

**Chemical Exposures
and Health Outcomes
of the East Palestine,
Ohio Train
Derailment on
Pennsylvania First
Responders**

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Epidemiology**

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Executive Summary

On February 3, 2023, a train carrying hazardous chemicals derailed just outside of East Palestine, Ohio (OH) near the OH/Pennsylvania (PA) border. The derailment resulted in the release of vinyl chloride, butyl acrylate, and other harmful chemicals into the surrounding environment. Officials conducted a controlled vent and burn of chemicals on February 6, 2023 due to concerns of a potential explosion. Pennsylvania First Responders were among those at greatest risk for chemical exposure. An Assessment of Chemical Exposure (ACE) survey was developed to capture the unique exposures and experiences among responders. The following report summarizes survey results and highlights chemical exposure, personal protective equipment (PPE) used, and health symptoms reported among responders.

One hundred and fourteen ACE First Responder surveys were completed between March 5 – 31, 2023 by adult PA residents (age 18 years and older) who worked as a responder during the East Palestine, OH train derailment. Most responders were White males (88%), had a median age of 39.0, were firefighters (68%), and worked during the critical exposure period between February 3 – 8 (88%). Other responder roles included government worker, police officer, and HAZMAT. Importantly, only 11 responders reported knowing the chemical they were exposed to during their response work.

Almost all firefighters wore fire gear during the response; however, only 15 of all respondents reported wearing a mask. The most common exposure route was inhalation, and most respondents reported contact with smoke, vapor/gas, and dust. Fifty-four responders reported at least one new or worsening symptom, while 46 reported multiple symptoms. Most common symptoms among responders were those that afflicted the ears, nose, and throat (37%) and heart and lungs (21%). Exposure type and having smelled an odor increased the likelihood of reporting a symptom. Responder role, age, and hours or total days spent working on the response did not impact the likelihood of reporting at least one new or worsening symptom.

This study had several limitations, perhaps the greatest being the amount of time elapsed between response work and survey implementation. However, findings suggest that chemical exposure played an important role in the number and type of symptoms reported and symptoms were consistent with the known acute health effects of hazardous materials released during the derailment. Based on survey results, additional analysis and follow-up with responders are recommended to determine potential longer-term health implications. Additionally, working with local Fire Departments to ensure proper training of volunteer firefighters and develop emergency response communication plans, would better prepare responders to safely perform job duties in the event of a future disaster.

Background

On the evening of 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, 20 of which were carrying hazardous materials such as 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 for a potential explosion, a controlled vent and burn of the chemicals took place on February 6, 2023, involving at least 5 cars.

Given the proximity to PA, PA First Responders were among some of the first on scene at the incident. During the initial response and days following, it was imperative to suppress and control the resulting fire, direct community traffic, and monitor changes in the environment. Many local PA firefighters, police officers, HAZMAT, and government workers, performed job duties within a 1-mile radius of the derailment where the likelihood of chemical exposure was at its greatest.

Some of the hazardous materials released are known eye and skin irritants that can cause acute symptoms such as watery eyes or irritation of the eyes, nasal passages, or respiratory tracts. 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, can cause shortness of breath and can cause eye, lung, and throat irritation. Disasters are also known to negatively impact the mental health of those affected.

Methods

Survey Implementation

In collaboration with the Agency for Toxic Substances and Disease Registry (ATSDR) and Centers for Disease Control and Prevention (CDC), an Assessment of Chemical Exposure (ACE) survey was developed to capture chemical exposures and health symptoms experienced among PA responders. The survey included questions about demographic characteristics, duration and timing of response work, use of personal protective equipment (PPE) and preparedness to respond, exposure characteristics, health impacts, and concerns about response work (Appendix B).

The survey was created using REDCap Cloud software, and data were stored in the secure REDCap database. Residents were able to complete the survey online via weblink from March 5th through March 31st. Survey launch was during an in-person responder meeting held on March 5th in East Palestine, OH, where representatives from CDC, ATSDR, the National Institute for Occupational Safety and Health, Ohio Department of Health, Pennsylvania Department of Health, and Columbia County public health were present. Responder groups present included individuals from federal response agencies, as well as local and state responders from both PA and OH.

Data analysis

Descriptive statistics of survey data were produced to capture response trends among the survey population and identify possible relationships among independent and outcome variables. Relationships among variables contributing to the type and number of health symptoms were analyzed by Fishers Exact Test. Binary and multivariate logistical regression models were used to determine unadjusted and adjusted odds ratios and 95% confidence intervals. Reported contact with smoke, vapor/gas, and dust, odor smelled, and total number of hours and days spent working within a 1-mile radius of the derailment between February 3 – 8 were used as indicators of exposure. Respondents could choose more than one symptom, chemical exposure type, and odor. In multivariate models, odds ratios were adjusted for age, gender, responder role, cigarette smoking status, and smokeless tobacco use.

To minimize excessive stratification and small cell sample size, certain responses were grouped for specific variables (Table 1). For “Yes / No / Unsure / Prefer not to answer” responses, those that answered “Unsure” and “Prefer not to answer” were grouped with those that answered “No”.

Survey data were analyzed with SAS Enterprise Guide software version 7.1. Graphs were produced using GraphPad Prism version 9.2.0.

Table 1. Variable Groups for Analysis

Variable	Groups (specific responses if applicable)
Age	<ul style="list-style-type: none"> • 18-24 • 25-34 • 35-44 • 45-54 • 55+
Responder Role	<ul style="list-style-type: none"> • Firefighter • All Other Response Roles (Hazmat, Police officer, Government worker, Other)
Hours spent working within a 1-mile radius of the derailment between February 3 – 8	<ul style="list-style-type: none"> • ≤ 5 hours (including 0 hours) • ≥ 6 hours
Number of days working within a 1-mile radius of the derailment between February 3 – 8	<ul style="list-style-type: none"> • ≤1 day (including no days) • 2 days • ≥ 3 days
PPE Used	<ul style="list-style-type: none"> • Yes (Sometimes, Always) • No (Never, Unsure)
At least one symptom reported	<ul style="list-style-type: none"> • No symptoms • ≥ 1 symptom
At least two symptoms reported	<ul style="list-style-type: none"> • ≤ 1 symptom (including no symptoms) • ≥ 2 symptoms
Respiratory symptoms	<ul style="list-style-type: none"> • No respiratory symptoms • ≥ 1 symptom (including ears, nose & throat and heart & lungs)

Results

Survey Population Demographics

The majority of respondents were White males (100 of 114) with a median age of 39 years (Table A1). During the train derailment response, 68% of respondents had a role of firefighter (78 of 114) while the rest had other roles (36 of 114). Most firefighters were volunteers (90%). Other roles consisted of government workers, HAZMAT, police officer, and other (Table 2). Fourteen percent of respondents smoked cigarettes (16 of 114) and 25% used smokeless tobacco (29 of 114) at the time of survey completion.

Table 2. Response Role

Response Role (N = 114)	N	%
Firefighter	78	68.4%
Volunteer	70	89.7%
All other roles	36	31.6%
Government worker	13	36.1%
HAZMAT	10	27.8%
Police officer	10	27.8%
Other	5	13.9%

Note – Individuals had the option to choose more than one role, primary role was counted as firefighter due to exposures. Other category is represented by those working in Rehab, US EPA Contractor, 911 Dispatcher, and EMA.

Duration, Time, and Place of Response Work

Eighty-eight percent (101 of 114) of respondents worked within a 1-mile radius of the derailment during the critical exposure period of February 3 – 8. Most respondents worked on Friday, February 3 (87 of 114) and/or Saturday, February 4 (73 of 114). Only 10 respondents reported working during the vent and burn on Monday, February 6 (Table 3). Fifty-five percent (63 of 114) reported working a total of 5 hours or less and 45% (51 of 114) reported working a total of 6 hours or more during the critical exposure period. Fifty-nine percent (67 of 114) of respondents conducted most of their response work at the site of derailment (Table 4).

Table 3. Day worked during the critical exposure period of Friday, February 3 – Wednesday February 8 within a 1-mile radius of the incident

Day worked during critical exposure period (N = 114)	N	%
Friday, February 3	87	76.3%
Saturday, February 4	73	64.0%
Sunday, February 5	19	16.7%
Monday, February 6	10	8.8%
Tuesday, February 7	5	4.4%
Wednesday, February 8	5	4.4%

Note – Respondents could choose more than one day worked during the critical exposure period.

Table 4. Physical location where most time was spent working on the response among Firefighters and All Other Response Roles

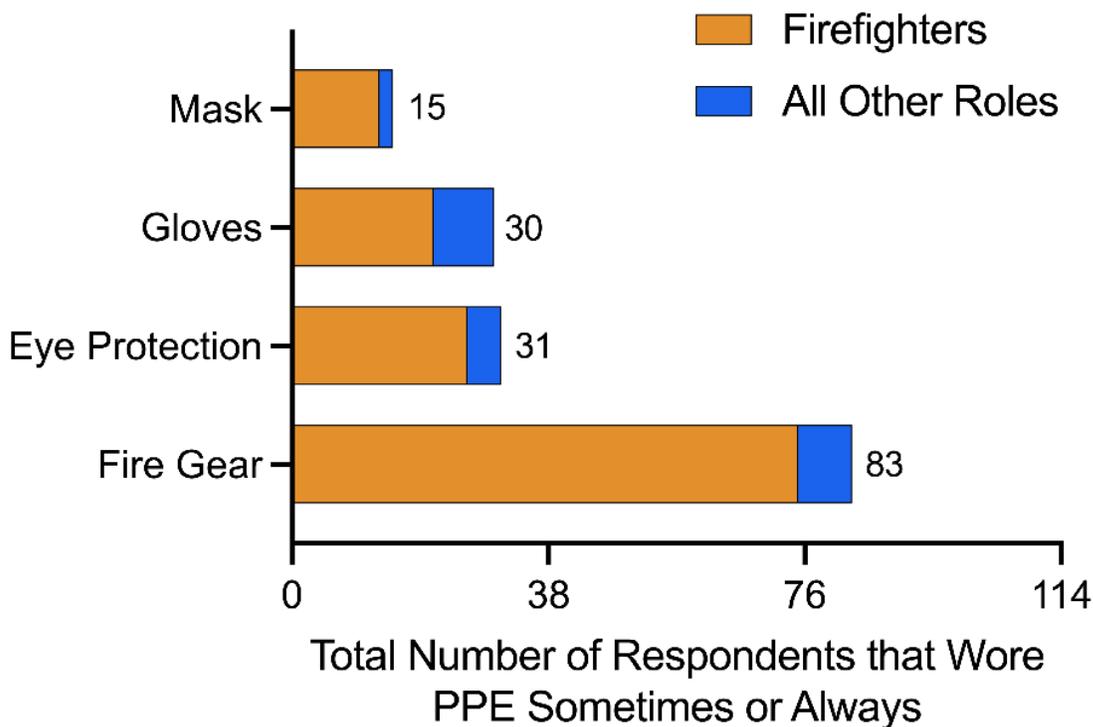
Physical location	Firefighter (N = 78)	All other response roles (N=36)
Site of derailment	59 (75.6%)	8 (22.2%)
Incident command location	2 (2.6%)	9 (25.0%)
Residential areas	2 (2.6%)	9 (25.0%)
Other	12 (15.4%)	9 (25.0%)
Unsure / Prefer not to answer	3 (3.9%)	1 (2.8%)

Other includes Beaver County Airport, traffic control points, Unity OH, Clark Street Fire Station, Taggart Road, Tanker & fill stations, a few miles away, just outside the 1-mile radius.

Preparedness to Respond

Thirty-six percent (41 of 114) of respondents had prior experience responding to a chemical spill. Only 11 respondents (of 78 who answered) reported being aware of the chemicals they were exposed to during their response work and 58% (65 of 113) reported feeling adequately prepared to respond. Ninety percent (70 of 78) of firefighters always wore fire gear (Figure 1). Importantly, only 15 of all respondents wore a mask at some point during their response work (Figure 1). Most respondents had First Responder Awareness (81 of 112), Proper Use of PPE (81 of 112), and First Responder Operations (78 of 112) trainings. Less than one third of respondents had training in cleaning and decontamination procedures for flammable and combustible materials (35 of 112) and safety procedures during a chemical incident (33 of 112). Note that respondents could choose more than one training option.

Figure 1. Number of Firefighters and All Other Response Roles that Reported Wearing Personal Protective Equipment (PPE) Sometimes or Always



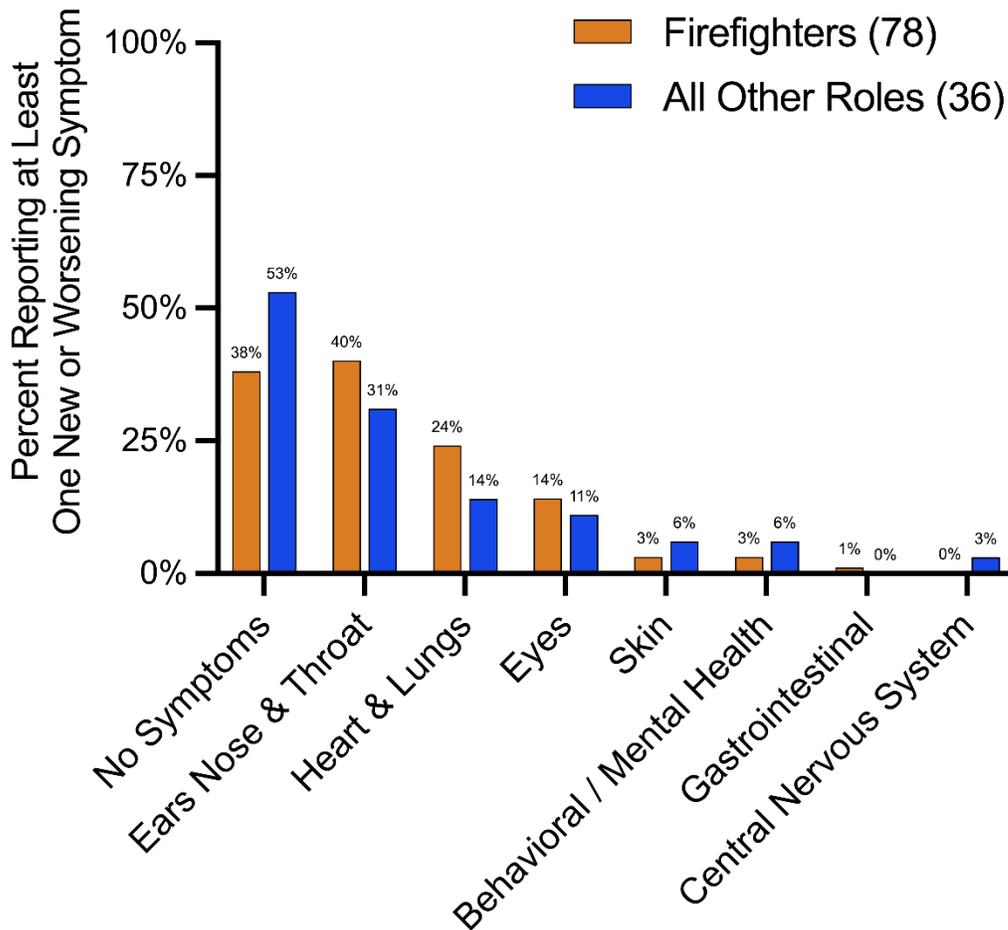
Chemical Exposure

Eighty-six percent (98 of 114) of respondents reported smelling an odor, of which the majority reported a chemical smell (76 of 98). This was followed by smelling smoke (33 of 114) and a sweet smell (26 of 114). Sixty-eight percent of respondents reported inhalation (78 of 114) followed by touching (16 of 114) and ingestion (10 of 114) as exposure routes. Respondents were mostly exposed to smoke (78 of 114), vapor/gas (58 of 114), and dust (38 of 114).

Reported Symptoms

Forty-seven percent (54 of 114) reported at least one new or worsening symptom and 40% reported two or more new or worsening symptoms (46 of 114). The top symptom category afflicted was ears, nose and throat (42 of 114) with 69% (29 of 42) reporting stuffy nose and sinus congestion, 50% (21 of 42) reporting burning nose or throat, and 43% (18 of 42) reporting increased congestion/phlegm. This was followed by symptoms afflicting the heart and lungs (24 of 114), where 67% (16 of 24) reported coughing, and eye symptoms (16 of 114) where 93% (15 of 16) reported pain/irritation/burning in the eyes. For a list of all symptoms reported, see Appendix Table A2. Responder role did not have an impact on likelihood to report a specific symptom category (Figure 2).

Figure 2. Percent of Firefighters and All Other Response Roles that Reported at Least One New or Worsening Symptom Among Symptom Categories



Among those that reported symptoms, 30% (16 of 54) had symptoms worsen or return when conducting job duties on site and 17% (9 of 54) missed work due to a new or worsening symptom. One respondent reported being hospitalized for symptom treatment, 4 were seen in an emergency department, and 8 consulted a healthcare provider via phone/video conferencing. Sixty-nine percent (37 of 54) did not receive healthcare to treat symptoms.

Responders who reported contact with vapor/gas, smoke, and dust were ≥ 2.5 times more likely to report at least one new or worsening symptom (Table 5) and ≥ 3.5 times more likely to report 2 or more symptoms (Table 5). Responders who reported smelling an odor, specifically a chemical smell [95% CI 1.26-7.63, p -value ≤ 0.05] and smoke smell [95% CI 1.10-6.54, p -value ≤ 0.05] were approximately 3 times more likely to report at least one new or worsening symptom.

Those that reported a chemical smell [95% CI 1.08-5.90, *p*-value ≤ 0.05] or sweet smell [95% CI 1.01-6.65, *p*-value ≤ 0.05] were approximately 2.5 times more likely to report two or more symptoms.

Table 5. Unadjusted and Adjusted Odds Ratios of Experiencing at Least One New or Worsening Symptom or Two or More Symptoms by Specific Contact Exposure

Specific contact exposure	Unadjusted odds ratio	95% Confidence Intervals	Adjusted odds ratio	95% Confidence Intervals
At least one new or worsening symptom				
Smoke (vs no contact)	4.09**	1.70-9.84	4.44**	1.64-12.01
Dust (vs no contact)	3.12**	1.38-7.04	2.45*	1.03-5.82
Vapor/gas (vs no contact)	4.75**	2.15 – 10.50	4.80**	2.04 – 11.28
Other (vs no contact)	0.87	0.32 – 2.39	--	--
Two or more symptoms				
Smoke (vs no contact)	3.33**	1.35-8.20	3.91*	1.39-10.97
Dust (vs no contact)	4.21**	1.84-9.60	3.52**	1.47-8.43
Vapor/gas (vs no contact)	3.69**	1.67-8.19	4.02**	1.68 – 9.58
Other (vs no contact)	1.22	0.44-3.37	--	--

*Logistic regression models run separately. Covariates include age, gender, role, smoking status, and smokeless tobacco use. N = 114, p-value ≤ 0.01** or ≤ 0.05*. Other is debris/liquid exposure.*

Specific contact exposure and odor also impacted the likelihood of reporting at least one new or worsening symptom of the ears, nose and throat and heart and lungs. Most odors and exposure types increased the likelihood of reporting a symptom of the ears, nose and throat, especially vapor/gas exposure (Table 6). Reporting a smoke smell or smoke exposure increased the likelihood of reporting a symptom of the heart and lungs by at least 2-fold; however, this relationship was not significant when adjusted for covariates (Table 6).

Table 6. Unadjusted and Adjusted Odds Ratios of Experiencing a New or Worsening Symptom of the Ears, Nose & Throat or Heart & Lungs by Specific Contact Exposure and Odor Smelled

Odor or Contact Exposure	Unadjusted odds ratio	95% Confidence Intervals	Adjusted odds ratio	95% Confidence Intervals
At least one symptom of the Ears, Nose & Throat				
Chemical Smell (vs no smell)	3.78**	1.48-9.64	3.91**	1.44-10.59
Smoke Smell (vs no smell)	2.38*	1.04-5.46	2.83*	1.16-6.93
Sweet Smell (vs no smell)	2.03	0.84-4.94	--	--
Vapor/Gas Exposure (vs no contact)	3.93**	1.73-8.92	4.24**	1.74-10.33

Smoke Exposure (vs no contact)	3.37*	1.32-8.62	4.15**	1.44-11.96
Dust Exposure (vs no contact)	4.60**	2.00-10.57	4.16**	1.70-10.19
At Least One Symptom of the Heart & Lungs				
Chemical Smell (vs no smell)	1.00	0.385-2.60	--	--
Smoke Smell (vs no smell)	2.62*	1.03-6.67	2.61	0.97-7.02
Sweet Smell (vs no smell)	0.62	0.19-2.00	--	--
Vapor/Gas Exposure (vs no contact)	1.82	0.72-4.59	--	--
Smoke Exposure (vs no contact)	4.05*	1.12-14.63	3.41	0.85-13.66
Dust Exposure (vs no contact)	1.00	0.39-2.60	--	--

*Logistic regression models run separately. Covariates include age, gender, role, smoking status, and smokeless tobacco use. N = 114, p-value ≤ 0.01** or ≤ 0.05*. Other is debris/liquid exposure.*

Working within a 1-mile radius during the critical exposure period between February 3 – 8, and total number of hours worked during the critical period did not impact the likelihood of reporting at least one new or worsening symptom. However, those that reported working 3 days or more compared to 2 days were approximately 4.5 times more likely to report two or more symptoms [95% CI 1.21-15.97, p-value ≤ 0.05] and at least one symptom afflicting the heart and lungs [95% CI 1.24-16.09, p-value ≤ 0.05]. Additionally, individuals that reported working on Sunday February 5, compared to those who did not, were approximately 3 times more likely to report two or more symptoms [95% CI 1.11-8.55, p-value ≤ 0.05] as well as symptoms of the ears, nose and throat [95% CI 1.04-7.77, p-value ≤ 0.05].

Gender, age, cigarette smoking, and smokeless tobacco use did not have an impact on likelihood to report at least one new or worsening symptom, 2 or more symptoms, or a symptom of a specific category. Cigarette smoking and smokeless tobacco use did not impact reporting of a respiratory symptom. Use of a mask sometimes or always during response work did not impact the likelihood of reporting a respiratory symptom [p-value, 0.25]. Similarly, use of eye protection sometimes or always did not impact the likelihood of reporting an eye-related symptom [p-value, 0.55].

Additional tables are included as Appendix A.

Conclusion

Results from the ACE Responder survey suggests that PA First Responders were exposed to chemicals released from the East Palestine, OH, train derailment during their response work. The analysis supported that type of chemical exposure and timing of exposure likely contributed to reported health symptoms.

Most reported symptoms were those afflicting the ears, nose, and throat and heart and lungs. These symptoms are also consistent with known acute clinical effects of the hazardous chemicals released during the derailment. Smoke, which was the only exposure and odor to be associated with an increased likelihood of reporting a symptom of the heart and lungs, is known to irritate the lungs and respiratory system.

Many of the PA responders captured from the ACE Responder survey were volunteer firefighters. Additionally, most respondents did not have any prior experience responding to an emergency chemical spill, were not aware of what chemicals they were exposed to during the response and did not have training in safety procedures for a chemical incident.

Recommendations

Based on these findings, additional analyses and follow-up are recommended to confirm reported acute clinical health symptoms and identify potential longer-term health implications among responders. Given that many responders, in some way, were not prepared to conduct their response work (i.e., not knowing of the chemical exposure prior to work), it is recommended that local fire departments take steps to ensure the following: firefighters are adequately trained in emergency disaster responses (such as a chemical spill), communication plans are well-established; and, the proper response-specific PPE is available and distributed prior to conducting emergency response work. This will better prepare PA first responders to conduct job duties safely and confidently in the event of a future emergency disaster.

Limitations

With any environmental exposure investigation, the complexity of exposure is difficult to ascertain and analyze.

The ACE Responder survey was released 30 days after the incident occurred. This time lapse may have resulted in impaired recollection of the incident. Additionally, news and media surrounding the derailment may have resulted in bias to report a certain symptom or concern. Due to the word choice for some survey questions, temporal associations for multiple questions could not be established. For example, responders were asked if they have experienced a new or worsening symptom since the incident, but they are not asked when the symptoms began, the duration of symptoms, nor the severity of symptoms. Reported symptoms could have occurred anytime during or after work on the response. Additional medical history was not obtained and could therefore not be considered as potential confounders.

Appendix A

Additional Tables

Table A1. Demographic Characteristics

Characteristic (N = 114)	N	%
Sex		
Male	101	88.6%
Female	13	11.4%
Age		
18-24	13	11.4%
25-34	27	23.7%
35-44	35	30.7%
45-54	23	20.2%
55+	16	14.0%
Race		
White	113	99.1%
Native Hawaiian or Pacific Islander	1	0.9%
Ethnicity		
Not Hispanic or Latino	114	100.0%

Median age: 39

Table A2. Reported Symptoms (includes multiple symptoms)

Symptom Category (N=114)	N	%
Eyes	15	13.2%
Increased watering/tearing	5	33.3%
Irritation/pain/burning in the eyes	14	93.3%
Blurred or double vision	1	6.7%
Other eye-related issues	1	6.7%
Ears Nose Throat	42	36.8%
Runny nose	20	47.6%
Burning nose or throat	21	50.0%
Nose bleeds	9	21.4%
Hoarseness	11	26.2%
Increased Salivation	1	2.4%
Hearing loss or ringing in ears (tinnitus)	1	2.4%
Difficulty swallowing	9	21.4%
Swollen neck	5	11.9%
Pain in neck	8	19.1%
Stuffy nose / sinus congestion	29	69.1%

Increased congestion / phlegm	18	42.9%
Other ear, nose, or throat	3	7.1%
Central Nervous System	1	0.9%
Other central nervous system issues	1	100.0%
Heart and Lungs	24	21.1%
Breathing slow	2	8.3%
Breathing fast	1	4.2%
Difficulty breathing / feeling out of breath	8	33.3%
Coughing	16	66.7%
Wheezing in the chest	9	37.5%
Fast heartrate/pulse	1	4.2%
Chest tightness or pain / angina	5	20.8%
Burning sensation in the lungs	3	12.5%
Other heart or lung issues	1	4.2%
Gastrointestinal Tract	1	0.9%
Diarrhea	1	100.0%
Skin	4	3.5%
Irritation, pain, or burning of skin	3	75.0%
Skin rash	1	25.0%
Dry or itchy skin	1	25.0%
Behavioral / Mental Health	4	3.5%
Anxiety	4	100.0%
Agitation/irritability	3	75.0%
Feeling hopeless or helpless	2	50.0%
Feeling distant, numb, or detached	2	50.0%
Difficulty sleeping (falling asleep or staying asleep)	1	25.0%
Difficulty concentrating	3	75.0%
Difficulty remembering things	2	50.0%
Tension or nervousness	1	25.0%
An increase or decrease in your consumption of food or snacks	2	50.0%
I have not experienced any of these symptoms	49	43.0%
Unsure	15	13.2%

Note - Respondents could choose more than one symptom. 54 (47.4%) respondents reported at least one new or worsening symptom.

Appendix B

Confidential

ACE Responder Survey

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responder_general_survey

Responder Survey

Now we will collect some contact information.

What is your first name?

What is your last name?

Please provide your home address

Address Line 1

Address Line 2

City

State

Zipcode

Do you want us to mail you a copy of the completed survey?

Yes

No

(Please allow 10 business days.)

Is your mailing address different than your home address?

Yes

No

Mailing Address

Mailing address: STREET

Mailing address: CITY

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Mailing address: STATE

Mailing address: ZIPCODE

Please provide your email.

(e.g. user@site.com)

Please provide your phone number.

Do we have permission to contact you again in the future if we can provide you information or services?

- Yes
- No

Do we have permission to contact you again in the future to participate in follow-up activities to learn more about how this Incident might have impacted you and the community?

- Yes
- No

What is your preferred method for us to contact you?

- Email
- Phone call
- Text
- Mail

Can the phone number you provided accept text messages?

- Yes
- No

Please provide a phone number that CAN accept text messages

Incident role

We are going to be asking you about your role throughout the Incident.

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What was your role during the response to the train derailment Incident? (Check all that apply.)

- Firefighter
- HAZMAT team member
- Police officer
- EMS responder
- Hospital/emergency department worker
- Military personnel
- Government worker
- Other

Please describe your other Incident role:

Please specify your hospital/emergency department worker role:

Are you a contractor or self-employed?

- Yes, contractor
- Yes, self-employed
- No

With which agency or local government did you respond with during the Incident?

- Agency based in Beaver County, PA
- Agency based in Columbiana County, OH
- Agency located in Lawrence County, PA
- Agency located in WV
- US Environmental Protection Agency (EPA)
- US Federal Emergency Management Agency (FEMA)
- Ohio National Guard
- Pennsylvania Department of Environmental Protection (PA DEP)
- National Transportation Safety Board
- Other
- Prefer not to answer
- Unsure

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Please specify other agency:

How many years have you served in this role?

How many years have you worked as a government worker?

How many years have you worked or volunteered as a firefighter?

In what capacity do you currently work for the Fire Department?

- Volunteer Firefighter
- Career Firefighter
- Both career and volunteer firefighter
- Prefer not to answer
- Unsure

How many years have you worked as a HazMat technician?

How many years have you worked as a police officer?

How many years have you worked as an EMS responder?

How many years have you worked as a hospital/emergency department worker?

How many years have you served in the military?

In what state did your responding agency originate?

- Ohio
- Pennsylvania
- West Virginia
- Other
- Prefer not to answer
- Unsure

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Please specify:

What date did you first respond to the Incident?

(YYYY-MM-DD)

What is the last day you worked as a responder for the Incident? *If currently working please select today's date.*

(YYYY-MM-DD)

What were your job tasks or responsibilities as an incident responder?

Did you have a supervisory role during your response to the Incident?

- Yes
- No
- Prefer not to answer
- Unsure

The next 3 questions will pertain to the following map.

Between the start of the Incident and the end of the evacuation order (Friday Feb 3 - Wednesday Feb 8), on which days did you work within the 1-mile radius (dotted line)?

- Friday, February 3
- Saturday, February 4
- Sunday, February 5
- Monday, February 6
- Tuesday, February 7
- Wednesday, February 8
- I did not work within the 1-mile radius on any of these dates
- Unsure
- Prefer not to answer

Between the start of the Incident and the end of the evacuation order (Friday Feb 3 - Wednesday Feb 8), please estimate the total number of hours you spent working within the 1-mile radius (dotted line)?

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Between the start of the Incident until the end of the evacuation order (Friday Feb 3 - Wednesday Feb 8), please estimate the total number of hours you spent working on response activities outside the 1-mile radius (dotted line)?

Please estimate the total number of hours you have spent working on the response to this Incident?

The next sets of questions will ask about your work environment during the Incident.

In the course of your work on this response, have you had direct contact to potentially harmful chemicals/substances by touching, inhaling, or swallowing the substance(s)? (check all that apply)

- Touching
- Inhaling
- Swallowing
- I did not come into contact with any potentially dangerous chemicals or substances
- Prefer not to answer
- Unsure

Do you know what chemical/substance(s) you may have been exposed to?

- Yes
- No
- Prefer not to answer
- Unsure

To the best of your knowledge, what are the names of the chemicals you may have been exposed to while you responded to the Incident?

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Did you come in contact with any of the following? Check all that apply

- Smoke
- Dust
- Debris
- Liquid
- Vapor/gas
- None of the above
- Other
- Prefer not to answer
- Unsure

Please describe other contact:

Did you smell an odor?

- Yes
- No
- Prefer not to answer
- Unsure

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

- Gasoline
- Rotten eggs
- Chemical smell
- Paint or Paint thinner
- Car tires or asphalt
- Smoke
- Sewage
- Sweet smell
- Other
- Unsure

Please describe the odor:

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Would you describe the odor as?

- Very Light
- Light
- Moderate
- Strong
- Very Strong
- Unsure

Please select the physical location where you spent the most time while working on response activities:

- At the site of derailment
- Incident command location
- Residential areas
- Other
- Prefer not to answer
- Unsure

Please specify other physical location:

Injuries related to the Incident

The next set of questions will ask you about any possible injuries you may have sustained while responding to the Incident.

Were you injured during your response to the Incident?

- Yes
- No
- Prefer not to answer
- Unsure

Were you injured more than once during your response to the Incident?

- Yes, more than one injury
- No, just one injury
- Unsure
- Prefer not to answer

What date were you injured?

(YYYY-MM-DD)

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Please list the dates of each injury:

Where on your body did you get injured? (Check all that apply)

- Head, face, neck
- Trunk
- Arms
- Hands
- Legs
- Feet

How were you injured? (Check all that apply):

- Abrasion/Contusion
- Amputation
- Body fluid splash
- Burn (thermal/electric)
- Burn (chemical)
- Crush
- Fracture
- Heat Exhaustion
- Laceration/puncture
- Needle stick/sharps
- Poisoning
- Sprain/strain
- Other (describe)

Please describe how you were injured

What is the highest level of healthcare you received to treat your injury or injuries?

- Hospitalized
- Seen in an emergency department
- Receive in-person care at another healthcare facility
- Consulted a healthcare provider via phone /video conferencing
- I did not receive any health care to treat my injury or injuries
- Prefer not to answer
- Unsure

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How many days were you hospitalized?

Where did you receive medical treatment for your injury or injuries? (Check all that apply)

- Disaster Medical Assistance Team (DMAT)
- Urgent care
- Community health clinic
- Doctor's office
- Emergency department
- Hospital
- Other
- Prefer not to answer
- Unsure

Please specify where you received treatment:

Did you report your injury or injuries to your supervisor, agency, or someone else?

- Yes
- No
- Prefer not to answer
- Unsure

To whom did you report your injury or injuries?

Is there any other information you would like to provide us regarding your injury?

Personal Protective Equipment

While responding to the Incident, how often did you use the following

PPE

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Chemical protective gloves

- Always
- Sometimes
- Never
- Unsure

Standard fire protection gear (fire helmet, turnout pants and jacket, leather gloves, boots)?

- Always
- Sometimes
- Never
- Unsure

Hazmat suit

- Always
- Sometimes
- Never
- Unsure

Hazmat coveralls

- Always
- Sometimes
- Never
- Unsure

Eye protection? (specify type:)

- Always
- Sometimes
- Never
- Unsure

Mask or respirator? (see image below for examples)

- Always
- Sometimes
- Never
- Unsure

Other PPE

- Always
- Sometimes
- Never
- Unsure

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Please describe the other personal protective equipment used:

Please described the eye protection you used:

From the photo above, please select any masks/respirators you have worn during your time working on the response to the Incident: (Check all that apply.)

- Option A: Cloth face mask
- Option B: Disposable surgical mask
- Option C: KN95 mask
- Option D: N95 disposable
- Option E: Elastomeric half-mask respirator
- Option F: Elastomeric full facepiece respirator
- Option G: Loose fitting PAPR
- Option H: Tight-fitting full facepiece PAPR
- Option I: Full facepiece SCBA
- Other
- Unsure

Please specify the other mask(s) or respirator(s) used:

For each type of mask or respirator you have worn over the response listed below, why did you wear it?

For each type of mask or respirator you have worn over the response, why did wear it?

Cloth mask

- Personal preference
- Specific job duties
- Other
- I did not wear during this response

Disposable/surgical mask

- Personal preference
- Specific job duties
- Other
- I did not wear during this response

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KN95

- Personal preference
- Specific job duties
- Other
- I did not wear during this response

N95 respirator

- Personal preference
- Specific job duties
- Other
- I did not wear during this response

Elastomeric half mask respirator

- Personal preference
- Specific job duties
- Other
- I did not wear during this response

Elastomeric full facepiece respirator

- Personal preference
- Specific job duties
- Other
- I did not wear during this response

Loose fitting PAPR

- Personal preference
- Specific job duties
- Other
- I did not wear during this response

Tight fitting full facepiece PAPR

- Personal preference
- Specific job duties
- Other
- I did not wear during this response

Full facepiece SCBA

- Personal preference
- Specific job duties
- Other
- I did not wear during this response

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Please describe your other reasons for using the mask(s) or respirator(s) you used:

What job duties were you performing while wearing each type of mask or respirator selected?

If you wore a respirator, have you been fit tested for that respirator make and model within the last 12 months?

- Yes
- No
- Prefer not to answer
- Unsure

After finishing a shift, during your work in the response, how often did you shower before returning home?

- Always
- Sometimes
- Never
- Prefer not to answer
- Unsure

After finishing a shift, during your work in the response, how often did you conduct decontamination of your protective clothing in the field?

- Always
- Sometimes
- Never
- Prefer not to answer
- Unsure

After finishing a shift, during your work in the response, how often did you change into clean clothes before returning home?

- Always
- Sometimes
- Never
- Prefer not to answer
- Unsure

Health Symptoms

The next set of questions ask you about any possible health symptoms you may have experienced while responding to the Incident.

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Since the Incident have you experienced a new onset or worsening of symptoms in any of the following:

- Eyes
- Ears, Nose, Throat
- Central Nervous System
- Heart and Lungs
- Gastrointestinal Tract
- Skin
- Behavioral/Mental Health
- I have not experienced any of these symptoms
- Unsure

Please select which of the following eye-related symptoms you experienced or have been experiencing since your arrival at the Incident site:

- Increased watering/tearing
- Irritation/pain/burning in the eye(s)
- Blurred or double vision
- Bleeding in the eye(s)
- Other eye-related issues
- Unsure

Please describe your other eye-related symptom(s):

Please select which of the following you are experiencing with your ears, nose, or throat:

- Runny nose
- Burning nose or throat
- Nose bleeds
- Hoarseness
- Increased salivation
- Hearing loss or ringing in ears (tinnitus)
- Difficulty swallowing
- Swollen neck
- Pain in neck
- Odor on breath
- Stuffy nose/sinus congestion
- Increased congestion or phlegm
- Other ear, nose or throat issues
- Unsure

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Please describe your other ear, nose, or throat symptom(s):

Please select which of the following you are experiencing with your nervous system:

- Headache
- Dizziness/lightheadedness
- Loss of consciousness/fainting
- Weakness
- Tremor
- Less coordinated movement
- Numbness or tingling
- Other central nervous system issues
- Unsure

Please describe your other nervous system symptom(s):

Please select which of the following you are experiencing with your heart and lungs:

- Breathing slow
- Breathing fast
- Difficulty breathing/feeling out-of-breath
- Coughing
- Wheezing in the chest
- Slow heart rate/pulse
- Fast heart rate/pulse
- Chest tightness or pain/angina
- Burning sensation in the lungs
- Other heart or lung issues
- Unsure

Please describe your other heart and/or lung symptom(s):

Please select which of the following you are experiencing with your gastrointestinal tract:

- Abdominal pain
- Nausea
- Vomiting
- Diarrhea
- Other gastrointestinal issues
- Unsure

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Please describe your other gastrointestinal tract symptom(s):

Please select which of the following you are experiencing with your skin:

- 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 or pinpoint round spots on skin
- Blue coloring of ends of fingers/toes or lips
- Abrasion/scrape
- Bruise
- Other skin issues
- Unsure

Please describe your other skin symptom(s):

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Please select which of the following you are experiencing with your overall wellbeing:

- Anxiety
- Agitation/irritability
- Feeling hopeless or helpless
- Feeling distant, numb or detached
- Fatigue/tiredness
- Difficulty sleeping (falling asleep or staying asleep)
- Difficulty concentrating
- Difficulty remembering things
- Nightmares or bad dreams
- Unexplained fear
- Tension or nervousness
- An increase or decrease in your consumption of food or snacks
- A change in how often you exercise, participate in hobbies, or spend time with family and friends
- Suicidal thoughts or ideations
- Other
- Unsure

Please describe your other overall wellbeing symptom(s):

Did any of your health symptoms worsen or return when on-site at the Incident conducting your response job duties?

- Yes
- No
- Prefer not to answer
- Unsure

What do you think caused your symptom(s)?

Did you miss any days of work because of your response-related new onset or response-related worsening of existing symptoms?

- Yes
- No
- Prefer not to answer
- Unsure

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What is the highest level of healthcare you received to treat your symptoms?

- Hospitalized
- Seen in an emergency department
- Consulted a healthcare provider via phone /video conferencing
- Seen by a mental health or behavioral health professional
- Talked to a peer support specialist
- I did not receive any health care to treat my symptoms
- Unsure

How many days were you hospitalized?

How many days after beginning work as a responder to the Incident did you first receive medical care because of the Incident?

- Less than 24 hours after beginning work as a responder
- 1-2 days after beginning work as a responder
- 3-5 days after beginning work as a responder
- 6 days or longer after beginning work as a responder
- I did not seek medical care because of the Incident
- Prefer not to answer
- Unsure

What diagnosis were you given for the symptom(s) or health effect(s)?

Were you prescribed any medications or treatment for your symptoms that began after beginning work as a responder to this Incident?

- Yes
- No
- Prefer not to answer
- Unsure

What is the name of the medicine or medicines you were prescribed? If you can't remember, what was the medicine for?

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Did you take any over the counter medications for your symptoms that began after beginning work as a responder to this Incident?

- Yes
- No
- Prefer not to answer
- Unsure

What is the name of the medicine or medicines you took? If you can't remember, what was the medicine for?

Did the doctor or healthcare provider tell you that your symptom(s) were related to your work as a responder on this Incident?

- Yes
- No
- Prefer not to answer
- Unsure

Response Experience

Have you been part of a chemical spill or emergency response before?

- Yes
- No
- Prefer not to answer
- Unsure

How many chemical spills or emergency responses have you been involved in?

Resource needs

The next set of questions asks about resources.

As a result of this Incident, are you in need in any of the following: (check all that apply)

- Medicine or medical supplies
- Medical care
- Mental health care
- Financial support
- Food
- Water
- Shelter
- Utilities
- Transportation
- No needs
- Other
- Unsure
- None
- Prefer not to answer

Other resource needs?

Current Occupation Information

The next set of questions asks about your primary job.

Is being a responder your primary job?

- Yes
- No
- Prefer not to answer
- Unsure

What kind of work do you do? Or what is your job title? (e.g., registered nurse, janitor, cashier, auto mechanic, etc.)

What kind of business or industry do you work in? Or what does your employer make or do? (e.g., hospital, elementary school, clothing manufacturing, restaurant, etc.)

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Since February 3, 2023, is the physical working location for your primary job (i.e. agency or remote home office, agency headquarters, etc) within a 1-mile radius of the Incident? (see map below)

- Yes
- No
- Prefer not to answer
- Unsure

On average, how many hours per week do you work at your primary job?

On average since the Incident, how many hours per week have you worked on activities not associated with the response to this Incident?

Health behaviors

The next set of questions are about your health behaviors.

Do you currently smoke cigarettes?

- Yes
- No
- Prefer not to answer
- Unsure

Do you use e-cigarettes or other electronic vaping products?

- Yes
- No
- Prefer not to answer
- Unsure

Do you currently use smokeless tobacco?

- Yes
- No
- Prefer not to answer
- Unsure

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Since you responded to the Incident, have you had at least one drink of any alcoholic beverage such as beer, wine, a malt beverage, or liquor?

- Yes
- No
- Don't know
- Prefer not to answer

Since you first arrived on-site at the Incident, has your alcohol consumption:

- Increased
- Decreased
- Stayed about the same
- Prefer not to answer
- Unsure

Training questions

The following questions are about your responder training experience.

Have you ever received any of the following trainings or training topics? (check all that apply):

- First Responder Awareness
- First Responder Operations
- Hazardous Materials Technician
- HAZWOPER (24 hr)
- HAZWOPER (40 hr+)
- HAZWOPER annual refresher training (8 hr)
- Cleaning and decontamination procedures for flammable and combustible materials
- Hazard communication
- Safety procedures during a chemical incident
- Proper use of respiratory protection PPE
- Proper use of other PPE
- Other training(s)
- I have not had any of the above listed trainings
- Unsure
- Prefer not to answer

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Please describe your other training(s):

Have you had any of the following trainings in the past 12 months? (check all that apply):

- First Responder Awareness
- First Responder Operations
- Hazardous Materials Technician
- HAZWOPER (24 hr)
- HAZWOPER (40 hr+)
- HAZWOPER annual refresher training (8 hr)
- Cleaning and decontamination procedures for flammable and combustible materials
- Hazard communication
- Safety procedures during a chemical incident
- Proper use of respiratory protection PPE
- Proper use of other PPE
- Other training(s)
- I have not had any of the above listed trainings
- Unsure
- Prefer not to answer

Please describe your other training(s) taken in the past 12 months:

Do you feel that you were adequately prepared to respond to this Incident?

- Yes
- No
- Prefer not to answer
- Unsure

If no or unsure, why not?

Is there equipment, training, or information you wish you had? Please describe what and why.

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Demographic information

For health screening purposes only, please select your gender

- Male
- Female
- Prefer not to answer
- Other

Are you currently pregnant?

- Yes
- No
- Prefer not to answer
- Unsure

What is your race? (Check all that apply)

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

Please describe your race:

Do you consider yourself as Hispanic or Latino?

- Yes
- No
- Prefer not to answer

Are you covered by health insurance?

- Yes
- No
- Prefer not to answer
- Unsure

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Have you ever served on active duty in the U.S. Armed Forces, military Reserves or National Guard? Active duty does not include training in the Reserves or National Guard, but DOES include activation, for example, the war in Afghanistan.

- Yes, now on active duty
- Yes, on active duty in the last 12 months but not now
- Yes, on active duty in the past, but not in the last 12 months
- No, training or Reserves or National Guard only
- No, never served in the military
- Prefer not to answer

What is your highest level of education?

- Less than high school
- High school diploma or GED
- Some college education or associate's degree
- Bachelor's degree
- Graduate degree
- Prefer not to answer

Wrap-up

After the train derailment, do you currently have any lasting concerns about your health?

- Yes
- No
- Prefer not to answer
- Unsure

Please describe your concerns:

Please take this opportunity to share any other concerns we have not yet asked about or add detail to concerns addressed earlier in the survey. Is there anything else you would like us know?

Thank you for participating in this interview. The information you provided will be very helpful to our evaluation.

Please press the "NEXT" button to submit your responses.

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Was a copy of the completed survey printed and mailed?

- Yes
- No



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