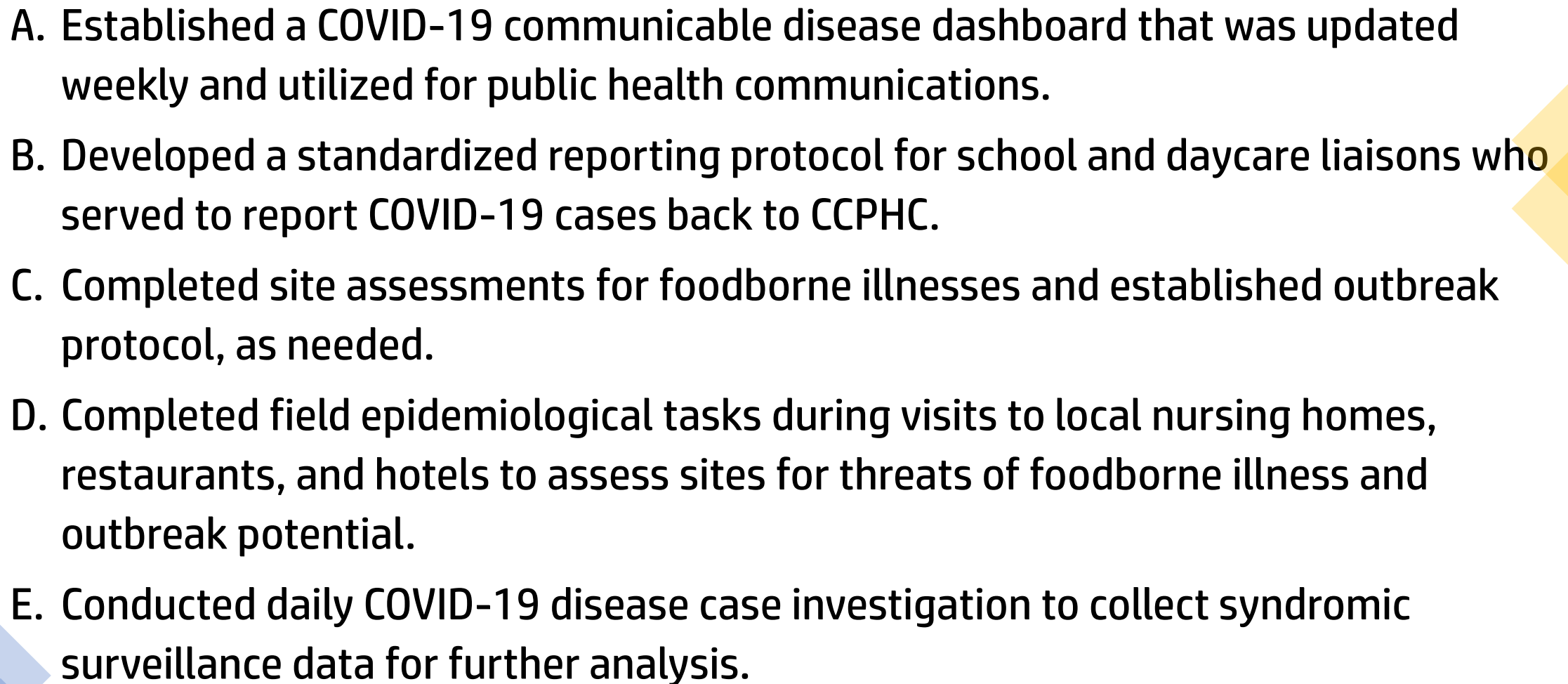
Portfolio Products

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| 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. |

Field Experience Accomplishments

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- 
- A. Established a COVID-19 communicable disease dashboard that was updated weekly and utilized for public health communications.
 - B. Developed a standardized reporting protocol for school and daycare liaisons who served to report COVID-19 cases back to CCPHC.
 - C. Completed site assessments for foodborne illnesses and established outbreak protocol, as needed.
 - D. Completed field epidemiological tasks during visits to local nursing homes, restaurants, and hotels to assess sites for threats of foodborne illness and outbreak potential.
 - E. Conducted daily COVID-19 disease case investigation to collect syndromic surveillance data for further analysis.

The Importance of Communication

First, an origin story!



The Importance of Data Visualization



Health experts often work with large, complex data sets.



Analysis process becomes efficient and highlights key insights.



Speeds up decision-making processes → actionable next steps for stakeholders!



Companies need a way to analyze, understand.



Tell the story of what's happening between data point A and data point B!



Portfolio Product A

Influenza

School

Daycare

ESSENCE

27

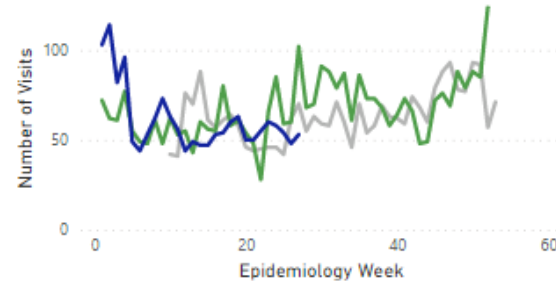
7/3/2022 - 7/9/22

Epi Week

Report Date

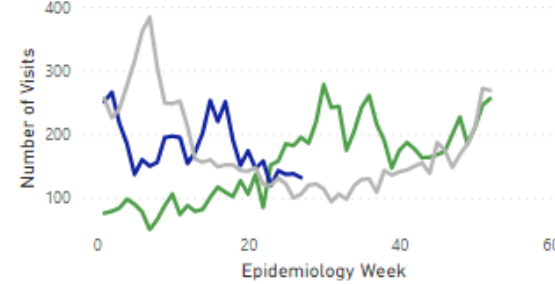
Clay County Emergency Room Visits: Covid-like Illness

● 2020 ● 2021 ● 2022



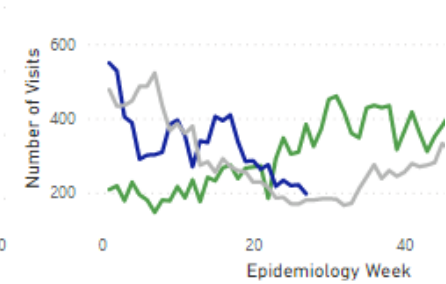
Clay County Emergency Room Visits: Fever

● 2021 ● 2022 ● Median (2016-2020)



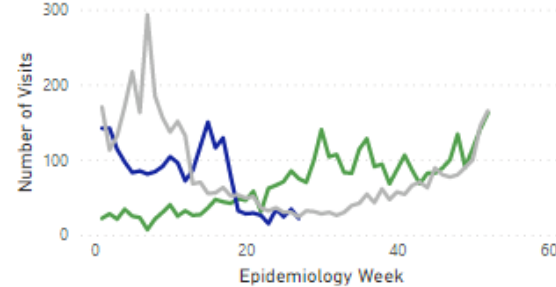
Clay County Emergency Room Visits: Respi

● 2021 ● 2022 ● Median (2016-2020)



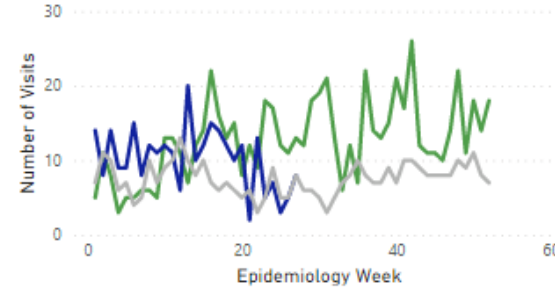
Clay County Emergency Room Visits: Influenza-like Illness

● 2021 ● 2022 ● Median (2016-2020)



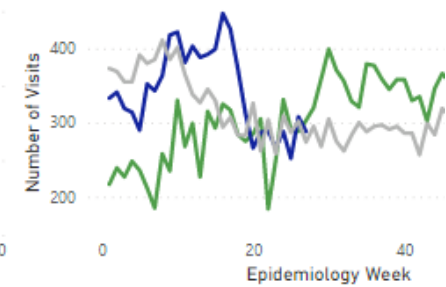
Clay County Emergency Room Visits: Asthma

● 2021 ● 2022 ● Median (2016-2020)



Clay County Emergency Room Visits: Gastr

● 2021 ● 2022 ● Median (2016-2020)

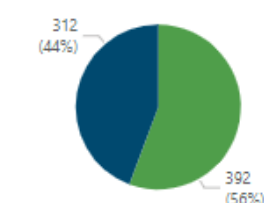


Current Week: View
Demographics by
Condition Type

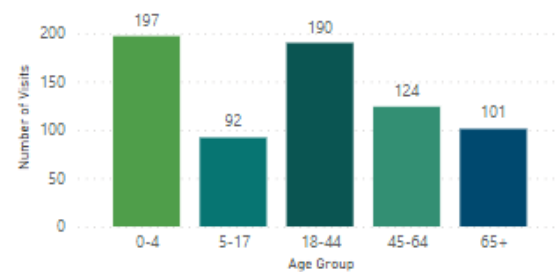
- ☐ Select all
- ☐ Asthma
- ☐ Covid-like Illness
- ☐ Fever
- ☐ Gastrointestinal
- ☐ Hyperthermia
- ☐ Influenza-like Illness
- ☐ Respiratory

Sex

● Female ● Male



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% |



Portfolio Product B


[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 Date Last Refreshed

[Influenza](#)
[School](#)
[Daycare](#)
[ESSENCE](#)

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Epi Week

5/15/2022-5/21/2022

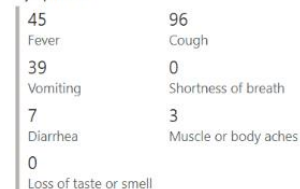
Reporting for the 2021-2022 school year ended May 21, 2022 - epi week 20. School syndromic data will continue at the start of the 2022-2023 school year.

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.

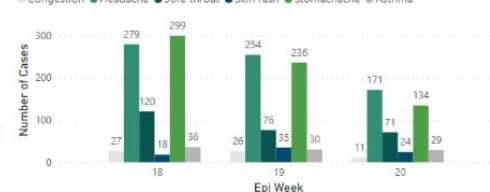
See Rate Data over Time

Current Week: Number of Cases of COVID-19 Symptoms



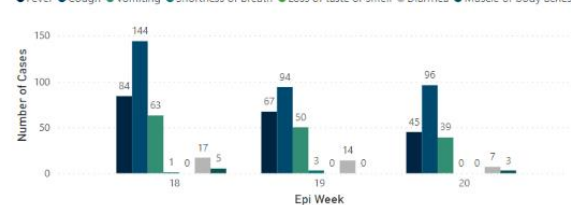
Other Monitoring Conditions

● Congestion ● Headache ● Sore throat ● Skin rash ● Stomachache ● Asthma



COVID-19 Symptoms

● Fever ● Cough ● Vomiting ● Shortness of breath ● Loss of taste or smell ● Diarrhea ● Muscle or body aches



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](#)

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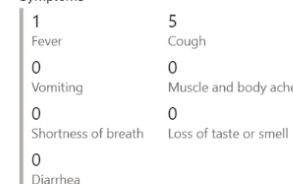
Epi Week

11/14/2021-11/20/2021

Daycare Syndromic Data

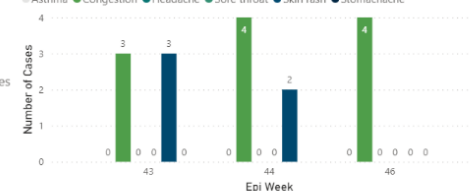
The daycare syndromic data collected are from participating daycares in Clay County.

Current Week: Number of Cases of COVID-19 Symptoms



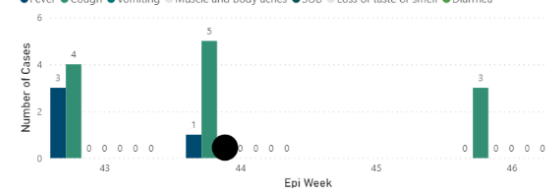
Other Monitoring Conditions

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COVID-19 Symptoms

● Fever ● Cough ● Vomiting ● Muscle and body aches ● SOB ● Loss of taste or smell ● Diarrhea



Epi Week

Multiple selections



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

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Last Data Refresh

Influenza

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Epi Week

11/14/2021-11/20/2021

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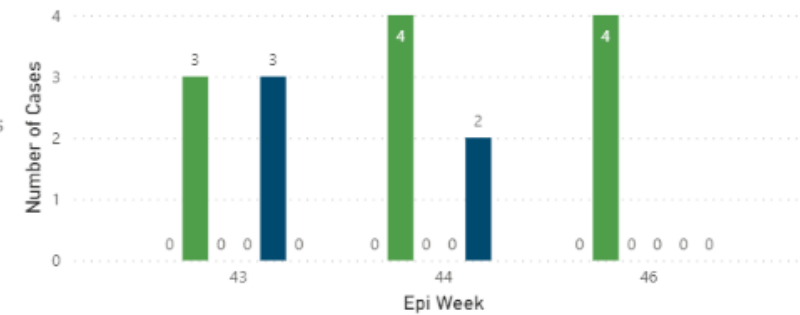
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Current Week: Number of Cases of COVID-19 Symptoms

| | |
|---------------------|------------------------|
| 1 | 5 |
| Fever | Cough |
| 0 | 0 |
| Vomiting | Muscle and body aches |
| 0 | 0 |
| Shortness of breath | Loss of taste or smell |
| 0 | |
| Diarrhea | |

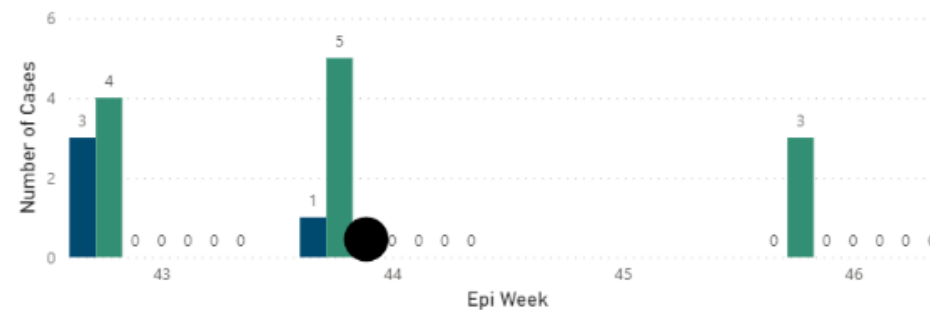
Other Monitoring Conditions

Asthma Congestion Headache Sore throat Skin rash Stomachache



COVID-19 Symptoms

Fever Cough Vomiting Muscle and body aches SOB Loss of taste or smell Diarrhea



Epi Week

Multiple selections


[Recovery Data](#)
[COVID-19 Community Level](#)
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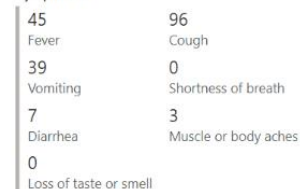
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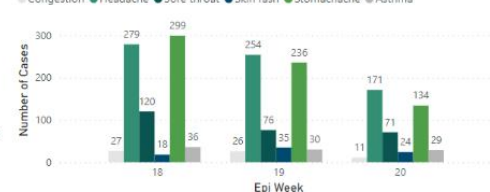
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Current Week: Number of Cases of COVID-19 Symptoms



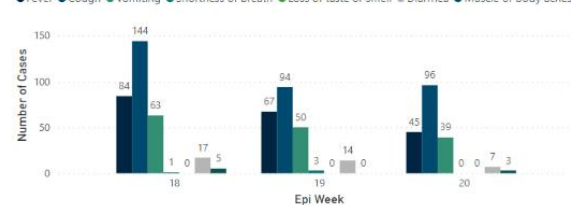
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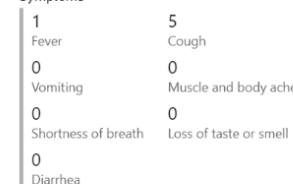
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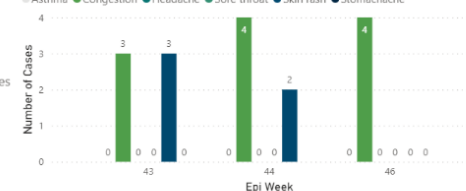
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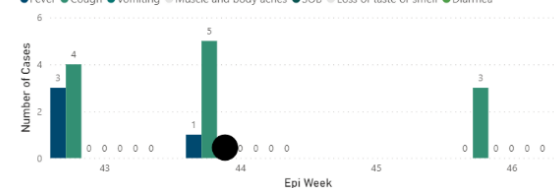
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COVID-19 Symptoms

● Fever ● Cough ● Vomiting ● Muscle and body aches ● SOB ● Loss of taste or smell ● Diarrhea



Epi Week

Multiple selections



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

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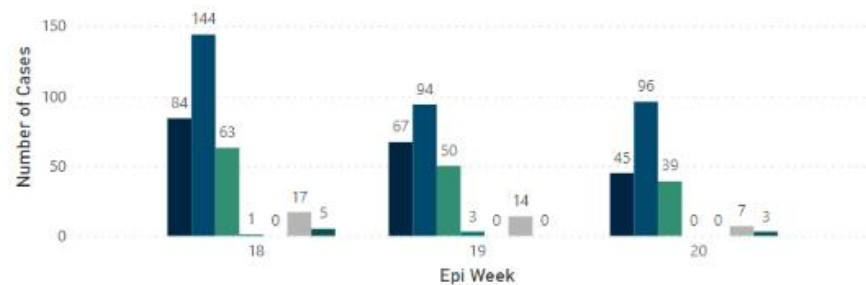
See Rate Data over Time

Current Week: Number of Cases of COVID-19 Symptoms

| | |
|------------------------|----------------------|
| 45 | 96 |
| Fever | Cough |
| 39 | 0 |
| Vomiting | Shortness of breath |
| 7 | 3 |
| Diarrhea | Muscle or body aches |
| 0 | |
| Loss of taste or smell | |

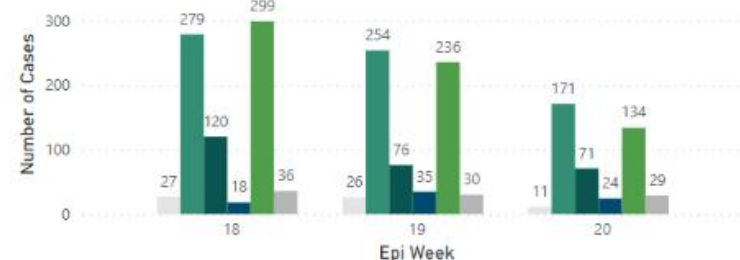
COVID-19 Symptoms

● Fever ● Cough ● Vomiting ● Shortness of breath ● Loss of taste or smell ● Diarrhea ● Muscle or body aches



Other Monitoring Conditions

● Congestion ● Headache ● Sore throat ● Skin rash ● Stomachache ● Asthma



Epi Week

Multiple selections

70%



Portfolio Product C

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



Portfolio Product D

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

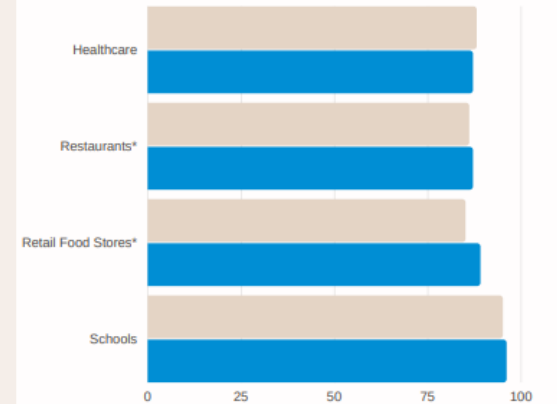
88%

2020 %
IN COMPLIANCE

% IN COMPLIANCE BY YEAR

Tan = 2019
Blue = 2020

07



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



Portfolio Product E

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 screenshot shows the 'Events' form in EpiTrax. Annotations indicate the following steps:

- 4a:** Click the 'New view name' button.
- 4b:** Select 'Assigned to LHD' from the 'Event investigation status' dropdown.
- 4c:** Select 'COVID-19' from the 'Diseases' dropdown.
- 4d:** Select your agency from the 'Investigating agency' dropdown.
- 4e:** Select 'Morbidity' from the 'Event Type' dropdown.
- 5:** Click the 'Save' button.

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.

The screenshot shows the 'Events' list in EpiTrax. The list contains several records, all of which are shaded in pink, indicating they are new cases. The records are listed in a table with columns for Record ID, Last name, First name, Event date after, Event date before, Event investigation status, Queue, Investigator, and Disease.

| Record ID | Last name | First name | Event date after | Event date before | Event investigation status | Queue | Investigator | Disease |
|-----------|-----------|------------|------------------|-------------------|----------------------------|-------|--------------|----------|
| 1001 | Smith | John | 10/01/2020 | 10/01/2020 | Assigned to LHD | 1001 | John Smith | COVID-19 |
| 1002 | Smith | John | 10/01/2020 | 10/01/2020 | Assigned to LHD | 1001 | John Smith | COVID-19 |
| 1003 | Smith | John | 10/01/2020 | 10/01/2020 | Assigned to LHD | 1001 | John Smith | COVID-19 |
| 1004 | Smith | John | 10/01/2020 | 10/01/2020 | Assigned to LHD | 1001 | John Smith | COVID-19 |
| 1005 | Smith | John | 10/01/2020 | 10/01/2020 | Assigned to LHD | 1001 | John Smith | COVID-19 |

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.

Missouri Department of Health and Senior Services

Events

Current view: Options

+ Add View + More Options

New view name:

View Criteria

Record # Last name First name Event date after: Event date before:

Event Type: ☐ Contact ☒ Morbidity

Show deleted events: ☐

Event investigation status: Queues: Investigators:

Diseases: Investigating agency:

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.

(Events 1 - 36 of 2417, Page 1/80)

| LB, RL, NR / Record # | Disease | State Status | Local Status | Investigating Agency | Workflow Status | Event Date | Actions |
|-----------------------|----------|--------------|--------------|--------------------------------|--|------------|--|
| | COVID-19 | Not a Case | | ADAMS COUNTY HEALTH DEPARTMENT | Assigned to LHD <input type="text" value="Add brief note"/> <input type="button" value="Save"/> | 06/15/2020 | <input type="button" value="File"/> <input type="button" value="Options"/> |
| | COVID-19 | Not a Case | | ADAMS COUNTY HEALTH DEPARTMENT | Assigned to LHD <input type="text" value="Add brief note"/> <input type="button" value="Save"/> | 06/15/2020 | <input type="button" value="File"/> <input type="button" value="Options"/> |
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Lessons Learned

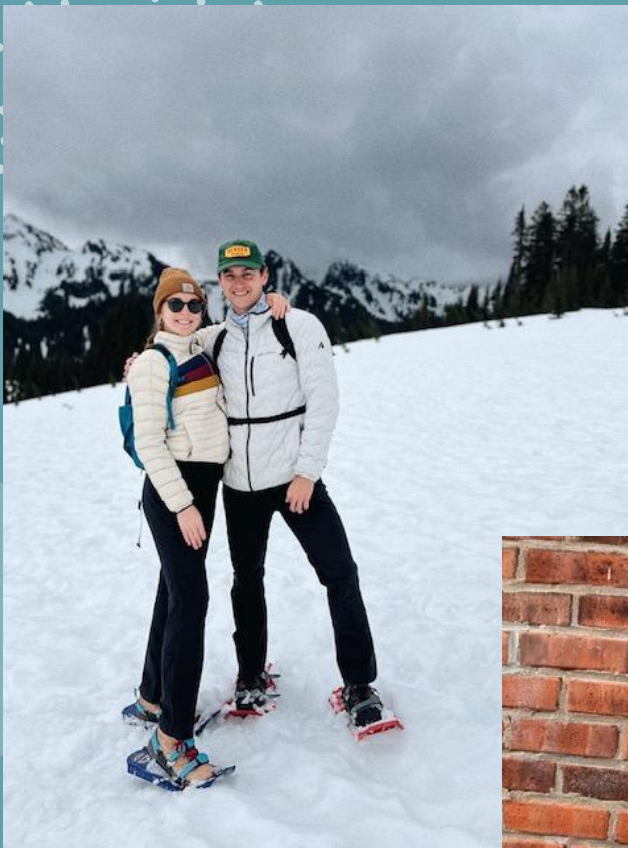
A decorative wavy line in a light blue-grey color spans the width of the slide, positioned below the title.

1. Working with the public is **HARD** yet rewarding.
2. Adapting to the unknown requires flexibility.
3. Communication strategies vary by audience.
4. Data collection is growing at an exponential rate.
How do we navigate challenges surrounding usability, applicability, security, and everything else in between?



Next Chapters

A decorative wavy line in a light blue-grey color spans the width of the slide, positioned below the title.



CONTINUE CURRENT WORK AT CDC
NHSN/ACAT



PURSUE DRPH AT JOHNS HOPKINS
UNIVERSITY BLOOMBERG SCHOOL OF
PUBLIC HEALTH



EPIDEMIC INTELLIGENCE SERVICE
(EIS)



DEVELOP MENTALMAPP.COM

The background of the slide is a vibrant blue, densely populated with numerous speech bubbles of various colors including red, yellow, pink, and light blue. Each speech bubble contains a large, dark blue question mark. In the center of the slide, there is a large, semi-transparent white rectangular box with a thin black border. Inside this box, the word "Questions?" is written in a large, bold, black sans-serif font. Below this text, a thin horizontal line separates it from the phrase "Thank you!", which is written in a smaller, black sans-serif font.

Questions?

Thank you!