Impacts of the East Palestine Train Derailment on Pennsylvania Residents

Bureau of Epidemiology

Division of Environmental Health Epidemiology

June 2023

pennsylvania
DEPARTMENT OF HEALTH

Table of Contents

List of Tables & Figures

Executive Summary

The East Palestine, Ohio (OH) train derailment that occurred on February 3, 2023, and subsequent controlled vent and burn on February 6, 2023, resulted in the potential exposure to hazardous chemicals to local residents. The following report summarizes three data sources used to identify impacts, particularly health impacts, for Pennsylvania (PA) residents living near the derailment site. These data sources include the community Assessment of Chemical Exposure (ACE) survey data from residents, PA syndromic surveillance data, and PA Poison Control Center (PCC) data. Results from all three data sources indicated similar acute clinical effects among the residents in a similar geographic area.

An ACE survey for PA residents was administered both in-person and online, collecting information on individuals' concerns, potential exposures, their health, and the health of their pets and livestock. A total of 174 PA residents completed the community ACE survey. Eighty-six percent of respondents reported symptoms, with the most commonly reported symptoms being headaches, anxiety, and increased pain, burning, or irritation of the eyes.

PA's syndromic surveillance system, EpiCenter, collects data from all Emergency Departments (EDs) in the state, which includes various 'syndrome' classifications that are developed from assigned diagnosis codes and chief complaints for an ED visit. Compared to baseline values pre derailment, ED visits for the post derailment and controlled burn period indicated a higher percentage of patient visits with symptoms corresponding to "Ear, Nose, Throat (ENT)," "Respiratory," and "Headache" syndromes that progressively declined through March 25, 2023. The percentage of visits due to "Neurological," "Nausea," "Mental" and "Rash" syndromes fluctuated during the post-derailment period. The percentage of visits due to "Neurological" and "Mental" syndromes remained high through March 25 compared to the pre-derailment percentages. Additionally, between February 4th, 2023, and April 1st, 2023, all syndromes, except for "Eyes" syndrome, had at least one day with counts of ED visits that were above previous baseline values and reached "alert" levels. The percentages of reported syndromes were also higher in 2023 than the average percentage of syndromes between 2018-2020 for "ENT," "Neurological," "Respiratory," "Rash," "Headache," and "Mental" syndromes.

Poison control centers (PCCs) in PA and OH received a variety of calls from PA residents following the derailment. Through May 24, 2023, 82 calls were made to poison control centers PCCs by PA residents following the derailment. The majority of calls were regarding human exposure with symptoms reported in 90.4% of human exposure calls. However, PCC clinicians determined that reported symptoms were related to the derailment in only 11 instances. Most common related symptoms were labored breathing, eye irritation/pain, throat irritation/pain, and headaches.

Similar symptoms were observed across all three data sources in a similar geographic pattern. These symptoms were consistent with the known acute health effects of the hazardous materials involved in the East Palestine train derailment. Based on these findings, additional analyses and targeted follow-up are recommended to inform future emergency responses, confirm the resolution of apparent acute clinical effects from chemical exposures, and identify long-term clinical effects in the affected residents.

Background

On February 3, 2023, at approximately 9:00 PM, a Norfolk Southern freight train traveling to southern New Jersey derailed and caught fire in East Palestine, Ohio (OH), about a quarter of a mile from the Ohio/Pennsylvania (PA) border. Fifty-three of 150 train cars were compromised by the derailment, with 20 cars carrying hazardous materials including among others vinyl chloride, benzene, ethylene glycol, ethylhexyl acrylate, butyl acrylate and isobutylene.

Due to an elevated temperature reading in one of the derailed train cars and concern about a potential explosion, a controlled vent and burn of the chemicals took place on February 6, 2023, involving at least 5 cars. As a result, PA residents within one mile of the derailment in Beaver County were asked to evacuate and those within 2 miles to shelter in place during the vent and burn.

Some of the hazardous materials contained in the derailed train cars are known eye and skin irritants that can cause acute symptoms such as watery eyes, or irritation of the eyes, nasal passages, or respiratory tract. Some of the hazardous materials are also known sensitizers, meaning they can cause a person to become allergic or sensitive to a chemical following repeated exposure. In addition to the hazardous materials, particulate matter (from the fire during the initial derailment and the controlled vent and burn) can exacerbate existing medical conditions such as asthma, and can cause shortness of breath and eye, lung, and throat irritation. Disasters are also known to negatively impact the mental health of those affected (Makwana, 2019).

In order to identify trends and patterns in acute health outcomes in PA residents following the derailment, an Assessment of Chemical Exposure (ACE) investigation was conducted. For urgent health needs, residents were encouraged to contact the Poison Control Incident Hotline or visit a local emergency department. Poison Control Center (PCC) calls from PA residents and syndromic surveillance data (emergency department (ED) visits) were also analyzed in order to identify the impacts and trends in acute health effects in PA residents related to the derailment. The following report discusses the findings from the analyses of these data sources.

Methods

Assessment of Chemical Exposure (ACE) Survey Data

In collaboration with federal partners from the Centers for Disease Control and Prevention (CDC) and the Agency for Toxic Substances and Disease Registry (ATSDR), and in coordination with the Ohio Department of Health, the PA Department of Health (PA DOH) conducted an ACE survey. This survey was designed to assist in the identification of the health impacts to PA residents who may have been exposed to hazardous substances from the train derailment. The survey included questions about demographic characteristics, proximity to the derailment, exposure characteristics, health impacts, pet, livestock, and agriculture impacts, and outstanding needs following the derailment (Appendix A).

The survey was created using REDCap Cloud software and data were stored in the secure REDCap database. Residents were able to complete the survey in-person with the assistance of staff at the Health Resource Center in the Darlington Township municipal building from February 28th through March 10th. Residents were also able to complete the survey online through a web link. Those under 18 were able to complete the survey with the consent and assistance of a parent or legal guardian. The survey was available until March 31, 2023, 11:59 PM.

Descriptive statistics of survey data were produced to describe and summarize survey responses. Where appropriate, descriptive data were plotted on a map to depict geographic patterns.

Multivariate logistic regression was utilized to assess the association between reported exposures and the outcome of the presence of a new or worsening symptom since the derailment. Reported contact with smoke, dust, debris, smelling an odor and being present in the 2-mile buffer zone surrounding the derailment site between February 3 at 9:00 PM and February 8 at 7:00 PM were used as indicators of exposure. Those who reported entering the 2-mile buffer as only passersby were not included in the exposed category. Five separate models for each exposure variable were run, adjusting for gender and age group. Due to small sample size, age was dichotomized into <55 and ≥ 55 and additional adjustments were not possible.

Survey data were analyzed with SAS Enterprise Guide software version 7.1. Mapping was performed using ArcGIS Pro software version 3.1.

Syndromic Surveillance Data

PA DOH's syndromic surveillance system, EpiCenter, receives data on visits to EDs from all hospitals in the state, except for Veteran Affairs (VA) Medical Center EDs. Each visit is assigned a syndrome "Classification" that is based on the assigned admission and discharge International Classification of Diseases (ICD) 10th Revision (ICD-10) codes and chief complaints for the visit.

Using patients' home location, ED visit data for patients who reside in Beaver and Lawrence Counties were downloaded from the EpiCenter web portal. The "Classification" field was searched to identify visits that were assigned any of eight chief complaint-based EpiCenter syndrome categories: "Ear, Nose, Throat (ENT)," "Neurological," "Respiratory," "Eyes," "Rash," "Nausea," "Headache," and "Mental." Categories established for identifying visits of interest are not mutually exclusive and there is also some potential overlap within the syndrome categories. For example, a visit flagged for the "Headache" syndrome category will also be flagged for the "Neurological" syndrome category, as "Headache" is a sub-syndrome of "Neurological." The number of visits at weekly intervals and the percentage of each syndrome by total visits per week were calculated by zip code. Particular attention was focused on ED visits of PA residents from the following zip codes: 16115 (Darlington Township, Beaver County), 16120 (Enon Valley, Lawrence County), and 16141 (New Galilee, Beaver County), which included the PA areas closest to the train derailment site.

Additionally, the Reason field (corresponding to the free-text chief complaints/primary reason for visit) and the assigned admission and discharge ICD-10 codes were searched to identify cases that were likely related to the train derailment. A case was likely related to the derailment if, on or after February 3rd, 2023, mention is made of any of the full or partial keywords: CHEM, EAST PAL, TRAIN, DERAIL, VINYL, PLUME, TOX, EXPLOD, EXPLOS (excluding INTOX, DETOX, NONTOX, CHEMO, ISCHEM, STRAIN) within the Reason field, **OR** if any of the following ICD-10 codes are assigned: Z77.* (Other contact with and (suspected) exposures hazardous to health); T59.* (Toxic effect of other gases, fumes, and vapors); T65.*(Toxic effect of other and unspecified substances); J68.* ("Respiratory" conditions due to inhalation of chemicals, gases, fumes, and vapors); X46.* (Accidental poisoning by and exposure to organic solvents and halogenated hydrocarbons and their vapors); X47.* (Accidental poisoning by and exposure to other gases and vapors); X49.* (Accidental poisoning by and exposure to other and unspecified chemicals and noxious substances). The Reason field for each visit was then reviewed to identify those that specifically mentioned the incident.

ED admissions between January 03, 2023, and March 25, 2023, were used to examine the trends for the various syndromes. Then ED admissions between February 04, 2023, and March 03, 2023, were compared to a 3-year average (2018-2020) of ED visits for the same period. ED visits for this period in 2021 and 2022 were excluded because there was a significant decline in ED visits during these years, likely due to the COVID-19 pandemic.

To determine whether ED visits occurred at a frequency that reached "alert" levels, daily ED visits for patients residing in the targeted zip codes over a 14-month period (Jan 2022 - Mar 2023) were queried from the line-level syndromic surveillance datasets in the enterprise data warehouse using SAS. The queried visit dataset was read into R Studio, where visits were flagged if they were assigned any of eight chief complaint-based Epicenter syndrome categories ("ENT", "Eyes," "Headache," "Mental," "Nausea," "Neurological," "Rash," "Respiratory"). Additionally, custom criteria were used to flag visits where any of seven ICD-10 CM diagnostic codes (T59, T65, J68, X46, X47, X49, Z77) were reported or contained potential chief complaint text references to the derailment (e.g., "EAST PAL", "TRAIN DERAIL", "PLUME", etc.). Visit counts were aggregated by day and week (Sat-Sun) for each category, with zero-count days inserted where applicable. Analysis included a separate category for total overall visit counts. Using the R package "surveillance," CDC's Early Aberration Reporting System (EARS)

algorithm was applied to the time series count data to identify days or weeks where visit counts for any visit category exceeded threshold values, indicating an alert. As the zip codes of interest are in a rural area with historically sparse daily ED visit counts, an extended EARS C2 baseline of 30 days was established for the aggregated daily data, while a baseline of 14 weeks was used for the aggregated weekly data; both aggregations used the default p-value cutoff of 0.01 to determine if the observed count constituted an alert. Alerts were summarized on the basis of occurring in the short-term post-derailment time period (2/3/2023 - 4/1/2023).

Poison Control Center (PCC) Data

The PCC incident hotline was provided to residents who had concerns or questions related to potential exposures and their health impacts. PCC data from PA residents related to the East Palestine train derailment were collected and shared from the Cincinnati Drug and Poison Information Center, Central Ohio Poison Center, Pittsburgh Poison Center, and Philadelphia PCC to PA DOH in accordance with a data-sharing agreement among entities as part of a regional response.

Calls to PCCs are answered primarily by clinical experts (e.g., specially trained nurses and pharmacists) with medical and clinical toxicologists' oversight. Captured data elements include call type, patient and exposure details, substance details, clinical effects, and therapies. The PCC clinical experts determined if calls with reported symptoms were related to the exposures from the derailment based on their clinical judgement and expertise. Symptoms are determined to be related if the timing of clinical effect was reasonable for the reported exposure, the severity of symptom was consistent with the reported exposure, the symptom was consistent with anticipated substance toxicity, and/or a clinical assessment made by a physician. In the case of the train derailment where multiple substances were involved, relatedness assessments were based on the full case and were not substance specific.

Descriptive statistics of PCC data were produced to describe and summarize call data. Where appropriate, descriptive data were plotted on a map to depict geographic patterns. PCC data were analyzed with SAS Enterprise Guide software version 7.1. Mapping of PCC call information was performed using ArcGIS Pro software version 3.1.

Findings

Assessment of Chemical Exposure (ACE) Survey Findings

A total of 174 PA residents from 135 unique households completed the community ACE survey. The majority of respondents completed the survey in-person at the Health Resource Center or during door-to-door canvassing (N=127), while 47 individuals completed the survey online. The highest number of surveys were completed on the opening day of the Health Resource Center, February 28th with 23 surveys completed.

Demographics

Demographic characteristics of the 174 respondents are presented in Table 1. Most respondents were female (62.6%), White (95.4%), and not Hispanic or Latino (93.1%). The median age of respondents was 60 years, with a range from 1 to 87 years. Most respondents indicated that they were first informed of the derailment and received the majority of the information surrounding the derailment via television. Social media and communication with friends, relatives, neighbors, or coworkers were also commonly cited sources of information related to the derailment.

Table 1. Demographic Characteristics of Community ACE Respondents (N=174)

Characteristic	N	%
Sex		
Male	64	36.8
Female	109	62.6
Refused/Other	1	0.6
Age		
< 18	5	2.9
18-24	1	0.6
25-34	4	2.3
35-44	18	10.3
45-54	25	14.4
55-64	51	29.3
65-74	38	21.8
75-84	20	11.5
85+	2	1.2
Missing	10	5.8
Race		
White	166	95.4
Refused/Other	3	1.7
Missing	5	2.9
Ethnicity		

Hispanic or Latino	8	4.6
Not Hispanic or Latino	162	93.1
Refused	2	1.2
Missing	2	1.2

Respondents were residents from 12 unique zip codes, with the following four most frequent: 16115 (52.3%) representing Darlington, 16120 (21.3%) representing Enon Valley, 16141 (11.5%) representing New Galilee, and 15010 (8.1%) representing Beaver Falls.

Exposure Characteristics

A total of 137 respondents (78.7%) believed they were exposed to hazardous substances. Among them, all 137 felt that their exposure was via air (100%), water (37.9%) and soil (46.7%). Respondents could indicate more than one exposure route.

A total of 102 respondents (58.6%) indicated that they had come into contact with smoke, dust, debris, or another substance (Table 2).

Table 2. Contact Material (N=102) *(Includes Multiple Contacts)*		
Material	**N=**	**%**
Smoke	89	87.3
Dust	50	49.0
Debris	15	14.7
Other	8	7.8

When asked if participants smelled an odor, over 70% indicated yes (N=122). Table 3 describes reported odors and their characteristics.

Table 3. Odor Detection & Characteristics (N=174)		
Odor	**N=**	**%**
Yes	122	70.1
No	43	24.7
Unsure	8	4.6
Missing	1	0.6
Odor Strength (N=122)		
Very Light	6	4.9
Light	21	17.2
Moderate	41	33.6
Strong	32	26.2
Very Strong	22	18.0
Odor Description *(Includes Multiple Descriptors)*		
Chemical smell	85	69.7
Other*	36	29.5
Sweet	30	24.6

Smoke	22	18.0
Paint or paint thinner	10	8.2
Rotten eggs	4	3.3
Gasoline	3	2.5
Sewage	3	2.5
Bug spray	1	0.8
* Other odor descriptions included burnt insulation, burnt plastic, nail polish remover, burnt rubber, metallic, acidic, chlorine, pungent, moldy wetness, and dirt/soil.		

Health Impacts

A total of 150 respondents (86.21%) reported the presence of at least one new or worsening clinical symptom since the train derailment to survey completion, with 135 individuals reporting more than one symptom. The maximum number of symptoms reported by one individual was 32. Specific symptoms and corresponding body category (eyes, nervous system, cardiopulmonary, etc.) are reported in Table 4. The most commonly reported symptoms included headache (N=99), anxiety (N=70), increased pain, burning, or irritation of the eyes (N=60), runny nose (N=55), and burning nose or throat (N=52).

Table 4. Presence and Type of New or Worsening Clinical Symptoms (N=150) *(Includes Multiple Symptoms)*		
Symptom Category and Type	**N**	**%**
Eyes	**84**	**56.0**
Increased pain/burning/irritation	60	40.0
Increased watering/tearing	41	27.3
Other	18	12.0
Blurred or double vision	9	6.0
Ears, Nose, Throat	**114**	**76.0**
Runny nose	55	36.7
Burning nose or throat	53	35.3
Stuffy nose/sinus congestion	52	34.7
Increased congestion or phlegm	52	34.7
Hoarseness	43	28.7
Other	41	27.3
Nose bleeds	15	10.0
Tinnitus	15	10.0
Pain in neck	9	6.0
Difficulty swallowing	8	5.3
Swollen neck	6	4.0
Odor on breath	6	4.0
Increased salivation	5	3.3
Nervous System	**105**	**70.0**
Headache	99	66.0

Dizziness or lightheadedness	36	24.0
Other	6	4.0
Fainting	3	2.0
New difficulty buttoning/unbuttoning clothing	1	0.7
Cardiopulmonary	**75**	**50.0**
Coughing	48	32.0
Difficulty breathing/feeling out-of-breath	39	26.0
Chest tightness or pain/angina	23	15.3
Wheezing	20	13.3
Burning lungs	16	10.7
Asthma	12	8.0
Bronchitis	9	6.0
Fast pulse	8	5.3
Other	8	5.3
Breathing slow	5	3.3
Breathing fast	3	2.00
Skin	**46**	**30.7**
Dry or itchy skin	28	18.7
Skin rash	23	15.3
Irritation/pain/burning of the skin	21	14.0
Other	8	5.3
Sweating	6	4.0
Hives	5	3.3
Skin discoloration	4	2.7
Petechia	3	2.0
Bruise	2	1.3
Blisters	1	0.7
Cool or pale skin	1	0.7
Poor wound healing	1	0.7
Abrasion	1	0.7
Mental Health	**85**	**56.7**
Anxiety	70	46.7
Fatigue/tiredness	36	24.0
Tension or nervousness	34	22.7
Difficulty sleeping	26	17.3
Agitation or irritation	24	16.0
Feeling hopeless or helpless	14	9.3
Unexplained fear	12	8.0
Other	12	8.0

In the geographic distribution of symptomatic individuals (N=150) (Figure 1), darker color saturations indicate a higher number of symptomatic individuals per zip code. The highest number of symptomatic individuals resided in 16115 (52.7%), representing Darlington.

Figure 1. Distribution of Symptomatic Community ACE Survey Respondents by Residential Zip Code

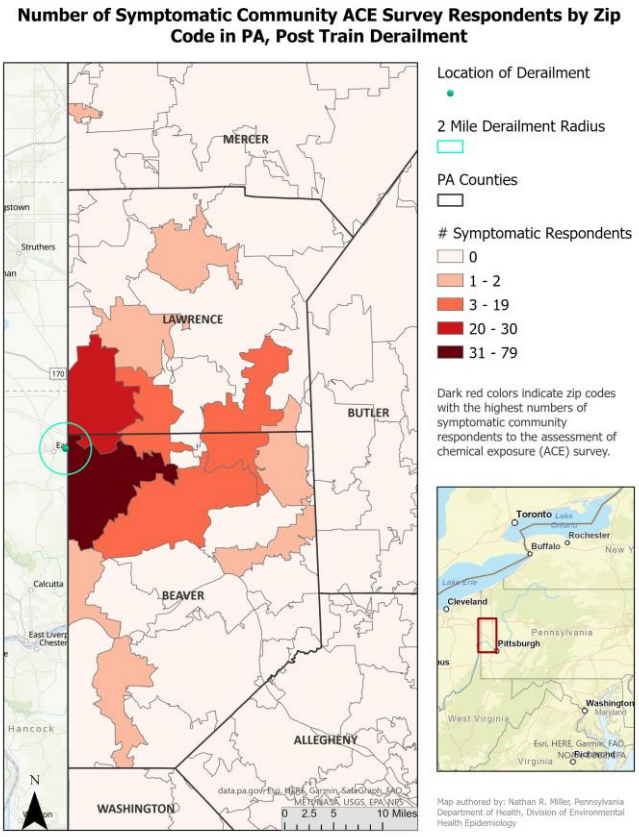


Table 5 describes the highest level of healthcare received by symptomatic respondents. Most symptomatic respondents did not receive any healthcare (46.7%), or self-treated symptoms at home (21.3%).

Table 5. Highest Level of Healthcare Received by Symptomatic Respondents (N=150)		
Level of Care	**N=**	**%**
Hospitalized	2	1.33
Seen in an emergency department, urgent care, or outpatient care	28	18.67
Consulted a healthcare provider via phone/video conferencing	16	10.67
Self-treated	32	21.33
No healthcare needed	70	46.67
Missing	2	1.33

Table 6 presents unadjusted and adjusted odds ratios for five separate models with reported symptom status as the outcome variable (symptomatic vs. not symptomatic) and exposure variables of reported contact with smoke, dust, debris, smelling an odor, and those reported being in the 2-mile buffer zone around the derailment.-None of the statistical models were statistically significant.

Table 6. Unadjusted and Adjusted Odds Ratios of Respondents Reporting a New or Worsening Symptom for Various Exposures (Five Separate Models)				
Exposure	**Unadjusted OR**	**95% CI**	**Adjusted OR**	**95% CI**
No contact with smoke	--	--	--	--
Contact with smoke	2.348	[0.948, 5.818]	2.615**	[0.981, 6.969]
No contact with dust	--	--	--	--
Contact with dust	2.212	[0.716, 6.834]	2.429**	[0.670, 8.801]
No contact with debris	--	--	--	--
Contact with debris	1.043	[0.220, 4.940]	0.764**	[0.153, 3.804]
Did not smell an odor	--	--	--	--
Smelled an odor	2.338*	[0.950, 5.751]	2.772**	[1.058, 7.261]
Outside 2-mile buffer	--	--	--	--
Within 2-mile buffer	0.500	[0.210, 1.192]	0.561**	[0.224, 1.409]

Note. Adjustments were made for gender and age (<55 and ≥ 55). CI = confidence interval. Respondents were excluded from the within 2-mile buffer exposure group if they indicated they reported passing through the 2-mile buffer for a brief period of time as a passerby.

***Quasi-complete separation of data points detected. Validity of the model fit is questionable.*

Pet, Livestock, and Agriculture Impacts

Although the ACE survey for community members was administered to individuals, questions pertaining to livestock, pets, and agriculture are reported by household to eliminate the duplication of results from multiple individuals that reside within the same household. Based on the addresses of respondents, 135 unique households were represented in the survey results.

A total of 39 households indicated that they had at least 1 pet in the 2-mile evacuation zone between Friday, February 3, 2023, at 9 PM and Wednesday, February 8, 2023, at 7 PM. The types of pets owned, fostered, or boarded by these households included dogs, cats, fish, and a potbelly pig. Since the derailment, 12 households with pets in the 2-mile buffer reported the presence of a new or worsening symptom in a pet.

The most common symptoms reported in dogs were sneezing and coughing. Other symptoms reported in dogs included difficulty breathing, eye or nose discharge, lethargy, lower appetite or decreased eating, vomiting, diarrhea, watery or red eyes, nosebleeds, and dry heaves. The commonly reported symptom in cats was also sneezing. Other symptoms reported in cats included coughing, eye or nose discharge, and lethargy. The potbelly pig demonstrated an apprehension to go outside. There were no reported pet deaths following the derailment.

Only 4 households reported having any livestock in the 2-mile evacuation zone between Friday, February 3, 2023, at 9 PM and Wednesday, February 8, 2023, at 7 PM. Owned livestock included horses, sheep, and poultry. No households definitively reported the presence of a new or worsening symptom in livestock following the derailment.

Eighty-nine households reported usually planting a vegetable or herb garden. Of these households, 59.6% reported that they were not (N=17) or unsure of (N=36) planting a vegetable or herb garden this year. Those not planning or unsure of planting expressed contamination and safety concerns.

Of the 23 households reported raising crops, with corn and hay as the most common, 21 indicated concerns about their crops. Those raising crops typically used their crops for household consumption, sale to the public, and as animal feed. Similar to those who garden, people who raise crops were also concerned about contamination and safety of crop consumption.

Residents' Needs

When asked if they or their household had any needs as a result of the derailment, 72 respondents (41.4%) indicated yes, and an additional 12.1% reported being unsure if they had any outstanding needs at the time of the survey. The most commonly reported needs were water (72.2%), medical care (19.4%), and medicine or medical supplies (18.1%). An additional 25 respondents indicated they were unsure of their specific needs. Other reported needs are outlined in Table 7.

Respondents indicating outstanding needs and consent for contact for future follow-up were contacted via email or phone and supplied with additional resources to address their needs. When participants were emailed, they were provided with information on ongoing bottled water and cleaning supply distribution, mental health services, and contact information for the Norfolk Southern resource hotline, Family Assistance Center and Abundant Life Church in New Waterford, Ohio, and the Attorney General. Additionally, a "Resources for Residents" guide was attached to the email that included information on the PA DOH Health Resource Center, PCC, and services provided by DEP, EPA, and Norfolk Southern. The end of the email message included the Division of Environmental Epidemiology's (DEHE) phone and email contact information if they had additional needs or questions.

Respondents without emails were called. They were verbally supplied with the information from the email message or resource guide relevant to the need(s) they expressed in the survey, asked if there were any other needs they needed assistance with, and provided with the DEHE contact information if they had additional needs or questions.

Table 7. Number Reporting At Least One Need and Types of Needs Reported (N=174)

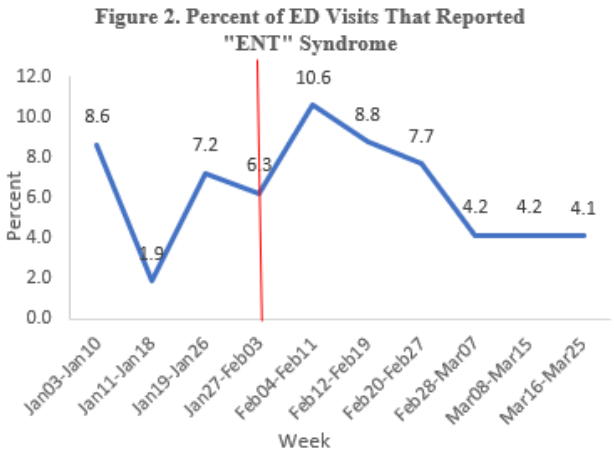
Reported Needs	**N=**	**%**
Yes	72	41.38
No	81	46.55
Unsure	21	12.07
Specific Need *(Includes Multiple Needs)*		
Water	52	72.22
Unsure	25	34.72
Medical care	14	19.44
Medicine or medical supplies	13	18.06
Other	13	18.06
Mental health care	6	8.33
Transportation	5	6.94
Shelter	4	5.56
Food	4	5.56
Utilities	4	5.56

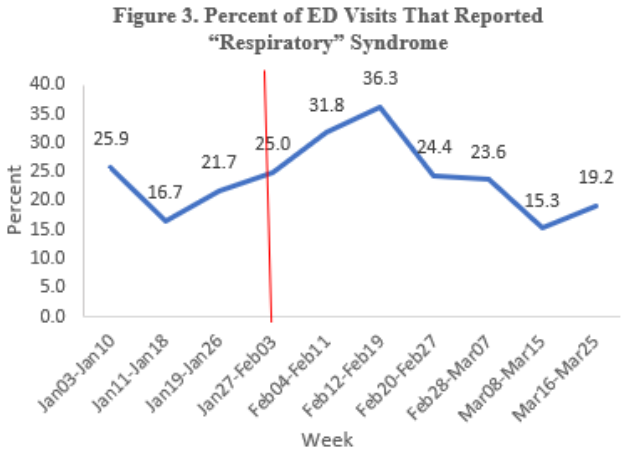
Syndromic Surveillance Findings

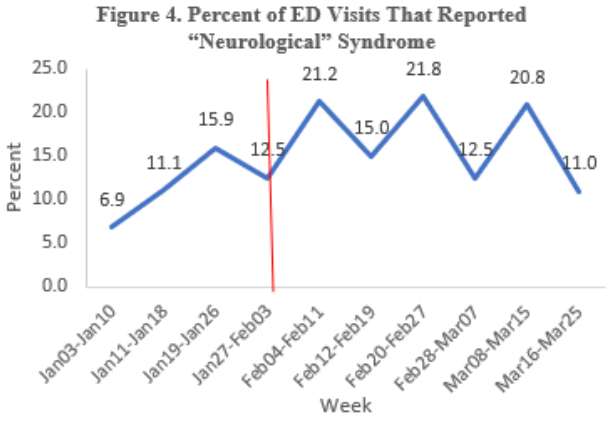
Trends in Syndrome Counts/Percentages

Figures 2-8 and Table B1 (Appendix) show the percentage of visits due to the various syndromes for residents of the combined zip codes 16115, 16120, and 16141. From February 4th - 11th, 10.6% of residents reported symptoms related to the "ENT" syndrome. This had steadily declined to 4.1% of visits between March 16th - 25th. The percent of visits due to symptoms related to the "Respiratory" syndrome increased from 16.7% during January 11th - 18th until February 12th - 19th when it comprised 36.3% of visits. The percentage of visits due to the "Rash" syndrome, and the "Nausea" syndrome fluctuated over the period between January 3rd - March 25th. The percentage of visits due to the "Neurological" syndrome fluctuated over the period from a low of 6.9% during January 3rd - 11th, to 21.2% during February 4th - 11th, to around 11.0% during March 16th - 25th.

Figures 2 – 8. Specific Syndromes for Combined Zip Codes 16115, 16120, 16141, January 3rd, 2023 – March 25th, 2023; Red vertical line represents the February 3 derailment







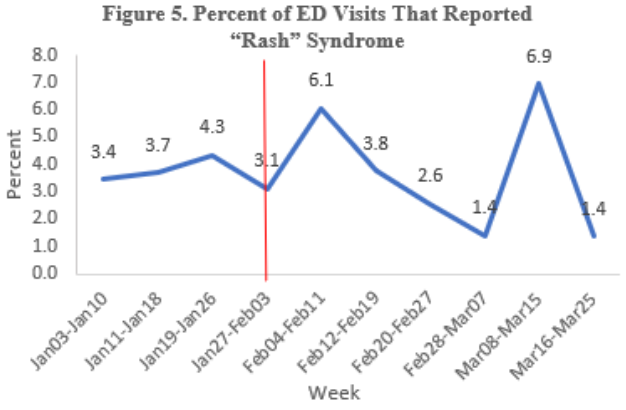


Figure 6. Percent of ED Visits That Reported "Nausea" Syndrome

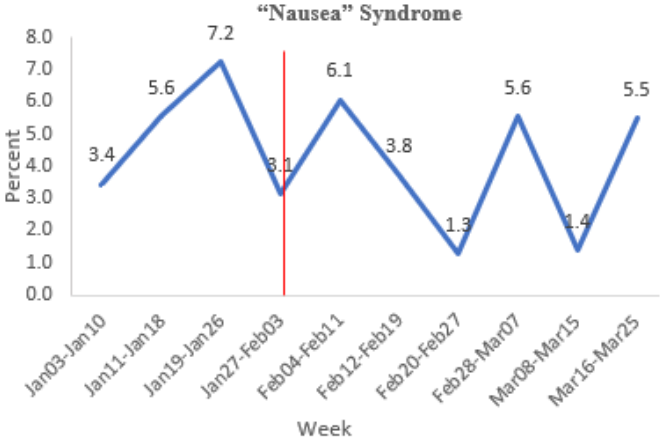


Figure 7. Percent of ED Visits That Reported "Headache" Syndrome

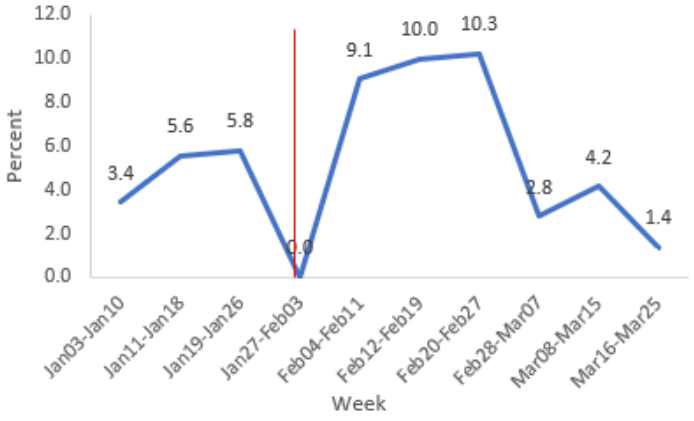
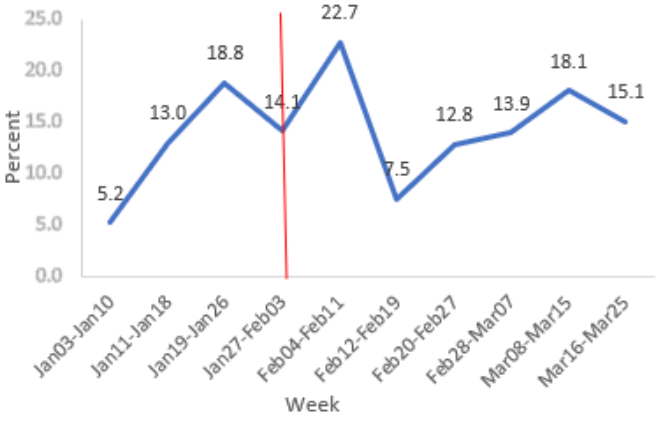


Figure 8. Percent of ED Visits That Reported "Mental" Syndrome



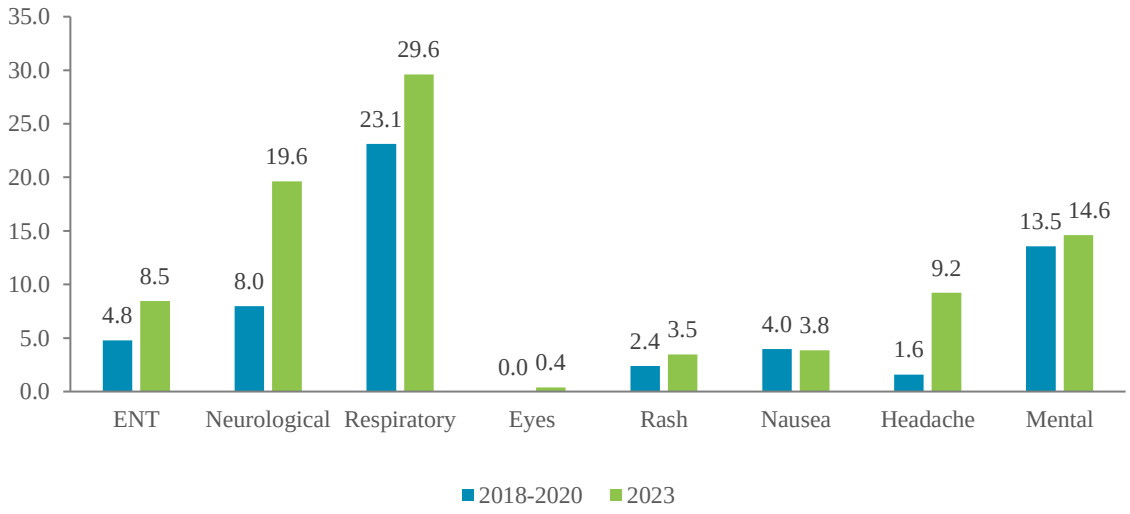
The percentage of visits due to the "Headache" syndrome, ranged between 9% to 10% during February 4th - 27th. Between March 16th - 25th, this had decreased to 1.4%. During January 3rd - 10th, 5.2% of visits were due to the "Mental" syndrome. Between February 4th - 11th, it had increased to 22.7% and then declined to 15.1% of visits during March 16th - 25th. After reviewing the reason for visit narratives, seven visits specifically mentioned the visit as being due to exposure to chemicals or having symptoms due to the train derailment.

Between February 3rd - March 4th, the total number of ED visits in 2023 (N=260) was slightly higher than the average total number of ED visits in 2018 - 2020 (N=251). The breakdown of this difference is as follows (Appendix, Table B2):

- There was no difference in the number of visits during February 4th - 10th (N=59).
- The number of visits was higher in 2023 than in 2018 - 2020 during February 11th - 17th (71 vs. 61) and February 18th - 24th (66 vs. 64).
- The number of visits was higher in 2018 - 2020 than in 2023 during February 25th - March 3rd (67 vs. 64).

- The percentages of reported syndromes were higher in 2023 than in 2018 - 2020 for the following: “ENT”: 8.5 vs. 4.8, “Neurological”: 19.6 vs. 8.0, “Respiratory”: 29.6 vs. 23.1, “Rash”: 3.5 vs. 2.4, “Headache”: 9.2 vs. 1.6, and “Mental”: 14.6 vs. 13.5. The percentage of “Nausea” was slightly higher in 2018 - 2020 than in 2023 (4.0 vs. 3.8) (Figure 9).

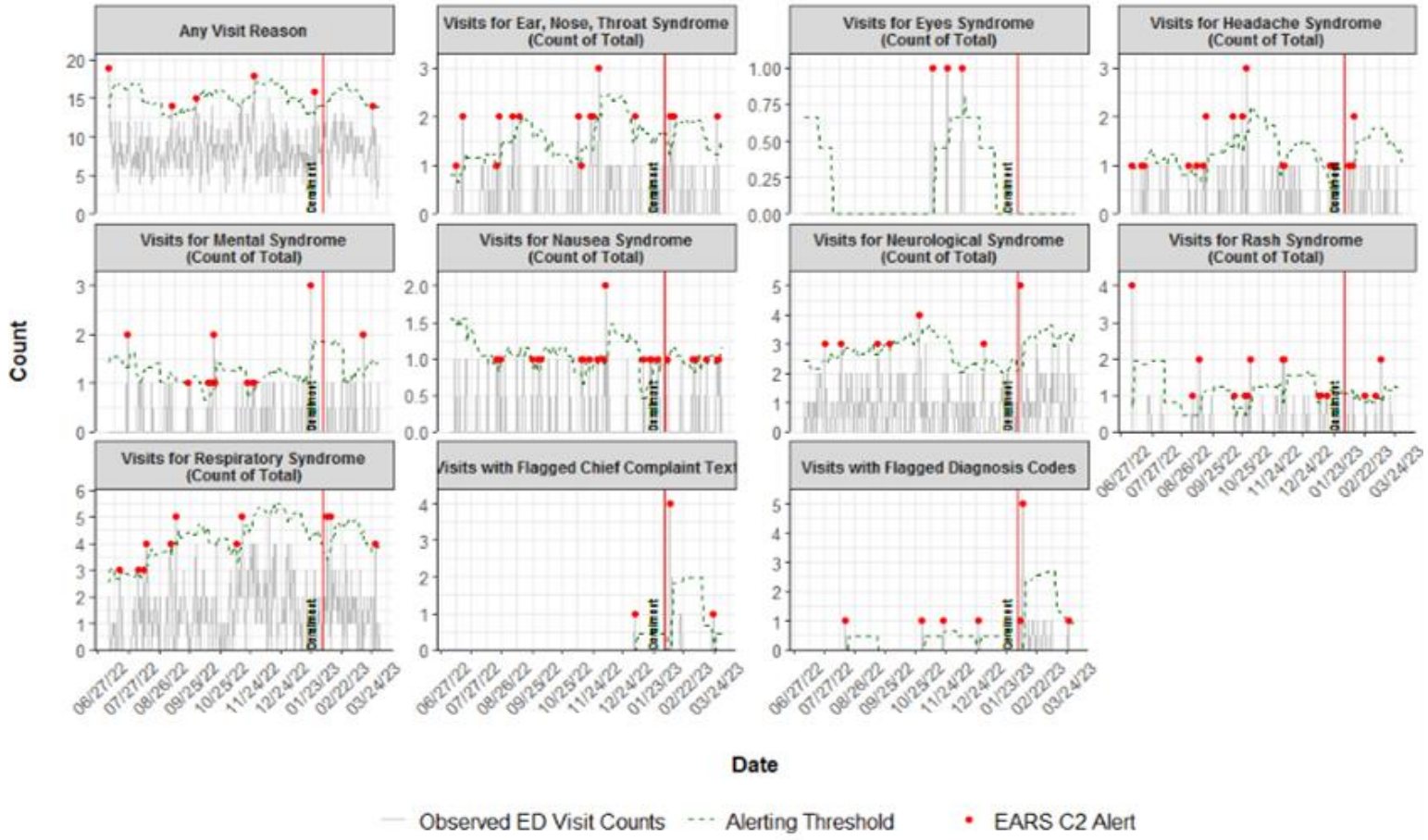
Figure 9. Percent of Reported Syndromes, Zip Codes 16115, 16120, 16141 Combined, Feb. 04 - Mar. 03, 2018-2020 vs. 2023



Syndrome Alerts

The daily analysis identified 28 individual EARS C2 alerts between February 4th and April 1st (Figure 10). Fifty percent of the daily alerts occurred within 10 days of the February 3rd derailment. All categories had at least one day with an alert with the exception of the "Eyes" syndrome category. The "Nausea" syndrome category had the most alerts in the daily analysis (N=7); however, all "Nausea" alerts occurred with an observed daily count value of one—in fact, 23/28 (82.1%) of all daily alerts occurred with <5 observed daily

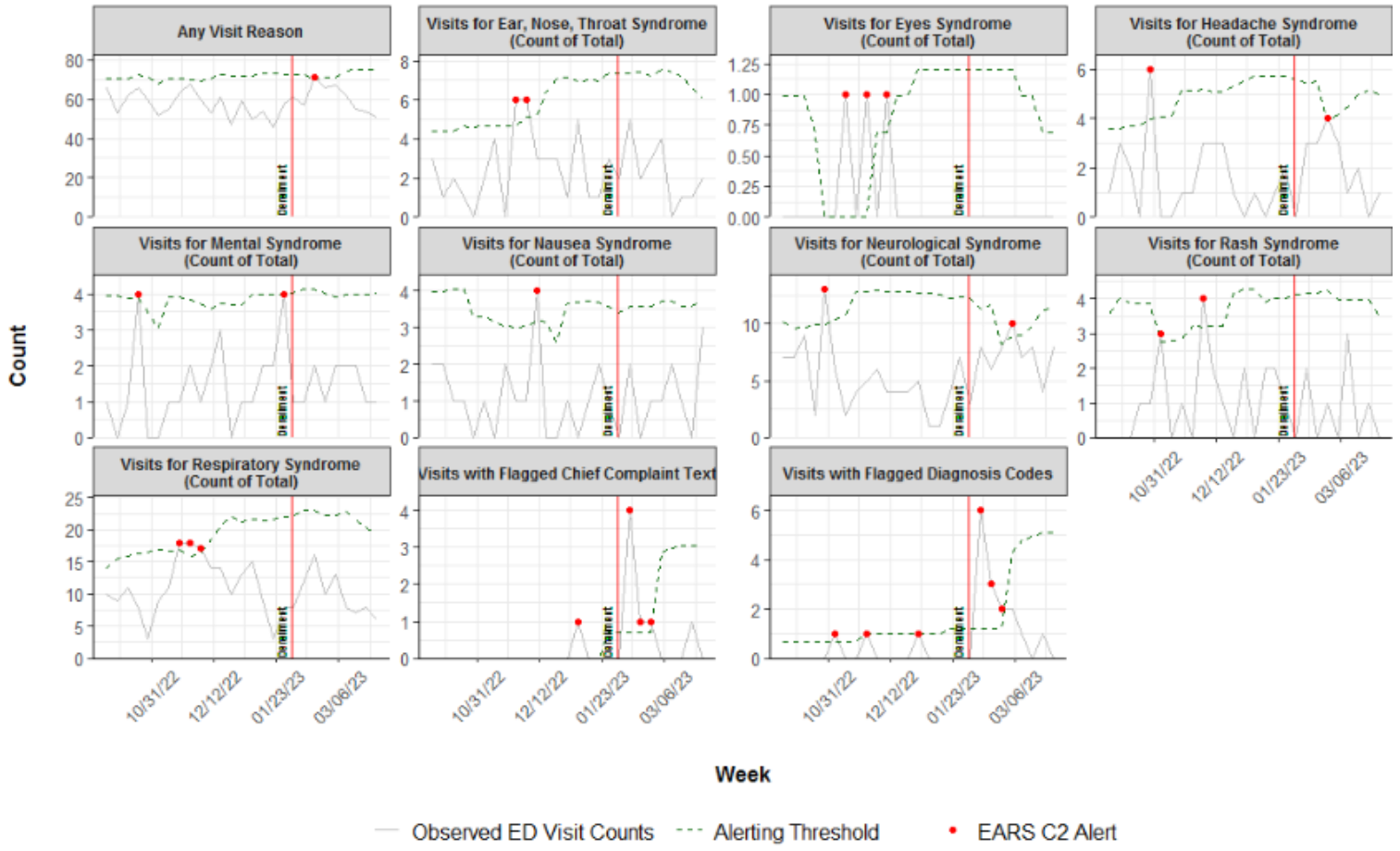
Figure 10. Daily Visit Counts for Combined Zip Codes (16115, 16120, 16141) by Syndrome Category – 07/07/2022 to 04/01/2023



visits. Overall, sparse visit counts in these three rural zip codes likely resulted in several false positive alerts using the EARS C2 algorithm when applied to daily time series data.

The weekly analysis identified nine individual EARS C2 alerts between February 4th and April 1st (Figure 11). Nearly all weekly alerts (88.9%) occurred within the first 3 weeks after the derailment. The earliest alerts following the derailment were associated with visits identified with chief complaint text referencing the derailment (N=2), specified ICD-10 CM diagnosis code (N=2), and total visits (N=1); all of these alerts occurred by the week ending 2/18/2023. The remaining alerts occurred during the week ending

Figure 11. Weekly Visit Counts for Combined Zip Codes (16115, 16120, 16141) by Syndrome Category – 10/01/2022 to 04/01/2022

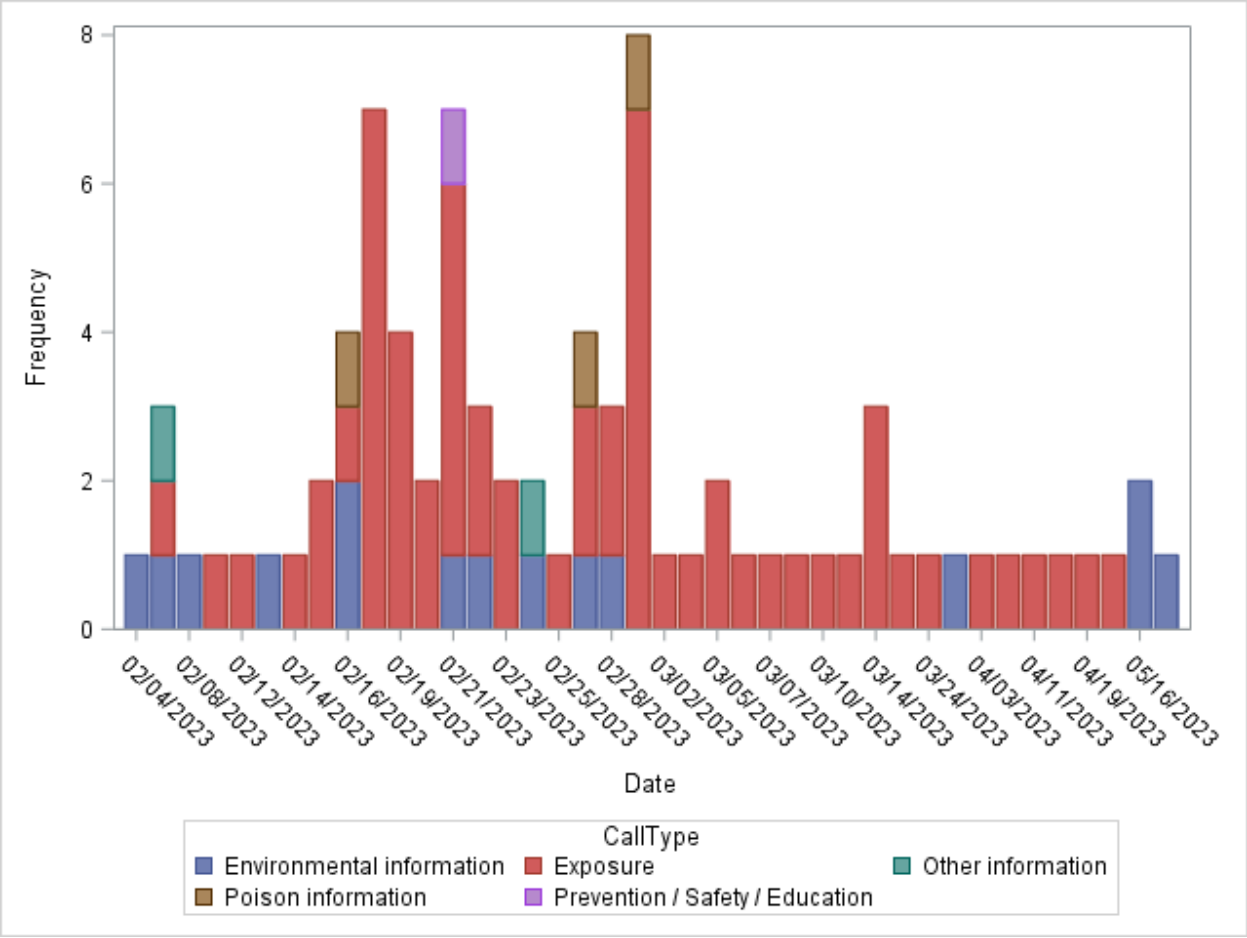


2/25/2023 (“Headache” syndrome category) and 3/4/2023 (“Neurological” syndrome category). While a smaller percentage of EARS C2 alerts were associated with small visit counts compared with the daily analysis, the majority of weekly EARS C2 alerts continued to be associated with visit counts <5 (66.7%).

Poison Control Center (PCC) Findings

Between February 4th and May 24th, PA residents placed a total of 82 calls to PCCs related to the East Palestine train derailment. Of these, 61 calls (74.4%) were classified as exposure calls, with 52 human and 9 animal exposures. The remaining calls were informational in nature. The majority of calls were placed between February 17th and March 1st. The number and type of calls received by date is depicted in Figure 12.

Figure 12. Number and Type of Call to PCCs by Date Received



Demographic Characteristics

Of the 52 human exposure calls, 44 related to exposures in individuals over the age of 20. There was a slight predominance in calls for females (57.7%). Calls came from 32 unique zip codes, with the majority of calls from 16115 (N=8) representing Darlington, 15010 (N=7) representing Beaver Falls, 16120 (N=7) representing Enon Valley, and 16157 (N=7) representing Wampum.

Exposure Characteristics

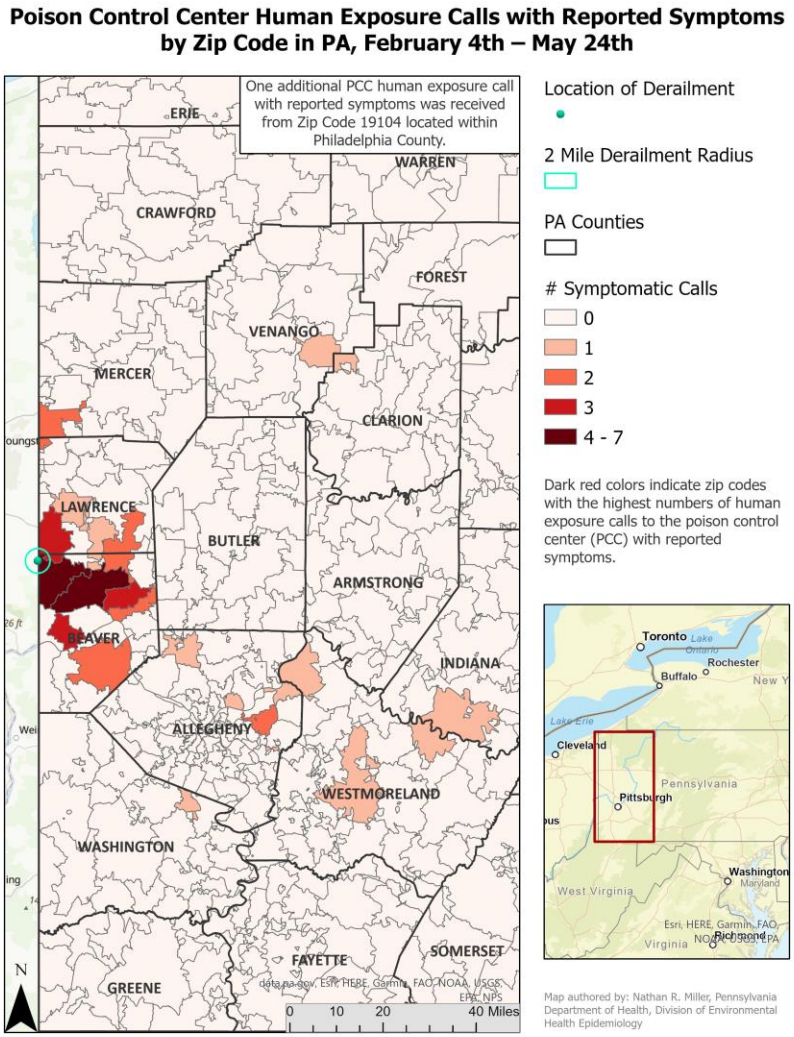
The most frequently identified exposure routes in human exposure calls was inhalation/nasal (92.1%), ingestion (9 calls, 17.3%), dermal exposure (4 calls, 7.7%), and unknown exposure (3 calls, 5.8%). Exposure routes were not mutually exclusive. The exposure site was most frequently identified as the individual's own residence (N=40), public area (N=5), workplace (N=4), and other (N=3).

Health Impact

Symptoms were reported in 47 of 52 human exposure calls (90.4%), with more than one symptom reported in 37 calls (71.2%). The median number of unique symptoms was 2, with total symptoms reported ranging from 0 to 6. The most frequently reported symptoms were headaches (N=14), cough/choke (N=13), and eye irritation/pain (N=12). The geographic distribution of symptomatic individuals is presented in Figure 13 (excluding calls where all reported symptoms were determined to be not related to the derailment). Darker color saturations indicate a higher number of symptomatic individuals per zip code. The highest number of symptomatic individuals resided in 16115, representing Darlington.

PCC clinical experts determined that reported symptoms were likely related to the derailment in only 11 human exposure calls (21.2%). In these 11 calls, the most commonly reported symptoms were labored breathing, eye irritation or pain, and throat irritation. The highest number of symptomatic individuals with symptoms determined to be related resided in 16115 (N=3), representing Darlington.

Figure 13. Poison Control Center Human Exposure Calls with Reported Symptoms by Zip Code in PA, February 4th – May 24th



Conclusion

Results from all three data sources indicate the presence of similar acute clinical effects in a similar geographic pattern. The analysis and concurrence of multiple data sources increases the reliability of findings.

In the two self-reported data sources, the ACE survey and PCC data, commonly reported symptoms were consistent, including headaches, eye and throat irritation, and respiratory symptoms such as labored breathing and coughing. Anxiety was the second most commonly reported symptom among ACE respondents; however, mental health symptoms are not captured in PCC data. Similarly, the greatest increases in reported syndromes between 2018-2020 and 2023 were in neurological syndromes, headaches, and respiratory syndromes. These symptoms are consistent with the known acute health effects of the hazardous materials involved in the derailment.

The geographic distribution of reported symptoms between data sources was also similar. The zip codes with the highest number of symptomatic individuals from the ACE survey included 16115, 16120, 16141, and 15010, representing Darlington, Enon Valley, New Galilee, and Beaver Falls, respectively. These zip codes are located within Lawrence and Beaver Counties. Similarly, 3 of the 11 PCC calls where symptoms were related to the derailment came from the zip code 16115.

Recommendations

Based on these findings, additional analyses and targeted follow-up are recommended to inform future emergency responses, confirm the resolution of apparent acute clinical effects from chemical exposures and identify long-term clinical effects in the affected residents. Given that ACE respondents indicated a preference for the use of television as their primary source of information in first hearing of the derailment and since the derailment, consideration should be made for future contact and data dissemination to include this communication channel.

Strengths & Limitations

ACE Survey Data

The ACE survey was made available for completion both in-person and via online self-administration. In-person administration captured those who may have lacked internet access in their homes or did not own a smartphone. Self-administration online allowed those who were unable to travel to the Health Resource Center to complete the survey where they were able to. The survey included both quantitative and qualitative components, covering a wide variety of topics, to gain comprehensive data on the residents' impacts from the derailment.

Self-reported survey data are subject to recall bias, particularly as the community ACE survey was not implemented until three weeks after the derailment. Additionally, the population that completed the survey may not be representative of the entire exposed local community and therefore results may not be generalizable. Surveys that were administered in-person with the

assistance of PA DOH staff may have been subject to interviewer bias, although standard training for all staff was conducted to mitigate this issue.

Due to the wording of some survey questions, temporal associations could not be established for multiple questions. For example, participants were asked if they experienced a new or worsening symptom since the event, but they were not asked when the symptoms began, the duration of symptoms, or the severity of symptoms. Additional medical comorbidities and medical history were not obtained and, therefore, could not be considered as potential confounders.

Syndromic Surveillance Data

Syndromic surveillance data are usually available within twelve hours of a healthcare encounter and contain information about presenting clinical symptoms/chief complaints for the visit, initial and final diagnoses (if available), and patient demographics. The application of computer algorithms to the free-text chief complaints field to develop syndrome classifications and generate public health alerts provides the ability to rapidly detect and monitor outbreaks of diseases or new health issues within communities.

There are a few limitations associated with the data. The free-text chief complaints field could include misspellings or abbreviations and is usually missing contextual information that provides a fuller understanding of the reason for the visit. There is also no uniform coding system for inputting the chief complaints information, and there is variability in how health facilities complete this field. Thus, the syndrome categories may be limited in their ability to capture all symptoms related to the health conditions they represent. Additionally, not all EDs in PA report ICD-10 codes, so some cases may be missed with the use of the ICD-10 codes. It is also not possible to identify any correlations between the changes in syndrome proportions observed and exposure to any chemicals/substances from the derailment site. Patients' residential addresses were used to identify the relevant zip codes. Residents of these zip codes who received care in facilities that do not report cases to the PA syndromic surveillance system would not be included. These data are a record of ED visits and do not represent unique patients. Therefore, individuals who receive ED care multiple times are counted more than once. Finally, the counts of ED visits to these zip codes are relatively small, so differences observed are likely to be unstable.

PCC Call Data

In addition to serving as direct healthcare service providers, PCCs also play a major role in public health surveillance. The PCC hotline serves as a broad sentinel, with 24-hour availability and expert clinical staff.

Self-reported PCC calls are subject to recall bias. PCC data do not capture mental health symptoms and, therefore, do not accurately depict a full picture of clinical effects. Reporting practices and expert opinions may differ between clinicians and centers. Additional medical comorbidities were not obtained and, therefore, could not be considered as potential confounders. A lack of data regarding the time and duration of potential exposure and symptoms due to self-reporting did not allow for temporal associations to be established.

References

Makwana N. (2019). Disaster and its impact on mental health: A narrative review. *Journal of family medicine and primary care*, *8*(10), 3090–3095. https://doi.org/10.4103/jfmpc.jfmpc_893_19

Appendix A: Community ACE Survey Questions

individual

Main Section

Record ID _____

Interviewer name _____

Interview date _____
(YYYY-MM-DD)

Interview start time _____

Consent

Confirm you are speaking with an adult; if speaking with a minor, obtain both minor assent and parent/guardian consent (see fields below).

The Pennsylvania Department of Health is doing this survey to find out about the health of people who may have been exposed to hazardous substances from the train derailment that occurred on February 3rd, 2023.

We are being assisted by the United States Department of Health and Human Services.

This interview will take approximately 30 minutes to complete. We will ask you questions about:

- Where you were when the train derailment happened.
- How you heard about the evacuation.
- If you evacuated.
- Your health status after the train derailment.
- Medical care you received.

We are not aware of a risk to you in answering the questions; however, some questions are personal and ask about sickness. We are asking you to take part in this survey because you live or work in the area of the incident. Participation in the interview is optional. You can stop the interview at any time. You can also refuse to answer any question. If you refuse, it will not affect any government benefits that you receive.

What you tell us will help us better learn how incidents affect people's health. The Pennsylvania Department of Health may also use what we learn to help your community. We may also learn how to better prepare for future disasters. There is no compensation or other direct benefit from being in the survey.

Names and addresses, and other identifying information, of people who take part in the survey will not be used in any report or made public. If you provide us with your mailing address, we can provide you with a copy of your completed survey.

Everything we learn will be kept private to the fullest extent of the law. Only project team members will be allowed to view this information.

If you have any questions about this investigation, you can call the federal Assessment of Chemical Exposure (ACE) Program at (404) 567-3256.

If there is any part of this form that is not clear to you, please be sure to ask about it.

Mar 28, 2023 5:43:23 PM

Do you agree to take part in the interview?

- ◯ Yes
- ◯ No

Is the participant a minor?

- ◯ Yes
- ◯ No

Does the parent/legal guardian give their permission for the participant (minor) to take part in this survey?

- ◯ Yes
- ◯ No

Do we have permission to contact you again in the future if we can provide you information or services or to gain more detailed information from you? You are still eligible to take part in this survey if you say no to future contact.

- ◯ Yes
- ◯ No

Do you want a copy of the completed survey?

(Print at completion of survey if printer is available; otherwise, advise respondent that the completed survey will be mailed from the Department of Health Central Office in Harrisburg. We will send ASAP but please allow 10 business days.)

- ◯ Yes
- ◯ No

Contact Information

First name _____

Last name _____

Date of birth _____
(YYYY-MM-DD)

Home address STREET _____

Home address CITY _____

Home address STATE _____

Home address ZIPCODE _____

What is the best telephone number to reach you in case we have questions about your survey? _____

Mar 28, 2023 5:43:23 PM

Email address _____

(e.g. user@site.com)

Demographics

Race (check all that apply)

- ☐ White
- ☐ Black
- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Native Hawaiian or Pacific Islander
- ☐ Other
- ☐ Prefer not to answer

Other (specify) _____

Ethnicity

- ◯ Hispanic or Latino
- ◯ Not Hispanic or Latino
- ◯ Prefer not to answer

Gender

- ◯ Male
- ◯ Female
- ◯ Prefer not to answer
- ◯ Other

Are you currently pregnant?

- ◯ Yes
- ◯ No
- ◯ Unsure
- ◯ Prefer not to answer

Location/Exposure and Communications

SHOW 2-MILE AREA ON MAP (yellow circle)

road map

satellite imagery

Mar 28, 2023 5:43:23 PM

Were you in the yellow-circled area on the map between Friday, February 3, 2023 at 9 p.m. and Wednesday, February 8 at 7 p.m.?

- ◯ Yes
- ◯ No
- ◯ Unsure

Reason for being in the area

- ☐ First responder
- ☐ Resident within the 1-mile evacuation zone
- ☐ Resident outside the 1-mile evacuation zone
- ☐ Passerby
- ☐ Clean-up worker or volunteer
- ☐ Government Official
- ☐ Individual working, receiving services such as healthcare, daycare, shopping or other within the evacuation zone
- ☐ Other

Other (specify) _____

SHOW 1-MILE AREA ON MAP (red circle)

road map

satellite map

Were you in the red-circled area on the map between Friday, February 3, 2023 at 9 p.m. and Wednesday, February 8 at 7 p.m.?

- ◯ Yes
- ◯ No
- ◯ Unsure

Mar 28, 2023 5:43:23 PM

Reason for being in the area (check all that apply)

- ☐ First responder
- ☐ Resident within the 1-mile evacuation zone
- ☐ Resident outside the 1-mile evacuation zone
- ☐ Passerby
- ☐ Clean-up worker or volunteer
- ☐ Government Official
- ☐ Individual working, receiving services such as healthcare, daycare, shopping or other within the evacuation zone
- ☐ Other

Other (specify) _____

Physical location where you spent the most time between Friday, February 3rd, 2023 and Wednesday, February 8th

- ◯ Inside Building
- ◯ Outside
- ◯ Inside a car/vehicle
- ◯ I left the area
- ◯ Other

Other (specify) _____

Address or landmark where you spent the most time _____

How long were you in that physical location?

- ◯ Less than 1 hour
- ◯ 1 hour to 4 hours
- ◯ 5 hours to 11 hours
- ◯ 12 hours to 23 hours
- ◯ 24 hours to 47 hours
- ◯ 48 hours to 71 hours (2-3 days)
- ◯ 72 hours to 94 hours (3-4 days)
- ◯ 95 hours to 120 hours (4-5 days)
- ◯ Greater than 120 hours

Were you asked to evacuate from your residence or work location during the event?

- ◯ Yes
- ◯ No
- ◯ Unsure

Mar 28, 2023 5:43:23 PM

For health information purposes only, did you evacuate as asked?

- ◯ Yes
- ◯ No
- ◯ Unsure
- ◯ Prefer not to answer

About what day and time did you evacuate?

Date evacuated _____ (YYYY-MM-DD)

Time evacuated _____

Address or landmark where you evacuated to _____

How did you first learn about the incident?

- ◯ Directly from person in authority (i.e. police, firefighter, Hazmat official, supervisor)
- ◯ TV
- ◯ Radio/Two-way radio
- ◯ Newspaper
- ◯ Relative/friend/neighbor/coworker
- ◯ Website
- ◯ Social Media
- ◯ Reverse 911 call
- ◯ Phone call
- ◯ Text message on a cell phone
- ◯ Email
- ◯ Community Meeting
- ◯ Other

Other (specify) _____

Mar 28, 2023 5:43:23 PM

How have you received most of your information since the incident?

- ◯ Directly from person in authority (i.e. police, firefighter, Hazmat official, supervisor)
- ◯ TV
- ◯ Radio/Two-way radio
- ◯ Newspaper
- ◯ Relative/friend/neighbor/coworker
- ◯ Website
- ◯ Social Media
- ◯ Community Meeting
- ◯ Other

Other (specify) _____

Did you come in contact with any of the following? (check all that apply)

- ☐ Smoke
- ☐ Dust
- ☐ Debris
- ☐ Unsure
- ☐ Other
- ☐ None of the above

Other (specify) _____

Did you smell an odor?

- ◯ Yes
- ◯ No
- ◯ Unsure

Can you describe the odor? (check all that apply)

- ☐ Gasoline
- ☐ Rotten eggs
- ☐ Chemical smell
- ☐ Paint or Paint thinner
- ☐ Bug Spray
- ☐ Smoke
- ☐ Sewage
- ☐ Sweet
- ☐ Other

Mar 28, 2023 5:43:23 PM

Other (specify) _____

Would you describe the odor as

- ◯ Very Light
- ◯ Light
- ◯ Moderate
- ◯ Strong
- ◯ Very Strong

What is the water supply to the home?

- ◯ Municipal
- ◯ Well
- ◯ Other

Other (specify) _____

Have you noticed any impacts on your drinking water (e.g., taste, color, odor, other)?

- ◯ Yes
- ◯ No
- ◯ Unsure

Please describe any impacts to water quality _____

Health Status

Since the event have you experienced worsening of a pre-existing or a new onset of any of the following symptoms:

Symptoms related to EYES

- ◯ Yes
- ◯ No
- ◯ Unsure

Please check the symptoms that apply

- ☐ Increased watering/tearing
- ☐ Irritation/pain/burning in eyes
- ☐ Blurred or double vision
- ☐ Bleeding in eyes
- ☐ Other

Other (specify) _____

Mar 28, 2023 5:43:23 PM

Symptoms related to EARS, NOSE, THROAT

- ◯ Yes
- ◯ No
- ◯ Unsure

Please check the symptoms that apply

- ☐ Runny nose
- ☐ Burning nose or throat
- ☐ Nose bleeds
- ☐ Hoarseness
- ☐ Increased salivation
- ☐ Ringing in ears (tinnitus)
- ☐ Difficulty swallowing
- ☐ Swollen neck
- ☐ Pain in neck
- ☐ Odor on breath
- ☐ Stuffy nose/sinus congestion
- ☐ Increased congestion or phlegm (mucus)
- ☐ Other

Other (specify) _____

Symptoms related to NERVOUS SYSTEM (e.g. headache, dizziness)

- ◯ Yes
- ◯ No
- ◯ Unsure

Please check the symptoms that apply

- ☐ Headache
- ☐ Dizziness or lightheadedness
- ☐ Loss of consciousness/fainting
- ☐ New difficulty buttoning/unbuttoning clothing
- ☐ Other

Other (specify) _____

Symptoms related to HEART, LUNGS

- ◯ Yes
- ◯ No
- ◯ Unsure

Mar 28, 2023 5:43:23 PM

Please check the symptoms that apply

- [ ] Asthma
- [ ] Breathing slow
- [ ] Breathing fast
- [ ] Difficulty breathing/feeling out-of-breath
- [ ] Coughing
- [ ] Wheezing in chest
- [ ] Slow heart rate/pulse
- [ ] Fast heart rate/pulse
- [ ] Chest tightness or pain/angina
- [ ] Bronchitis
- [ ] Burning lungs
- [ ] Other

Other (specify) _____

Symptoms related to SKIN

- ◯ Yes
- ◯ No
- ◯ Unsure

Please check the symptoms that apply

- [ ] Irritation, pain, or burning of skin
- [ ] Skin rash
- [ ] Hives
- [ ] Skin blisters
- [ ] Dry or itchy skin
- [ ] Sweating
- [ ] Cool or pale skin
- [ ] Skin discoloration
- [ ] Poor wound healing
- [ ] Petechia/pinpoint round spots
- [ ] Blue coloring of ends of fingers/toes or lips
- [ ] Lips turning blue
- [ ] Abrasion/scrape
- [ ] Bruise
- [ ] Other

Other (specify) _____

Mar 28, 2023 5:43:23 PM

Symptoms related to MENTAL HEALTH

- ◯ Yes
- ◯ No
- ◯ Unsure

Please check the symptoms that apply

- ☐ Anxiety
- ☐ Agitation/irritability
- ☐ Feeling hopeless or helpless
- ☐ Fatigue/tiredness
- ☐ Difficulty sleeping (falling asleep and staying asleep)
- ☐ Unexplained fear
- ☐ Tension or nervousness
- ☐ Other

Other (specify) _____

Any other symptoms _____

Medical Care Received

What is the highest level of healthcare you received because of the event?

- ◯ You were hospitalized.
- ◯ You were seen in an emergency department, urgent care, or outpatient care.
- ◯ You consulted a healthcare provider via phone/video conferencing.
- ◯ You self-treated.
- ◯ No healthcare needed.

When did you receive medical care because of the event? (check all that apply)

- ☐ Less than 24 hours following the event
- ☐ 1 - 2 days following the event
- ☐ 3 - 5 days following the event
- ☐ 6 days or longer following the event

Needs

Mar 28, 2023 5:43:23 PM

As a result of the incident, do you or your household need any of the following? (check all that apply)

- ☐ Medicine or medical supplies
- ☐ Medical care
- ☐ Mental health care
- ☐ Water
- ☐ Shelter
- ☐ Food
- ☐ Utilities
- ☐ Transportation
- ☐ Other
- ☐ Unsure

Other (specify) _____

Gardens, Pets, Livestock and Crops

In the next sections we will ask you questions about your gardens, pets, livestock and crops.

Gardens

Do you usually plant a vegetable or herb garden?

- ◯ Yes
- ◯ No
- ◯ Unsure

Do you plan to plant a vegetable or herb garden this year?

- ◯ Yes
- ◯ No
- ◯ Unsure

If you are not planting this year or are unsure if you will plant, what are your reasons for not planting? _____

Pets

Now we would like to ask about any pets you may have. We will ask about livestock in a later section.

SHOW 2-MILE AREA ON MAP (yellow circle)

Road Map

Mar 28, 2023 5:43:23 PM

Satellite Map

Do you have any pets (dogs, cats, birds, fish, reptiles) that were in the circled area on the map between Friday, February 3, 2023 at 9 p.m. and Wednesday, February 8 at 7 p.m.?

- ◯ Yes
- ◯ No
- ◯ Unsure

Which of the following types of pets do you own, foster or board?

- ☐ Dogs
- ☐ Cats
- ☐ Birds
- ☐ Fish
- ☐ Reptiles
- ☐ Other

Please specify other pet types. _____

Dogs

How many **DOGS** do you have? _____

Where are they housed?

- ◯ Indoor
- ◯ Outdoor
- ◯ Combined
- ◯ Unknown
- ◯ Other

Specify other: _____

Cats

How many **CATS** do you have? _____

Where are they housed?

- ◯ Indoor
- ◯ Outdoor
- ◯ Combined
- ◯ Unknown
- ◯ Other

Mar 28, 2023 5:43:23 PM

Specify other: _____

Birds

How many **BIRDS** do you have? _____

Where are they housed?

- ◯ Indoor
- ◯ Outdoor
- ◯ Combined
- ◯ Unknown
- ◯ Other

Specify other: _____

Fish

How many FISH do you have? _____

Where are they housed?

- ◯ Indoor
- ◯ Outdoor
- ◯ Combined
- ◯ Unknown
- ◯ Other

Specify other: _____

Reptiles

How many **REPTILES** do you have? _____

Where are they housed?

- ◯ Indoor
- ◯ Outdoor
- ◯ Combined
- ◯ Unknown
- ◯ Other

Mar 28, 2023 5:43:23 PM

Specify other: _____

Other Pets

How many other pets do you have? _____

Where are they housed?

- ◯ Indoor
- ◯ Outdoor
- ◯ Combined
- ◯ Unknown
- ◯ Other

Specify other: _____

Pet Evacuation

Did you evacuate any of your pets from their normal location because of the incident?

- ◯ Yes
- ◯ No
- ◯ Unsure

Which pets did you evacuate?

- ☐ Dogs
- ☐ Cats
- ☐ Birds
- ☐ Fish
- ☐ Reptiles
- ☐ Other

Specify other: _____

Symptomatic Pets

Since the event has your pet (or pets) had worsening of a pre-existing or a new onset of any symptoms?

- ◯ Yes
- ◯ No
- ◯ Unsure

Mar 28, 2023 5:43:23 PM

What type of pet has shown symptoms?

- ☐ Dogs
- ☐ Cats
- ☐ Birds
- ☐ Fish
- ☐ Reptiles
- ☐ Other

Specify other: _____

Symptomatic Dogs

How many of your DOG(s) showed symptoms? _____

Which of the following symptoms have you seen in your DOG (s)?

- ☐ Difficulty breathing
- ☐ Coughing
- ☐ Sneezing
- ☐ Eye or nose discharge
- ☐ Lethargy or lack of energy
- ☐ Inappetence or decreased eating
- ☐ Vomiting
- ☐ Diarrhea
- ☐ Other

Specify other symptom(s): _____

Symptomatic Cats

How many of your CAT(s) showed symptoms? _____

Which of the following symptoms have you seen in your CAT (s)?

- ☐ Difficulty breathing
- ☐ Coughing
- ☐ Sneezing
- ☐ Eye or nose discharge
- ☐ Lethargy or lack of energy
- ☐ Inappetence or decreased eating
- ☐ Vomiting
- ☐ Diarrhea
- ☐ Other

Specify other symptom(s): _____

Symptomatic Birds

How many of your BIRD(s) showed symptoms? _____

Which of the following symptoms have you seen in your BIRD(s)?

- ☐ Difficulty breathing
- ☐ Coughing
- ☐ Sneezing
- ☐ Eye or nose discharge
- ☐ Lethargy or lack of energy
- ☐ Inappetence or decreased eating
- ☐ Vomiting
- ☐ Diarrhea
- ☐ Other

Specify other symptom(s): _____

Symptomatic Fish

How many of your FISH showed symptoms? _____

Mar 28, 2023 5:43:23 PM

What symptoms have you seen in your FISH?

- ☐ Difficulty breathing
- ☐ Coughing
- ☐ Sneezing
- ☐ Eye or nose discharge
- ☐ Lethargy or lack of energy
- ☐ Inappetence or decreased eating
- ☐ Vomiting
- ☐ Diarrhea
- ☐ Other

Specify other symptom(s): _____

Symptomatic Reptiles

How many of your REPTILE(s) showed symptoms? _____

Which of the following symptoms have you seen in your REPTILE(s)?

- ☐ Difficulty breathing
- ☐ Coughing
- ☐ Sneezing
- ☐ Eye or nose discharge
- ☐ Lethargy or lack of energy
- ☐ Inappetence or decreased eating
- ☐ Vomiting
- ☐ Diarrhea
- ☐ Other

Specify other symptom(s): _____

Other Symptomatic Pets

How many of your other pets showed symptoms? _____

Mar 28, 2023 5:43:23 PM

Which of the following symptoms have you seen in your other pets?

- ☐ Difficulty breathing
- ☐ Coughing
- ☐ Sneezing
- ☐ Eye or nose discharge
- ☐ Lethargy or lack of energy
- ☐ Inappetence or decreased eating
- ☐ Vomiting
- ☐ Diarrhea
- ☐ Other

Specify other symptom(s): _____

Pets Seen By Veterinarian

Were any of your pets examined by a veterinarian after the incident?

- ◯ Yes
- ◯ No
- ◯ Unsure

Which of your pets were seen by the veterinarian?

- ☐ Dogs
- ☐ Cats
- ☐ Birds
- ☐ Fish
- ☐ Reptiles
- ☐ Other

Specify other: _____

Deceased Pets

Have any of your pets died since February 3rd?

- ◯ Yes
- ◯ No
- ◯ Unsure

Mar 28, 2023 5:43:23 PM

Which of your pets died?

- ☐ Dogs
- ☐ Cats
- ☐ Birds
- ☐ Fish
- ☐ Reptiles
- ☐ Other

Specify other: _____

Deceased Dogs

How many DOG(s) died since February 3rd? _____

How did they die? _____

Deceased Cats

How many CAT(s) died since February 3rd? _____

How did they die? _____

Deceased Birds

How many BIRD(s) died since February 3rd? _____

How did they die? _____

Deceased Fish

How many FISH died since February 3rd? _____

How did they die? _____

Deceased Reptiles

How many REPTILE(s) died since February 3rd? _____

How did they die? _____

Mar 28, 2023 5:43:23 PM

Other Deceased Pet

How many other pets died since February 3rd? _____

How did they die? _____

Livestock

Now we would like to ask about any livestock you may have.

SHOW 2-MILE AREA ON MAP (yellow circle)

Road Map

Satellite Map

Do you have any livestock (cattle, horses, sheep, goats, pigs, poultry/chickens) that were in the circled area on the map between Friday, February 3, 2023 at 9pm and Wednesday February 8 at 7pm?

- ◯ Yes
- ◯ No
- ◯ Unsure

Which of the following livestock do you own?

- ☐ Beef cattle
- ☐ Dairy cattle
- ☐ Horses
- ☐ Sheep
- ☐ Goats
- ☐ Pigs
- ☐ Poultry/chicken
- ☐ Other

Specify other: _____

Beef Cattle

How many BEEF CATTLE do you have? _____

Mar 28, 2023 5:43:23 PM

Where are they housed?

- ◯ Indoor
- ◯ Outdoor
- ◯ Combined
- ◯ Unknown
- ◯ Other

Specify other: _____

Dairy Cattle

How many DAIRY CATTLE do you have? _____

Where are they housed?

- ◯ Indoor
- ◯ Outdoor
- ◯ Combined
- ◯ Unknown
- ◯ Other

Specify other: _____

Horses

How many HORSES do you have? _____

Where are they housed?

- ◯ Indoor
- ◯ Outdoor
- ◯ Combined
- ◯ Unknown
- ◯ Other

Specify other: _____

Sheep

How many SHEEP do you have? _____

Where are they housed?

- ◯ Indoor
- ◯ Outdoor
- ◯ Combined
- ◯ Unknown
- ◯ Other

Specify other: _____

Goats

How many GOATS do you have? _____

Where are they housed?

- ◯ Indoor
- ◯ Outdoor
- ◯ Combined
- ◯ Unknown
- ◯ Other

Specify other: _____

Pigs

How many PIGS do you have? _____

Where are they housed?

- ◯ Indoor
- ◯ Outdoor
- ◯ Combined
- ◯ Unknown
- ◯ Other

Specify other: _____

Poultry/Chickens

How many POULTRY/CHICKENS do you have? _____

Where are they housed?

- ◯ Indoor
- ◯ Outdoor
- ◯ Combined
- ◯ Unknown
- ◯ Other

Specify other: _____

Other Livestock

How many other livestock do you have? _____

Where are they housed?

- ◯ Indoor
- ◯ Outdoor
- ◯ Combined
- ◯ Unknown
- ◯ Other

Specify other: _____

Livestock Evacuation

Did you evacuate any of your livestock from their normal location because of the incident?

- ◯ Yes
- ◯ No
- ◯ Unsure

Which of the following livestock did you evacuate?

- ☐ Beef cattle
- ☐ Dairy cattle
- ☐ Horses
- ☐ Sheep
- ☐ Goats
- ☐ Pigs
- ☐ Poultry/chicken
- ☐ Other

Specify other: _____

Mar 28, 2023 5:43:23 PM

Symptomatic Livestock

Since the event has your livestock had worsening of a pre-existing or a new onset of any symptoms?

- ◯ Yes
- ◯ No
- ◯ Unsure

What type of livestock has shown symptoms?

- ☐ Beef cattle
- ☐ Dairy cattle
- ☐ Horses
- ☐ Sheep
- ☐ Goats
- ☐ Pigs
- ☐ Poultry/chicken
- ☐ Other

Specify other: _____

Symptomatic Beef Cattle

How many of your BEEF CATTLE showed symptoms? _____

Which of the following symptoms have you seen in your BEEF CATTLE?

- ☐ Difficulty breathing
- ☐ Coughing
- ☐ Sneezing
- ☐ Eye or nose discharge
- ☐ Lethargy or lack of energy
- ☐ Inappetence or decreased eating
- ☐ Vomiting
- ☐ Diarrhea
- ☐ Other

Specify other: _____

Symptomatic Dairy Cattle

How many of your DAIRY CATTLE showed symptoms? _____

Mar 28, 2023 5:43:23 PM

Which of the following symptoms have you seen in your DIARY CATTLE?

- ☐ Difficulty breathing
- ☐ Coughing
- ☐ Sneezing
- ☐ Eye or nose discharge
- ☐ Lethargy or lack of energy
- ☐ Inappetence or decreased eating
- ☐ Vomiting
- ☐ Diarrhea
- ☐ Other

Specify other: _____

Symptomatic Horses

How many of your HORSES showed symptoms? _____

Which of the following symptoms have you seen in your HORSES?

- ☐ Difficulty breathing
- ☐ Coughing
- ☐ Sneezing
- ☐ Eye or nose discharge
- ☐ Lethargy or lack of energy
- ☐ Inappetence or decreased eating
- ☐ Vomiting
- ☐ Diarrhea
- ☐ Other

Specify other: _____

Symptomatic Sheep

How many of your SHEEP showed symptoms? _____

Mar 28, 2023 5:43:23 PM

Which of the following symptoms have you seen in your SHEEP?

- ☐ Difficulty breathing
- ☐ Coughing
- ☐ Sneezing
- ☐ Eye or nose discharge
- ☐ Lethargy or lack of energy
- ☐ Inappetence or decreased eating
- ☐ Vomiting
- ☐ Diarrhea
- ☐ Other

Specify other: _____

Symptomatic Goats

How many of your GOATS showed symptoms? _____

Which of the following symptoms have you seen in your GOATS?

- ☐ Difficulty breathing
- ☐ Coughing
- ☐ Sneezing
- ☐ Eye or nose discharge
- ☐ Lethargy or lack of energy
- ☐ Inappetence or decreased eating
- ☐ Vomiting
- ☐ Diarrhea
- ☐ Other

Specify other: _____

Symptomatic Pigs

How many of your PIGS showed symptoms? _____

Mar 28, 2023 5:43:23 PM

Which of the following symptoms have you seen in your PIGS?

- ☐ Difficulty breathing
- ☐ Coughing
- ☐ Sneezing
- ☐ Eye or nose discharge
- ☐ Lethargy or lack of energy
- ☐ Inappetence or decreased eating
- ☐ Vomiting
- ☐ Diarrhea
- ☐ Other

Specify other: _____

Symptomatic Poultry/Chickens

How many of your POULTRY/CHICKENS showed symptoms? _____

Which of the following symptoms have you seen in your POULTRY/CHICKENS?

- ☐ Difficulty breathing
- ☐ Coughing
- ☐ Sneezing
- ☐ Eye or nose discharge
- ☐ Lethargy or lack of energy
- ☐ Inappetence or decreased eating
- ☐ Vomiting
- ☐ Diarrhea
- ☐ Other

Specify other: _____

Other Symptomatic Livestock

How many of your OTHER livestock showed symptoms? _____

Mar 28, 2023 5:43:23 PM

Which of the following symptoms have you seen in your OTHER livestock?

- ☐ Difficulty breathing
- ☐ Coughing
- ☐ Sneezing
- ☐ Eye or nose discharge
- ☐ Lethargy or lack of energy
- ☐ Inappetence or decreased eating
- ☐ Vomiting
- ☐ Diarrhea
- ☐ Other

Specify other: _____

Livestock Seen By Veterinarian

Were any of your livestock examined by a veterinarian after the incident?

- ◯ Yes
- ◯ No
- ◯ Unsure

Which of your livestock was seen by a veterinarian?

- ☐ Beef cattle
- ☐ Dairy cattle
- ☐ Horses
- ☐ Sheep
- ☐ Goats
- ☐ Pigs
- ☐ Poultry/chicken
- ☐ Other

Specify other: _____

Deceased Livestock

Have any of your livestock died after the date of the incident on February 3rd?

- ◯ Yes
- ◯ No
- ◯ Unsure

Mar 28, 2023 5:43:23 PM

Which of your livestock died?

- ☐ Beef cattle
- ☐ Dairy cattle
- ☐ Horses
- ☐ Sheep
- ☐ Goats
- ☐ Pigs
- ☐ Poultry/chicken
- ☐ Other

Specify other: _____

Deceased Beef Cattle

How many BEEF CATTLE died since February 3rd? _____

How did they die? _____

Deceased Dairy Cattle

How many DAIRY CATTLE died since February 3rd? _____

How did they die? _____

Deceased Horses

How many HORSES died since February 3rd? _____

How did they die? _____

Deceased Sheep

How many SHEEP died since February 3rd? _____

How did they die? _____

Deceased Goats

How many GOATS died since February 3rd? _____

Mar 28, 2023 5:43:23 PM

How did they die? _____

Deceased Pigs

How many PIGS died since February 3rd? _____

How did they die? _____

Deceased Poultry/Chicken

How many POULTRY/CHICKENS died since February 3rd? _____

How did they die? _____

Other Deceased Livestock

How many OTHER livestock died since February 3rd? _____

How did they die? _____

Crops/Horticulture

Now we would like to ask you about any crops you might grow.

Do you raise crops?

- ◯ Yes
- ◯ No
- ◯ Unsure

Mar 28, 2023 5:43:23 PM

What crops do you raise?

- ☐ Hay
- ☐ Corn
- ☐ Oats
- ☐ Soybeans
- ☐ Wheat
- ☐ Apples
- ☐ Peaches
- ☐ Tobacco
- ☐ Pumpkins
- ☐ Barley
- ☐ Beans
- ☐ Rye
- ☐ Mushrooms
- ☐ Other

Specify other: _____

What do you use your crops for?

- ☐ Sale to public
- ☐ Household consumption
- ☐ Animal feed
- ☐ Composting
- ☐ None
- ☐ Other

Specify other use: _____

Do you have any concerns about your crops?

- ◯ Yes
- ◯ No
- ◯ Unsure

What concerns do you have about your crops? _____

Other Information

We have some final questions for you asking about your experiences, concerns and needs.

Mar 28, 2023 5:43:23 PM

Do you believe that you were exposed to hazardous substances?

- ◯ Yes
- ◯ No
- ◯ Unsure

Please specify exposure

- ☐ Air
- ☐ Water
- ☐ Soil
- ☐ Other

Other (specify) _____

We previously asked you about your household needs following the train derailment, are there any additional needs that you would like to share at this time? _____

What are your current concerns following the train derailment? _____

Is there information that you would like to receive or wish you had received about the train derailment response? _____

Based on your experience and observations, are there specific public health activities that should have been done following the train derailment? A public health activity is something that could improve or protect the overall health of your community. _____

Based on your experiences and observations what activities or organizations have been helpful in responding to the train derailment? _____

Is there anything else you want to tell us related to the train derailment incident or resulting community needs? _____

End of Survey

This ends the survey. We would like to sincerely thank you for taking the time to answer these questions. We understand that this has been a difficult time for you and others in this community. Thank you again.

Interview end time _____

Mar 28, 2023 5:43:23 PM

Administrative

Does the participant have a healthcare provider?

- ◯ Yes
- ◯ No

Did assessment result in a referral?

- ◯ Yes
- ◯ No

Was a copy of the completed survey printed and provided to the respondent at the time of survey completion?

- ◯ Yes
- ◯ No

Was a copy of the completed survey printed and mailed?

- ◯ Yes
- ◯ No

Specify referrals (check all that apply)

- ☐ Primary care provider
- ☐ FQHC
- ☐ Mental health services
- ☐ Toxicologist
- ☐ Other

Other (specify) _____

Mar 28, 2023 5:43:23 PM

Appendix B: Additional Tables & Figures

Table B1. Syndrome Counts for Zip Codes 16115, 16120, 16141 Combined																
Date	**Total Visits**	**Ear, Nose, Throat**		**Neurological**		**Respiratory**		**Eyes**		**Rash**		**Nausea**		**Headache**		**Mental**	
	N=	**N=**	**%**	**N=**	**%**	**N=**	**%**	**N=**	**%**	**N=**	**%**	**N=**	**%**	**N=**	**%**	**N=**	**%**
Jan03-Jan10	58	5	8.6	4	6.9	15	25.9	0	0.0	2	3.4	2	3.4	2	3.4	3	5.2
Jan11-Jan18	54	1	1.9	6	11.1	9	16.7	0	0.0	2	3.7	3	5.6	3	5.6	7	13.0
Jan19-Jan26	69	5	7.2	11	15.9	15	21.7	1	1.4	3	4.3	5	7.2	4	5.8	13	18.8
Jan27-Feb03	64	4	6.3	8	12.5	16	25.0	0	0.0	2	3.1	2	3.1	0	0.0	9	14.1
Feb04-Feb11	66	7	10.6	14	21.2	21	31.8	0	0.0	4	6.1	4	6.1	6	9.1	15	22.7
Feb12-Feb19	80	7	8.8	12	15.0	29	36.3	0	0.0	3	3.8	3	3.8	8	10.0	6	7.5
Feb20-Feb27	78	6	7.7	17	21.8	19	24.4	1	1.3	2	2.6	1	1.3	8	10.3	10	12.8
Feb28-Mar07	72	3	4.2	9	12.5	17	23.6	0	0.0	1	1.4	4	5.6	2	2.8	10	13.9
Mar08-Mar15	72	3	4.2	15	20.8	11	15.3	0	0.0	5	6.9	1	1.4	3	4.2	13	18.1
Mar16-Mar25	73	3	4.1	8	11.0	14	19.2	0	0.0	1	1.4	4	5.5	1	1.4	11	15.1

Table B2. Syndrome Counts, Zip Codes 16115, 16120, 16141 Combined (Feb. 04 – Mar. 03, 2018-2020 vs. 2023)																	
Year	**Week**	**Average Total Visits**	**Ear, Nose, Throat**		**Neurological**		**Respiratory**		**Eyes**		**Rash**		**Nausea**		**Headache**		**Mental**	
			N=	**%**	**N=**	**%**	**N=**	**%**	**N=**	**%**	**N=**	**%**	**N=**	**%**	**N=**	**%**	**N=**	**%**
2018-2020	Feb04-10	59	3	5.1	5	8.5	12	20.3	0	0.0	2	3.4	2	3.4	1	1.7	8	13.6
	Feb11-17	61	3	4.9	6	9.8	16	26.2	0	0.0	2	3.3	2	3.3	1	1.6	8	13.1
	Feb18-24	64	2	3.1	4	6.3	14	21.9	0	0.0	1	1.6	2	3.1	1	1.6	10	15.6
	Feb25-Mar03	67	4	6.0	5	7.5	16	23.9	0	0.0	1	1.5	4	6.0	1	1.5	8	11.9
	Feb04-Mar03	251 (total)	12	4.8	20	8.0	58	23.1	0	0.0	6	2.4	10	4.0	4	1.6	34	13.5
2023	Feb04-10	59	7	11.9	14	23.7	20	33.9	0	0.0	3	5.1	4	6.8	6	10.2	14	23.7

	Feb11-17	71	5	7.0	9	12.7	23	32.4	0	0.0	3	4.2	2	2.8	6	8.5	7	9.9
	Feb18-24	66	4	6.1	14	21.2	16	24.2	0	0.0	3	4.5	2	3.0	7	10.6	6	9.1
	Feb25-Mar03	64	6	9.4	14	21.9	18	28.1	1	1.6	0	0.0	2	3.1	5	7.8	11	17.2
	Feb04-Mar03	260 (total)	22	8.5	51	19.6	77	29.6	1	0.4	9	3.5	10	3.8	24	9.2	38	14.6

Table B3. Syndrome Counts by Date, Individual Zip Codes 16115, 16120, 16141

		Total Visits	Ear, Nose, Throat		Neurological		Respiratory		Eyes		Rash		Nausea		Headache		Mental	
Zip Code	Date	N=	N=	%	N=	%	N=	%	N=	%	N=	%	N=	%	N=	%	N=	%
	Jan03-Jan10	25	3	12.0	1	4.0	8	32.0	0	0.0	1	4.0	1	4.0	0	0.0	2	8.0
	Jan11-Jan18	24	0	0.0	3	12.5	3	12.5	0	0.0	0	0.0	2	8.3	1	4.2	4	16.7
	Jan19-Jan26	25	0	0.0	3	12.0	4	16.0	0	0.0	2	8.0	2	8.0	2	8.0	5	20.0
	Jan27-Feb03	22	0	0.0	2	9.1	4	18.2	0	0.0	1	4.5	1	4.5	0	0.0	2	9.1
	Feb04-Feb11	23	4	17.4	7	30.4	10	43.5	0	0.0	2	8.7	3	13.0	4	17.4	3	13.0
	Feb12-Feb19	41	3	7.3	7	17.1	16	39.0	0	0.0	0	0.0	1	2.4	4	9.8	4	9.8
	Feb20-Feb27	33	1	3.0	7	21.2	7	21.2	0	0.0	1	3.0	0	0.0	3	9.1	3	9.1
	Feb28-Mar07	32	1	3.1	3	9.4	9	28.1	0	0.0	1	3.1	3	9.4	0	0.0	4	12.5
	Mar08-Mar15	24	1	4.2	6	25.0	4	16.7	0	0.0	4	16.7	0	0.0	2	8.3	7	29.2
16115	Mar16-Mar25	26	2	7.7	3	11.5	9	34.6	0	0.0	1	3.8	1	3.8	0	0.0	6	23.1
	Jan03-Jan10	15	0	0.0	1	6.7	3	20.0	0	0.0	0	0.0	0	0.0	1	6.7	1	6.7
	Jan11-Jan18	13	1	7.7	0	0.0	3	23.1	0	0.0	0	0.0	1	7.7	0	0.0	0	0.0
	Jan19-Jan26	18	4	22.2	5	27.8	6	33.3	1	5.6	1	5.6	1	5.6	2	11.1	2	11.1
	Jan27-Feb03	17	2	11.8	2	11.8	6	35.3	0	0.0	1	5.9	0	0.0	0	0.0	1	5.9
	Feb04-Feb11	24	2	8.3	5	20.8	8	33.3	0	0.0	1	4.2	1	4.2	2	8.3	3	12.5
	Feb12-Feb19	25	4	16.0	3	12.0	9	36.0	0	0.0	2	8.0	2	8.0	2	8.0	1	4.0
	Feb20-Feb27	20	2	10.0	6	30.0	6	30.0	0	0.0	1	5.0	1	5.0	4	20.0	3	15.0
16120	Feb28-Mar07	24	1	4.2	4	16.7	4	16.7	0	0.0	0	0.0	1	4.2	2	8.3	1	4.2

	Mar08-Mar15	22	0	0.0	5	22.7	2	9.1	0	0.0	0	0.0	0	0.0	1	4.5	1	4.5
	Mar16-Mar25	30	0	0.0	4	13.3	3	10.0	0	0.0	0	0.0	2	6.7	1	3.3	3	10.0
	Jan03-Jan10	18	2	11.1	2	11.1	4	22.2	0	0.0	1	5.6	1	5.6	1	5.6	0	0.0
	Jan11-Jan18	17	0	0.0	3	17.6	3	17.6	0	0.0	2	11.8	0	0.0	2	11.8	3	17.6
	Jan19-Jan26	26	1	3.8	3	11.5	5	19.2	0	0.0	0	0.0	2	7.7	0	0.0	6	23.1
	Jan27-Feb03	25	2	8.0	4	16.0	6	24.0	0	0.0	0	0.0	1	4.0	0	0.0	6	24.0
	Feb04-Feb11	19	1	5.3	2	10.5	3	15.8	0	0.0	1	5.3	0	0.0	0	0.0	9	47.4
	Feb12-Feb19	14	0	0.0	2	14.3	4	28.6	0	0.0	1	7.1	0	0.0	2	14.3	1	7.1
	Feb20-Feb27	25	3	12.0	4	16.0	6	24.0	1	4.0	0	0.0	0	0.0	1	4.0	4	16.0
	Feb28-Mar07	16	1	6.3	2	12.5	4	25.0	0	0.0	0	0.0	0	0.0	0	0.0	5	31.3
	Mar08-Mar15	26	2	7.7	4	15.4	5	19.2	0	0.0	1	3.8	1	3.8	0	0.0	5	19.2
16141	Mar16-Mar25	17	1	5.9	1	5.9	2	11.8	0	0.0	0	0.0	1	5.9	0	0.0	2	11.8

Table B4. EARS C2 alerts (30-day baseline) on/after 2/3/2023, by Syndrome Category and Date

ED Visit Date	Category	Count	Threshold
2/5/2023	Nausea	1	0.937659
2/6/2023	Flagged Diagnosis Codes	1	0
2/6/2023	Headache	1	0.937659
2/6/2023	Nausea	1	0.937659
2/6/2023	Neurological	5	2.118612
2/8/2023	Ear, Nose, Throat	2	1.234089
2/8/2023	Flagged Chief Complaint Text	4	0
2/8/2023	Flagged Diagnosis Codes	5	0
2/8/2023	Headache	1	0.937659
2/8/2023	Respiratory	5	3.370603
2/10/2023	Headache	1	0.937659
2/12/2023	Ear, Nose, Throat	2	1.605083
2/12/2023	Headache	2	1.048467
2/12/2023	Respiratory	5	4.101882
2/23/2023	Rash	1	0.809835
3/3/2023	Nausea	1	0.809835
3/5/2023	Nausea	1	0.809835
3/5/2023	Rash	1	0.809835
3/11/2023	Rash	2	0.809835
3/16/2023	Mental	2	1.234089
3/16/2023	Nausea	1	0.937659
3/23/2023	Flagged Chief Complaint Text	1	0.458064
3/25/2023	Flagged Diagnosis Codes	1	0.937659
3/25/2023	Total Visits	14	13.95073
3/27/2023	Ear, Nose, Throat	2	1.234089
3/27/2023	Nausea	1	0.937659
3/27/2023	Respiratory	4	3.755144
3/28/2023	Nausea	1	0.937659

Table B5. EARS C2 alerts (14-week baseline) on/after 2/3/2023, by Syndrome Category and Date

Week Ending	Category	Count	Threshold
2/11/2023	Flagged Chief Complaint Text	4	0.693171193
2/11/2023	Flagged Diagnosis Codes	6	1.204880264
2/18/2023	Flagged Chief Complaint Text	1	0.693171193
2/18/2023	Flagged Diagnosis Codes	3	1.204880264
2/18/2023	Total Visits	71	70.70973185
2/25/2023	Flagged Chief Complaint Text	1	0.693171193
2/25/2023	Flagged Diagnosis Codes	2	1.204880264
2/25/2023	Headache	4	3.858450919
3/4/2023	Neurological	10	8.871623804

Table B6. EARS C2 alerts (30-day baseline) on/after 2/3/2023, by Zip code, Syndrome Category and Date

ED Visit Date	Zip code	Category	Count	Threshold
2/4/2023	16120	Respiratory	2	1.845721603
2/4/2023	16120	Total Visits	5	4.92991199
2/5/2023	16115	Nausea	1	0.458064402

Table B6. EARS C2 alerts (30-day baseline) on/after 2/3/2023, by Zip code, Syndrome Category and Date				
ED Visit Date	Zip code	Category	Count	Threshold
2/6/2023	16115	Ear, Nose, Throat	1	0.916128805
2/6/2023	16115	Flagged Diagnosis Codes	1	0
2/6/2023	16115	Headache	1	0.656880039
2/6/2023	16115	Nausea	1	0.458064402
2/6/2023	16115	Neurological	2	1.146446954
2/6/2023	16115	Rash	1	0.656880039
2/6/2023	16115	Respiratory	2	1.544556752
2/6/2023	16115	Total Visits	8	7.198566222
2/6/2023	16120	Neurological	3	1.146446954
2/7/2023	16141	Neurological	1	0.937658581
2/8/2023	16115	Ear, Nose, Throat	1	0
2/8/2023	16115	Respiratory	2	1.146446954
2/8/2023	16120	Ear, Nose, Throat	1	0.937658581
2/8/2023	16120	Flagged Chief Complaint Text	4	0
2/8/2023	16120	Flagged Diagnosis Codes	5	0
2/8/2023	16120	Headache	1	0.656880039
2/8/2023	16120	Respiratory	2	1.969504715
2/8/2023	16120	Total Visits	6	5.350589028
2/9/2023	16120	Ear, Nose, Throat	1	0.937658581
2/10/2023	16115	Ear, Nose, Throat	1	0.458064402
2/10/2023	16115	Headache	1	0.809835216
2/11/2023	16141	Rash	1	0.656880039
2/12/2023	16115	Headache	1	0.809835216
2/12/2023	16120	Ear, Nose, Throat	2	1.146446954
2/12/2023	16120	Headache	1	0.656880039
2/12/2023	16120	Mental	1	0
2/12/2023	16120	Respiratory	3	2.165590943
2/14/2023	16115	Flagged Diagnosis Codes	1	0.458064402
2/14/2023	16115	Respiratory	2	1.797249406
2/15/2023	16115	Total Visits	8	7.84909767
2/17/2023	16115	Flagged Diagnosis Codes	1	0.656880039
2/18/2023	16115	Flagged Chief Complaint Text	1	0
2/18/2023	16115	Flagged Diagnosis Codes	1	0.656880039
2/19/2023	16115	Ear, Nose, Throat	1	0.809835216
2/19/2023	16115	Flagged Chief Complaint Text	1	0
2/19/2023	16115	Flagged Diagnosis Codes	1	0.656880039
2/19/2023	16115	Nausea	1	0.656880039
2/19/2023	16115	Respiratory	3	2.118612362
2/22/2023	16141	Headache	1	0
2/22/2023	16141	Neurological	1	0.809835216
2/23/2023	16115	Rash	1	0.656880039
2/23/2023	16120	Headache	1	0.656880039
2/23/2023	16120	Total Visits	7	6.432444636
2/23/2023	16141	Neurological	1	0.809835216
2/25/2023	16120	Headache	1	0.656880039
2/25/2023	16141	Ear, Nose, Throat	1	0.656880039
2/26/2023	16120	Headache	1	0.809835216
2/26/2023	16141	Ear, Nose, Throat	1	0.458064402
2/26/2023	16141	Respiratory	2	1.384291202
2/28/2023	16120	Headache	1	0.937658581
2/28/2023	16141	Flagged Diagnosis Codes	1	0
2/28/2023	16141	Mental	1	0.656880039
3/1/2023	16115	Ear, Nose, Throat	1	0.937658581

Table B6. EARS C2 alerts (30-day baseline) on/after 2/3/2023, by Zip code, Syndrome Category and Date

ED Visit Date	Zip code	Category	Count	Threshold
3/2/2023	16115	Mental	1	0.656880039
3/3/2023	16115	Nausea	1	0.809835216
3/3/2023	16115	Neurological	2	1.710296476
3/4/2023	16141	Ear, Nose, Throat	1	0.809835216
3/5/2023	16115	Mental	1	0.656880039
3/5/2023	16115	Rash	1	0.656880039
3/5/2023	16120	Nausea	1	0
3/8/2023	16120	Neurological	2	1.969504715
3/8/2023	16141	Flagged Diagnosis Codes	1	0.458064402
3/8/2023	16141	Mental	1	0.809835216
3/9/2023	16141	Nausea	1	0
3/9/2023	16141	Respiratory	2	1.605083215
3/11/2023	16115	Rash	1	0.656880039
3/11/2023	16141	Rash	1	0.458064402
3/15/2023	16120	Neurological	2	1.710296476
3/15/2023	16141	Ear, Nose, Throat	1	0.809835216
3/15/2023	16141	Respiratory	2	1.744213151
3/16/2023	16115	Mental	1	0.809835216
3/16/2023	16120	Mental	1	0.458064402
3/16/2023	16120	Nausea	1	0.458064402
3/20/2023	16115	Rash	1	0.809835216
3/22/2023	16115	Mental	1	0.809835216
3/23/2023	16115	Ear, Nose, Throat	1	0.656880039
3/23/2023	16141	Flagged Chief Complaint Text	1	0
3/25/2023	16120	Total Visits	7	6.373201964
3/25/2023	16141	Flagged Diagnosis Codes	1	0.656880039
3/26/2023	16141	Headache	1	0.458064402
3/26/2023	16141	Neurological	2	1.384291202
3/27/2023	16115	Ear, Nose, Throat	1	0.656880039
3/27/2023	16115	Nausea	1	0.458064402
3/27/2023	16115	Respiratory	3	2.412734713
3/27/2023	16115	Total Visits	8	6.877526839
3/27/2023	16141	Ear, Nose, Throat	1	0.937658581
3/28/2023	16115	Nausea	1	0.458064402
3/30/2023	16120	Mental	1	0.458064402
3/30/2023	16120	Nausea	1	0.656880039
3/31/2023	16141	Neurological	2	1.605083215

Table B7. EARS C2 alerts (14-week baseline) on/after 2/3/2023, by Zip code, Syndrome Category and Date

Week Ending	Zip code	Category	Count	Threshold
2/4/2023	16141	Total Visits	25	21.79613606
2/11/2023	16115	Flagged Diagnosis Codes	1	0
2/11/2023	16115	Headache	2	1.931871785
2/11/2023	16115	Nausea	2	1.931871785
2/11/2023	16120	Flagged Chief Complaint Text	4	0.693171193
2/11/2023	16120	Flagged Diagnosis Codes	5	0.693171193
2/18/2023	16115	Flagged Chief Complaint Text	1	0
2/18/2023	16115	Flagged Diagnosis Codes	3	0
2/18/2023	16120	Mental	1	0.987639013
2/25/2023	16115	Flagged Chief Complaint Text	1	0

Table B7. EARS C2 alerts (14-week baseline) on/after 2/3/2023, by Zip code, Syndrome Category and Date				
Week Ending	Zip code	Category	Count	Threshold
2/25/2023	16115	Flagged Diagnosis Codes	1	0
2/25/2023	16120	Flagged Diagnosis Codes	1	0.693171193
2/25/2023	16120	Headache	2	1.623273407
3/4/2023	16115	Flagged Diagnosis Codes	1	0.693171193
3/4/2023	16120	Headache	2	1.70708264
3/4/2023	16141	Flagged Diagnosis Codes	1	0.693171193
3/4/2023	16141	Neurological	3	2.626912183
3/11/2023	16141	Flagged Diagnosis Codes	1	0.693171193
3/25/2023	16141	Flagged Chief Complaint Text	1	0
3/25/2023	16141	Flagged Diagnosis Codes	1	0.987639013
4/1/2023	16115	Nausea	2	1.931871785
4/1/2023	16120	Mental	1	0.987639013
4/1/2023	16141	Neurological	5	3.35117146

Figure B1. Daily time series, visit counts for individual zip codes (16115, 16120, 16141)

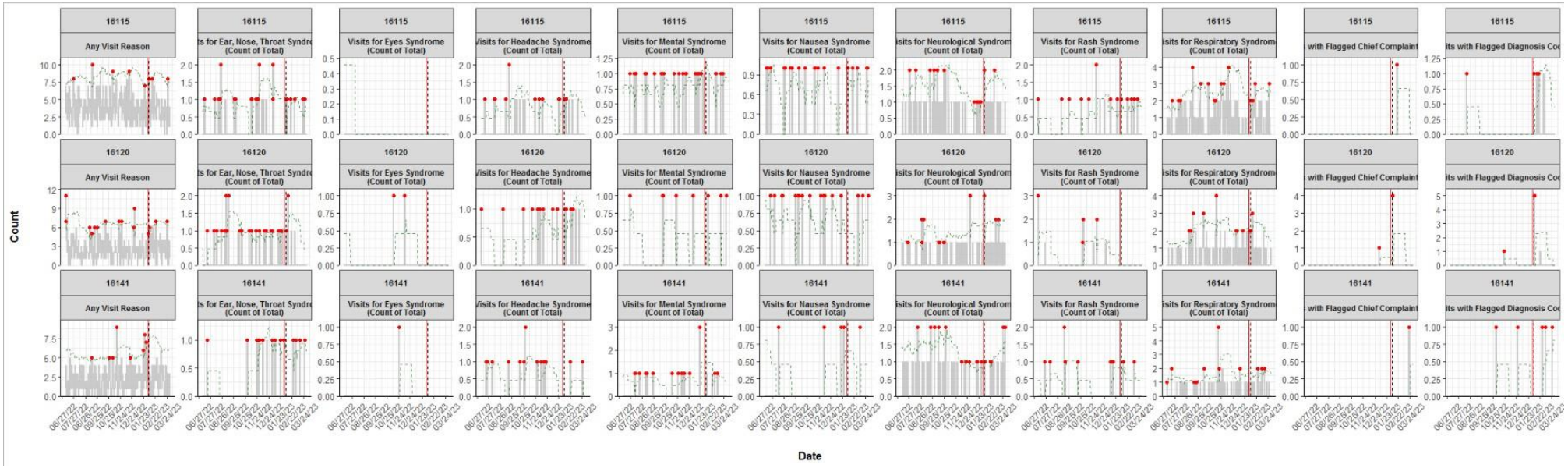
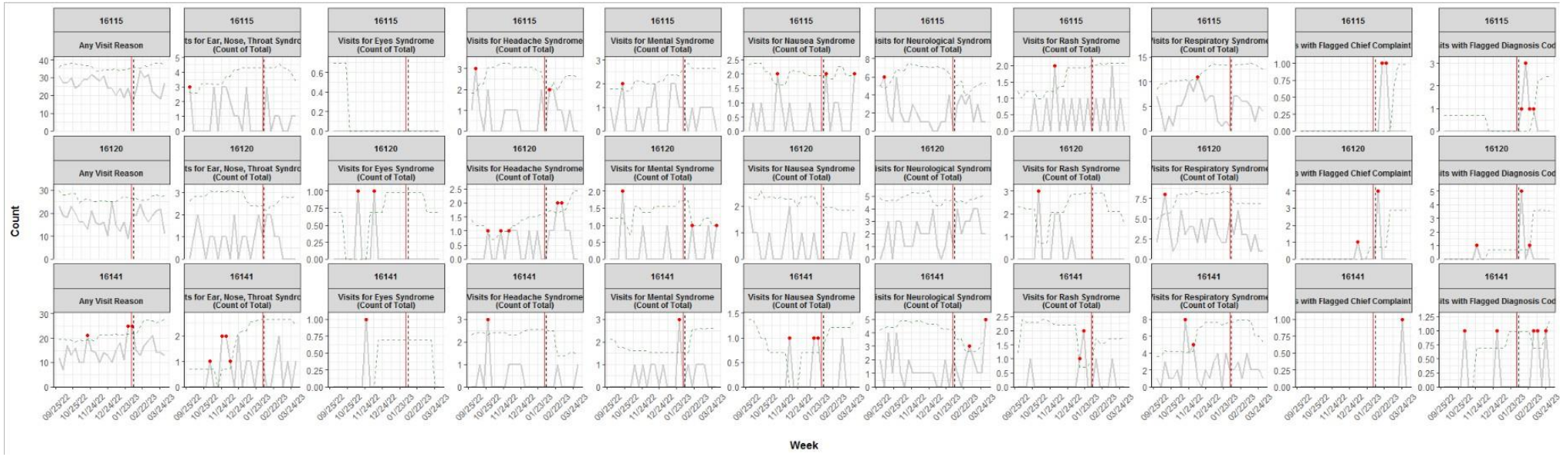
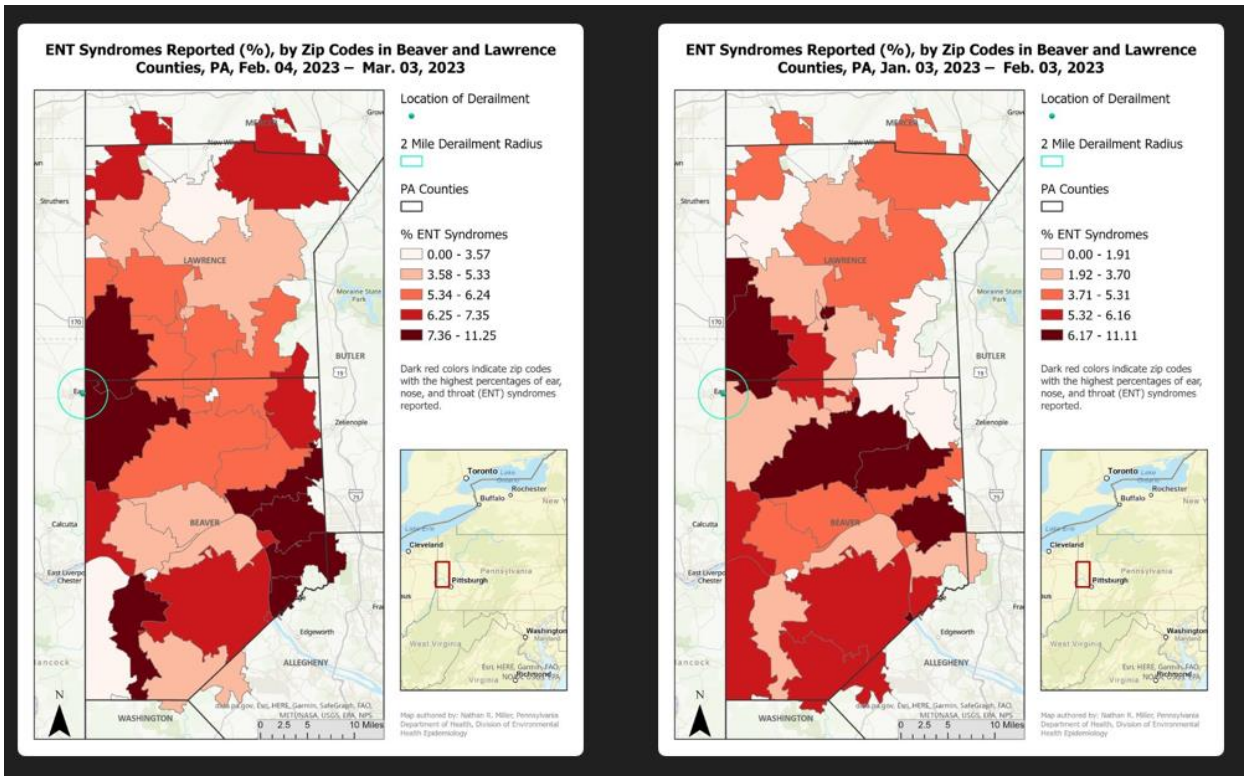
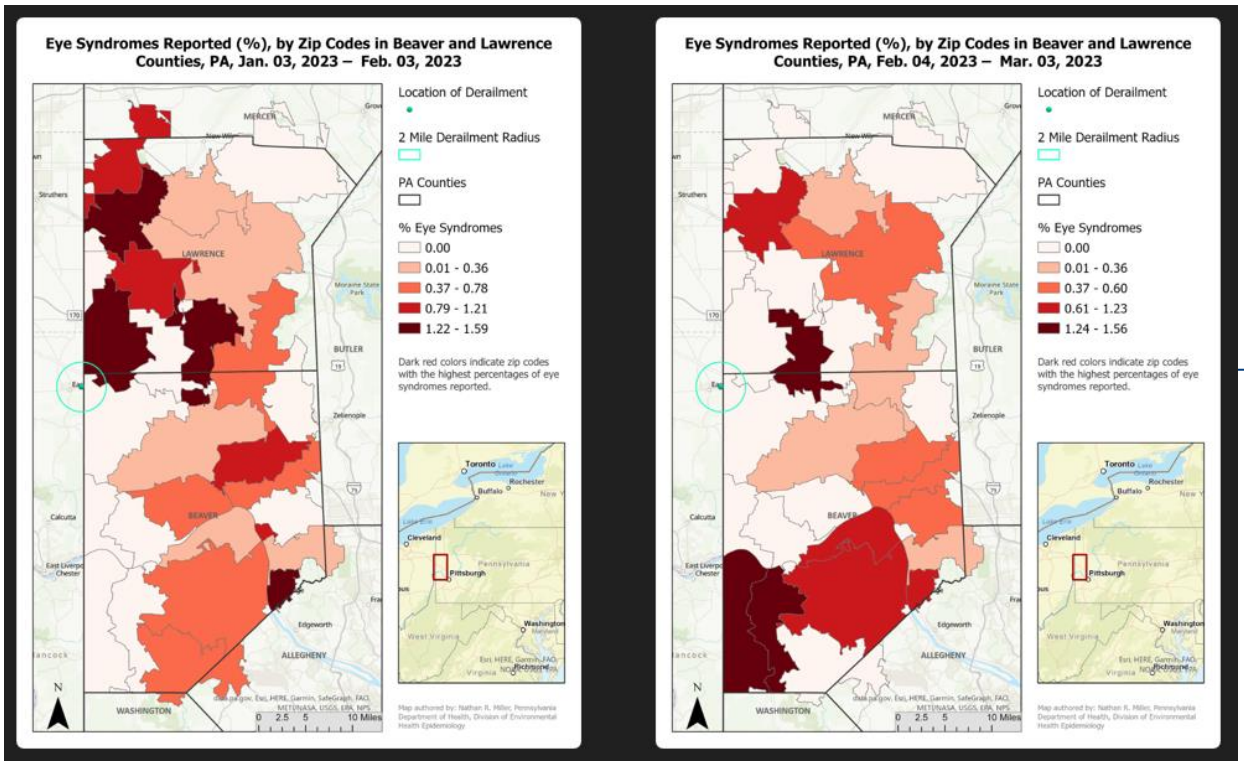


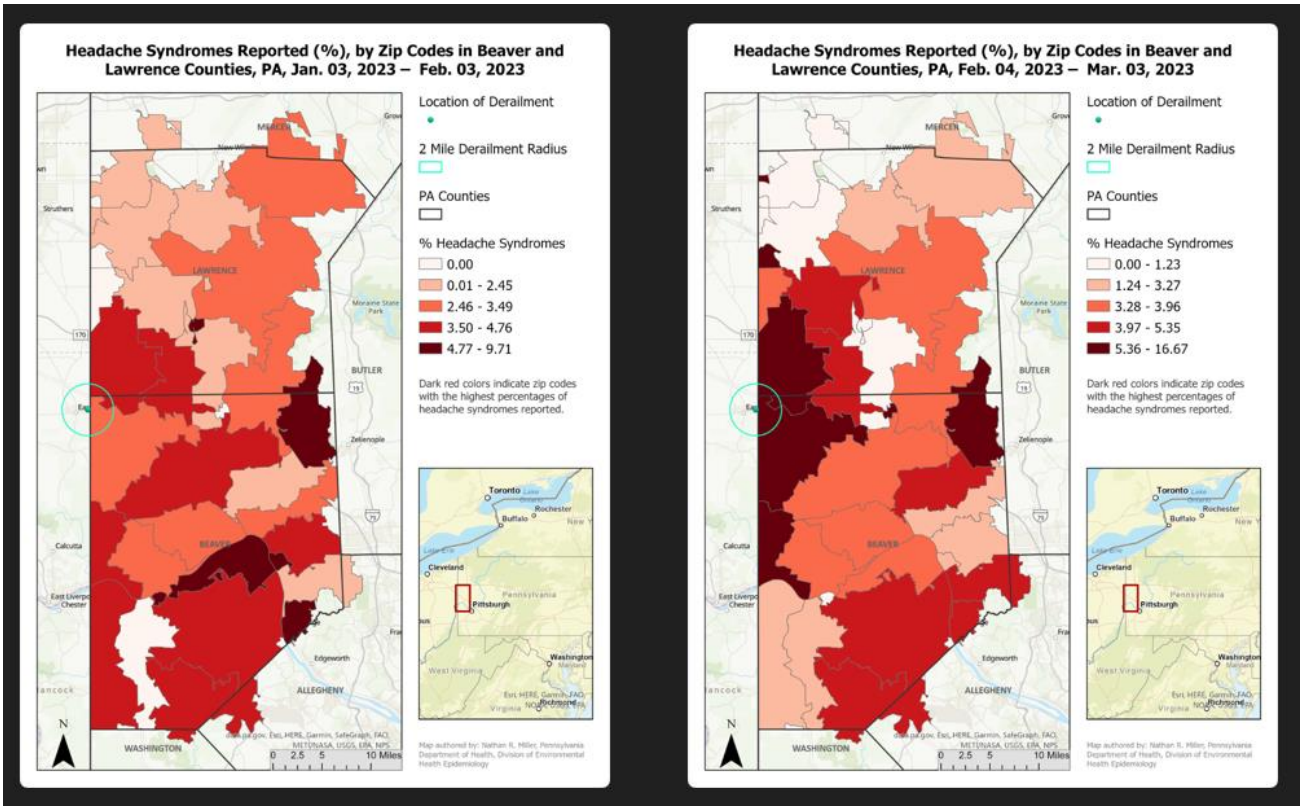
Figure B2. <u>Weekly</u> time series, visit counts for <u>individual</u> zip codes (16115, 16120, 16141)

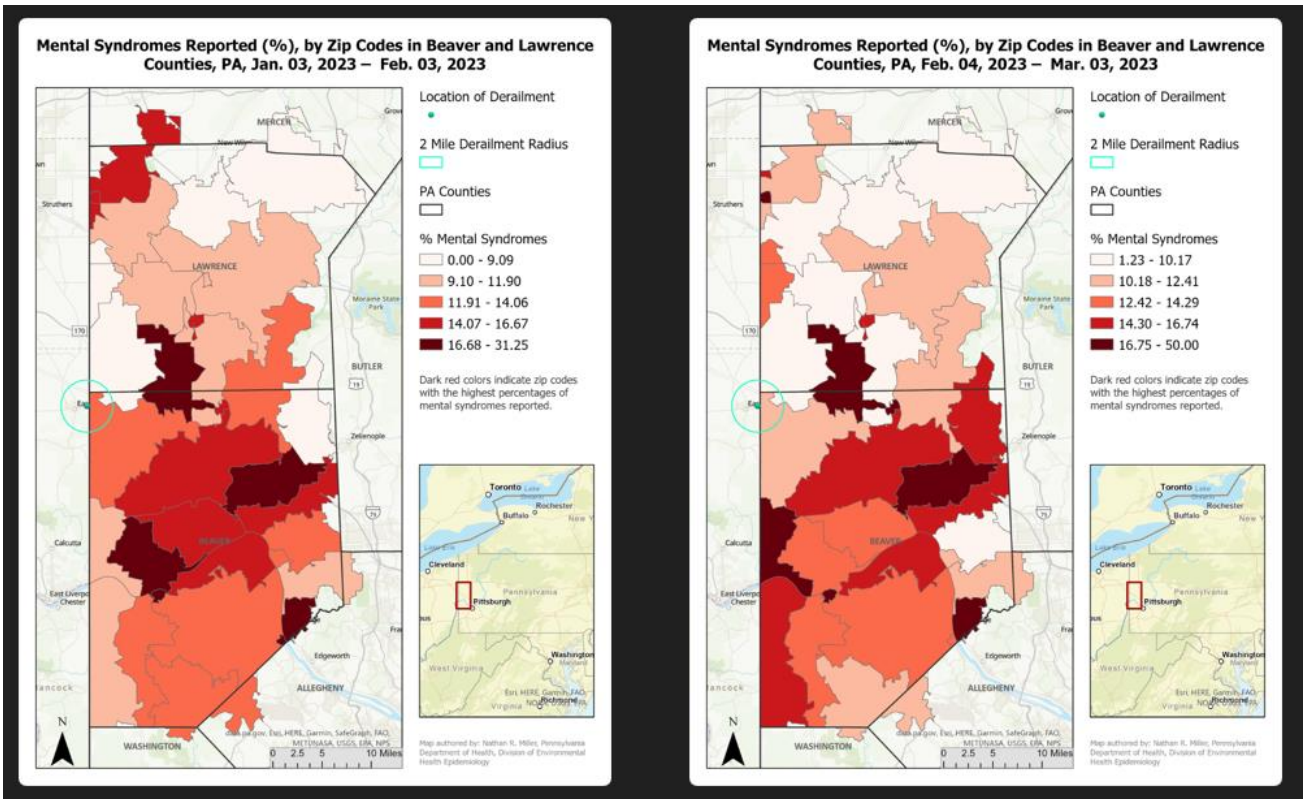


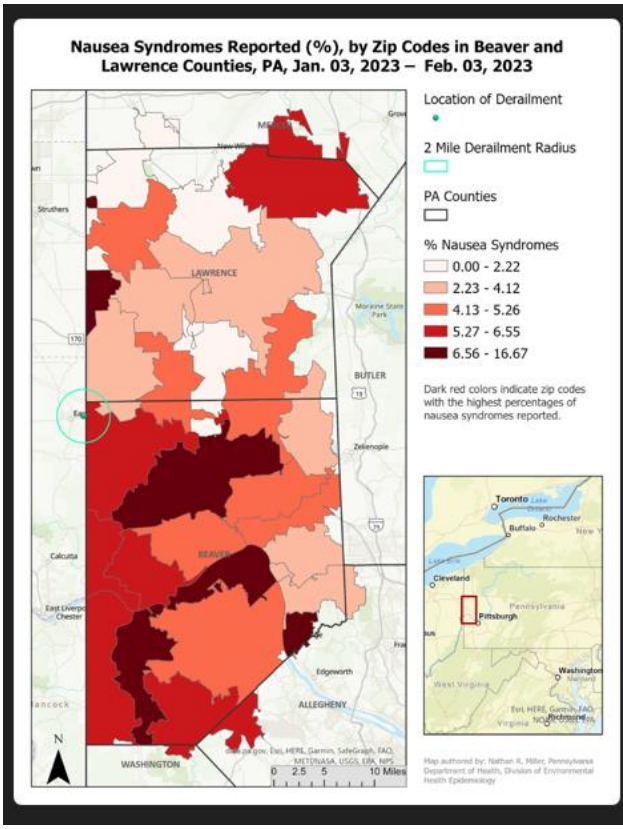
Figures B3-B10: Maps Showing Percentage of Specific Syndromes in Zip Codes Closest to the Derailment Site by Date

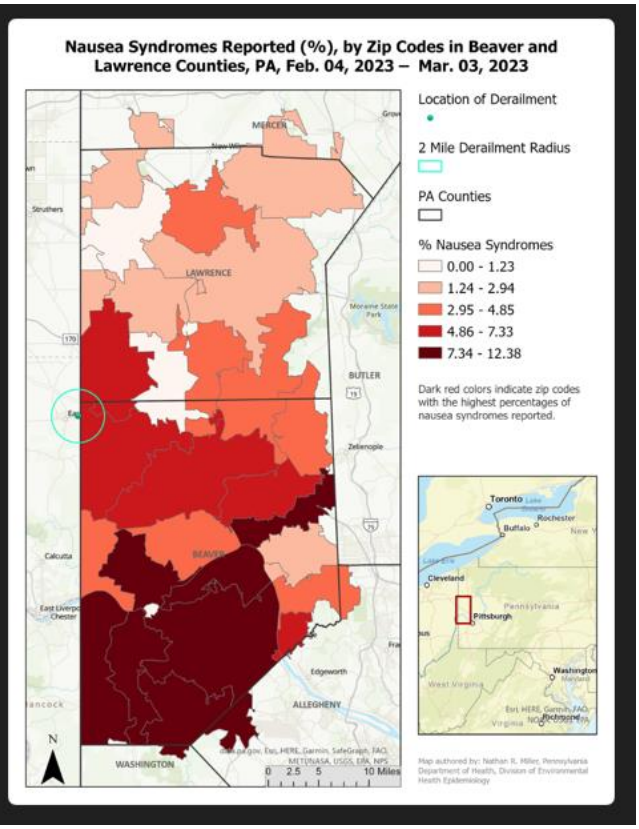


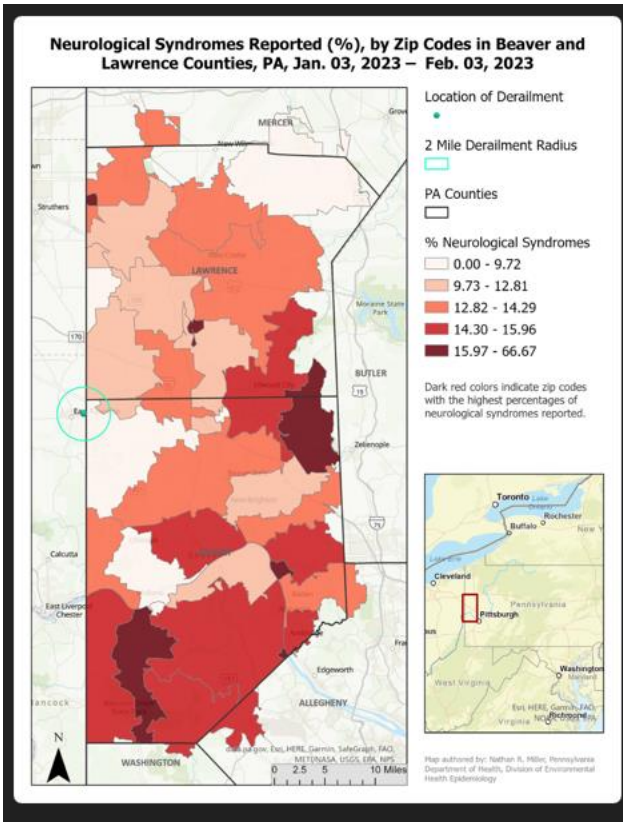


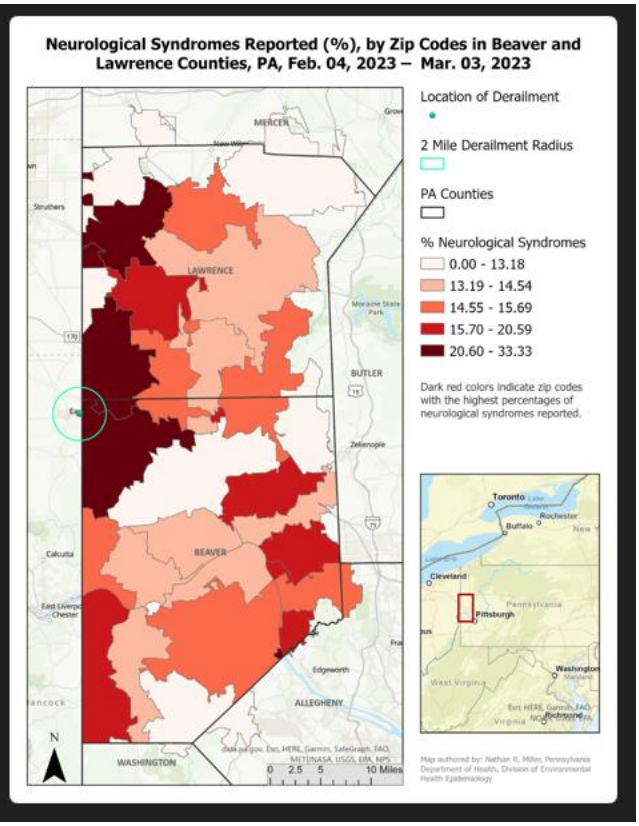

Headache Syndromes Reported (%), by Zip Codes in Beaver and Lawrence Counties, PA, Jan. 03, 2023 – Feb. 03, 2023
Location of Derailment
2 Mile Derailment Radius
PA Counties
% Headache Syndromes
0.00
0.01 - 2.45
2.46 - 3.49
3.50 - 4.76
4.77 - 9.71
Dark red colors indicate zip codes with the highest percentages of headache syndromes reported.
Headache Syndromes Reported (%), by Zip Codes in Beaver and Lawrence Counties, PA, Feb. 04, 2023 – Mar. 03, 2023
Location of Derailment
2 Mile Derailment Radius
PA Counties
% Headache Syndromes
0.00 - 1.23
1.24 - 3.27
3.28 - 3.96
3.97 - 5.35
5.36 - 16.67
Dark red colors indicate zip codes with the highest percentages of headache syndromes reported.
MERCER
LAWRENCE
BUTLER
BEAVER
ALLEGHENY
WASHINGTON
Toronto
Rochester
Buffalo
Cleveland
Pittsburgh
Washington
Pennsylvania
West Virginia
N
0 2.5 5 10 Miles

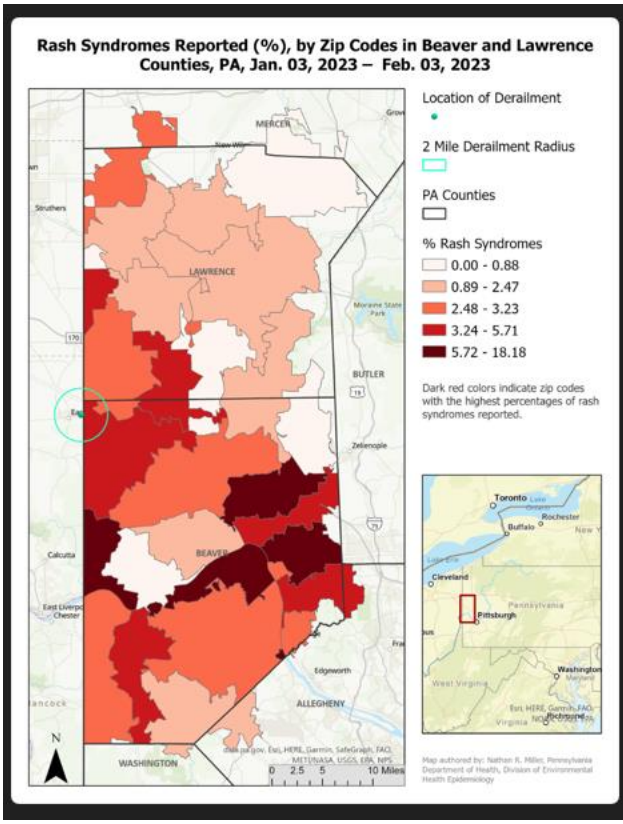

Mental Syndromes Reported (%), by Zip Codes in Beaver and Lawrence Counties, PA, Jan. 03, 2023 – Feb. 03, 2023
Location of Derailment
2 Mile Derailment Radius
PA Counties
% Mental Syndromes
0.00 - 9.09
9.10 - 11.90
11.91 - 14.06
14.07 - 16.67
16.68 - 31.25
Dark red colors indicate zip codes with the highest percentages of mental syndromes reported.
Mental Syndromes Reported (%), by Zip Codes in Beaver and Lawrence Counties, PA, Feb. 04, 2023 – Mar. 03, 2023
Location of Derailment
2 Mile Derailment Radius
PA Counties
% Mental Syndromes
1.23 - 10.17
10.18 - 12.41
12.42 - 14.29
14.30 - 16.74
16.75 - 50.00
Dark red colors indicate zip codes with the highest percentages of mental syndromes reported.
MERCER
LAWRENCE
BUTLER
BEAVER
ALLEGHENY
WASHINGTON
Toronto
Rochester
Buffalo
Cleveland
Pittsburgh
Washington
Pennsylvania
West Virginia
N
0 2.5 5 10 Miles

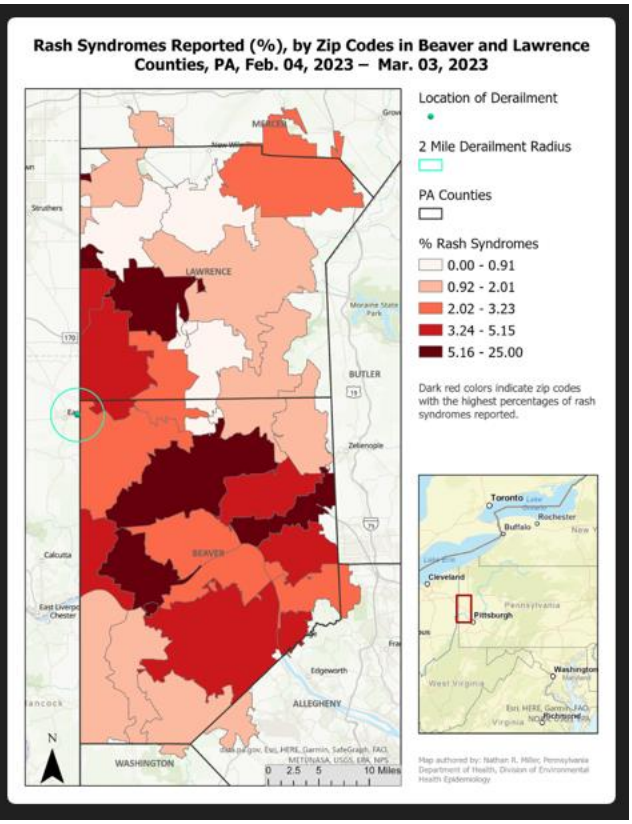

Nausea Syndromes Reported (%), by Zip Codes in Beaver and Lawrence Counties, PA, Jan. 03, 2023 – Feb. 03, 2023
Location of Derailment
2 Mile Derailment Radius
PA Counties
% Nausea Syndromes
0.00 - 2.22
2.23 - 4.12
4.13 - 5.26
5.27 - 6.55
6.56 - 16.67
Dark red colors indicate zip codes with the highest percentages of nausea syndromes reported.
LAWRENCE
BUTLER
BEAVER
ALLEGHENY
WASHINGTON
Toronto
Rochester
Buffalo
Cleveland
Pittsburgh
Washington
0 2.5 5 10 Miles

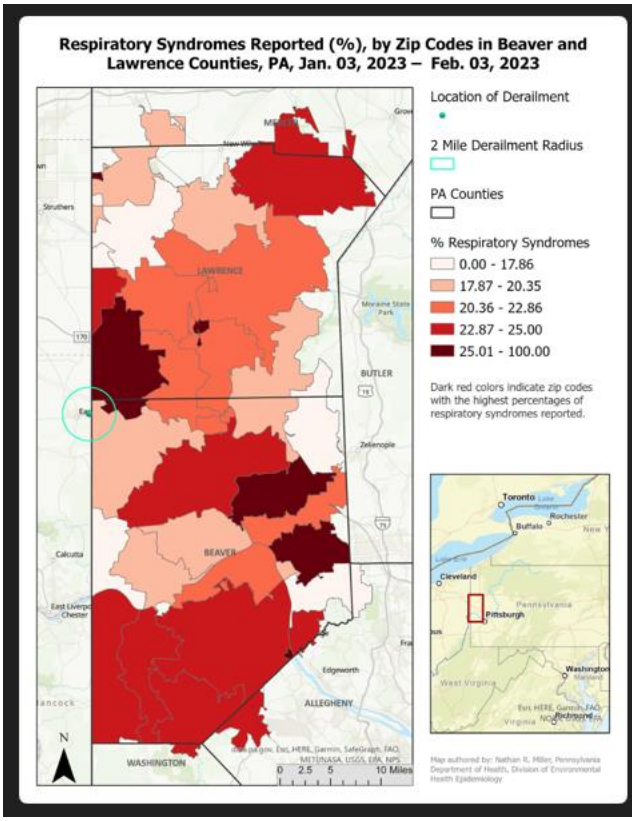

Nausea Syndromes Reported (%), by Zip Codes in Beaver and Lawrence Counties, PA, Feb. 04, 2023 – Mar. 03, 2023
Location of Derailment
2 Mile Derailment Radius
PA Counties
% Nausea Syndromes
0.00 - 1.23
1.24 - 2.94
2.95 - 4.85
4.86 - 7.33
7.34 - 12.38
Dark red colors indicate zip codes with the highest percentages of nausea syndromes reported.
LAWRENCE
BUTLER
BEAVER
ALLEGHENY
WASHINGTON
Toronto
Rochester
Buffalo
Cleveland
Pittsburgh
Washington
0 2.5 5 10 Miles

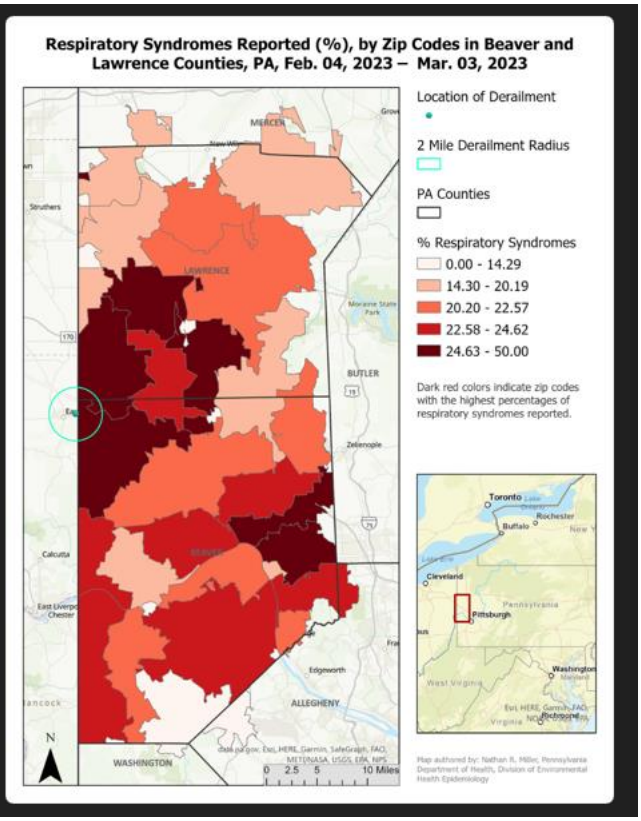

Neurological Syndromes Reported (%), by Zip Codes in Beaver and Lawrence Counties, PA, Jan. 03, 2023 – Feb. 03, 2023
Location of Derailment
2 Mile Derailment Radius
PA Counties
% Neurological Syndromes
0.00 - 9.72
9.73 - 12.81
12.82 - 14.29
14.30 - 15.96
15.97 - 66.67
Dark red colors indicate zip codes with the highest percentages of neurological syndromes reported.
LAWRENCE
BUTLER
BEAVER
ALLEGHENY
WASHINGTON
Toronto
Rochester
Buffalo
Cleveland
Pittsburgh
Washington
0 2.5 5 10 Miles


Neurological Syndromes Reported (%), by Zip Codes in Beaver and Lawrence Counties, PA, Feb. 04, 2023 – Mar. 03, 2023
Location of Derailment
2 Mile Derailment Radius
PA Counties
% Neurological Syndromes
0.00 - 13.18
13.19 - 14.54
14.55 - 15.69
15.70 - 20.59
20.60 - 33.33
Dark red colors indicate zip codes with the highest percentages of neurological syndromes reported.
LAWRENCE
BUTLER
BEAVER
ALLEGHENY
WASHINGTON
Toronto
Rochester
Buffalo
Cleveland
Pittsburgh
Washington
0 2.5 5 10 Miles


Rash Syndromes Reported (%), by Zip Codes in Beaver and Lawrence Counties, PA, Jan. 03, 2023 – Feb. 03, 2023
Location of Derailment
2 Mile Derailment Radius
PA Counties
% Rash Syndromes
0.00 - 0.88
0.89 - 2.47
2.48 - 3.23
3.24 - 5.71
5.72 - 18.18
Dark red colors indicate zip codes with the highest percentages of rash syndromes reported.
MERCER
LAWRENCE
BUTLER
BEAVER
ALLEGHENY
WASHINGTON
Zelienople
Edgeworth
Moraine State Park
Toronto
Rochester
Buffalo
Cleveland
Pittsburgh
Washington
Pennsylvania
West Virginia
0 2.5 5 10 Miles
N


Rash Syndromes Reported (%), by Zip Codes in Beaver and Lawrence Counties, PA, Feb. 04, 2023 – Mar. 03, 2023
Location of Derailment
2 Mile Derailment Radius
PA Counties
% Rash Syndromes
0.00 - 0.91
0.92 - 2.01
2.02 - 3.23
3.24 - 5.15
5.16 - 25.00
Dark red colors indicate zip codes with the highest percentages of rash syndromes reported.
MERCER
LAWRENCE
BUTLER
BEAVER
ALLEGHENY
WASHINGTON
Zelienople
Edgeworth
Moraine State Park
Toronto
Rochester
Buffalo
Cleveland
Pittsburgh
Washington
Pennsylvania
West Virginia
0 2.5 5 10 Miles
N


Respiratory Syndromes Reported (%), by Zip Codes in Beaver and Lawrence Counties, PA, Jan. 03, 2023 – Feb. 03, 2023
Location of Derailment
2 Mile Derailment Radius
PA Counties
% Respiratory Syndromes
0.00 - 17.86
17.87 - 20.35
20.36 - 22.86
22.87 - 25.00
25.01 - 100.00
Dark red colors indicate zip codes with the highest percentages of respiratory syndromes reported.
LAWRENCE
BUTLER
BEAVER
ALLEGHENY
WASHINGTON
Zelienople
Edgeworth
Moraine State Park
Toronto
Rochester
Buffalo
Cleveland
Pittsburgh
Washington
Pennsylvania
West Virginia
0 2.5 5 10 Miles
N


Respiratory Syndromes Reported (%), by Zip Codes in Beaver and Lawrence Counties, PA, Feb. 04, 2023 – Mar. 03, 2023
Location of Derailment
2 Mile Derailment Radius
PA Counties
% Respiratory Syndromes
0.00 - 14.29
14.30 - 20.19
20.20 - 22.57
22.58 - 24.62
24.63 - 50.00
Dark red colors indicate zip codes with the highest percentages of respiratory syndromes reported.
LAWRENCE
BUTLER
BEAVER
ALLEGHENY
WASHINGTON
Zelienople
Edgeworth
Moraine State Park
Toronto
Rochester
Buffalo
Cleveland
Pittsburgh
Washington
Pennsylvania
West Virginia
0 2.5 5 10 Miles
N