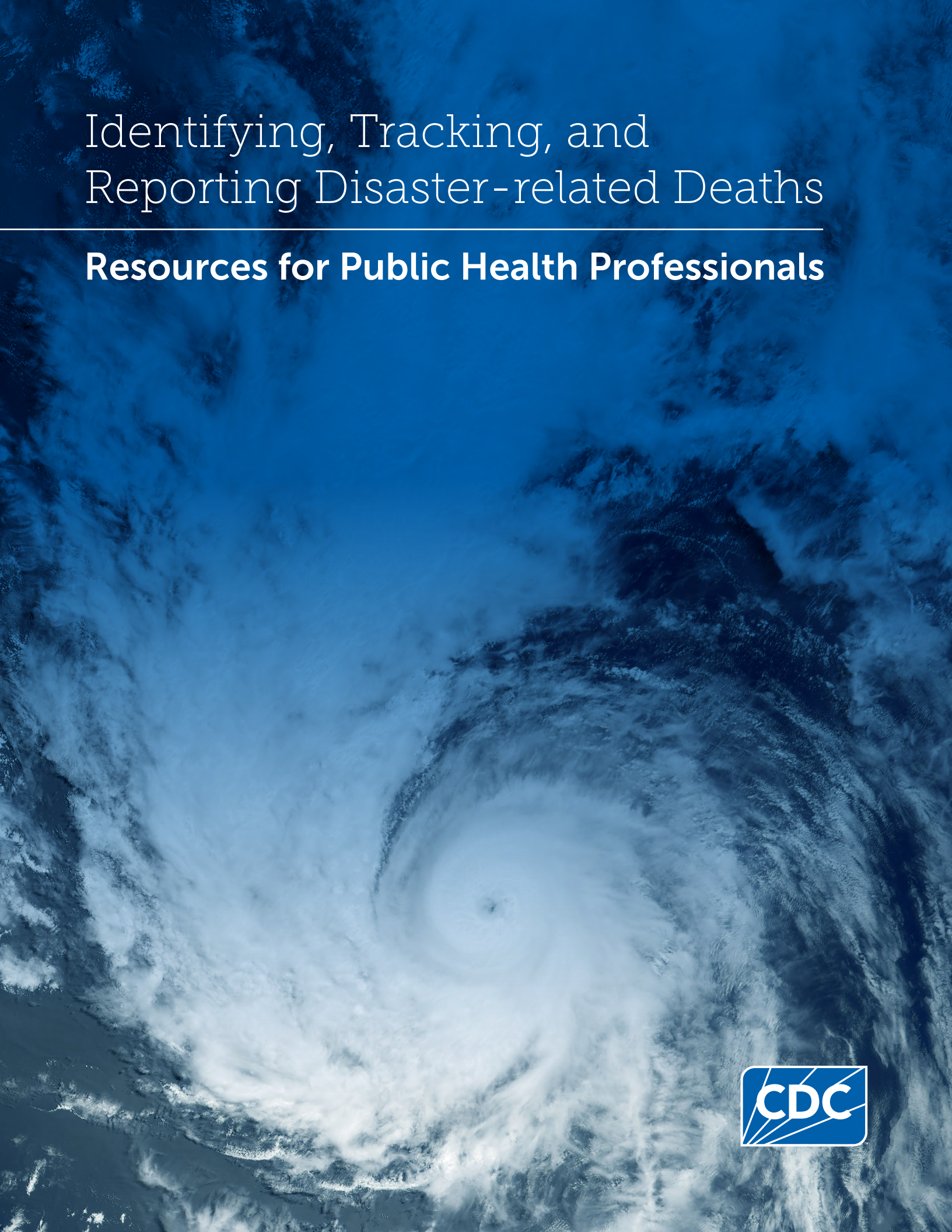

Identifying, Tracking, and Reporting Disaster-related Deaths

Resources for Public Health Professionals

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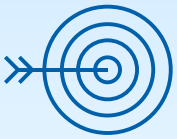
Contents

Introduction

Identifying, tracking, and reporting disaster-related deaths[i] is essential for emergency preparedness and response because it helps:

- guide immediate emergency management and public health response efforts,
- identify ongoing hazards requiring mitigation or public health messaging,
- strengthen the credibility and trust between government entities and the public during disaster response,
- indicate the severity of the disaster and inform the allocation of resources, including funding for recovery efforts, and
- inform public health preparedness, prevention, planning, and mitigation initiatives to prevent deaths in future disasters.

State, tribal, local, and territorial health departments have a critical role before, during, and after a disaster strikes. Before a disaster, health departments plan for how they will support the disaster response, including efforts to identify, track, and report disaster-related deaths in an accurate and timely fashion. During a disaster response, public health staff may conduct active surveillance to identify deaths in near real-time. Tracking disaster-related deaths can enable health departments to alert the public to high-risk activities or safety precautions that could prevent additional deaths. Later, during a disaster's recovery and mitigation periods, public health staff often review data on disaster-related deaths and conduct descriptive analyses of the circumstances of death, risk factors, and demographic characteristics of the decedents. Understanding how, when, and where people are most likely to die because of a disaster is key to helping mitigate deaths in future disasters.



GOALS

This guide has two main goals:

1. **Provide public health staff with background information on how disaster-related deaths are identified, tracked, and reported, including the key partners involved in these processes.**

2. **Describe activities that public health staff may conduct throughout the phases of disaster management. This section provides resources and examples that public health staff can use to help improve the process of identifying, tracking, and reporting disaster-related deaths in their jurisdiction.**

i While this document focuses on identifying, tracking, and reporting disaster-related deaths that occur during natural disasters, the recommendations provided may be applicable to human-induced or chemical/radiological disasters. However, additional coordination and steps may be required during a response to a human-induced or chemical/radiological disaster.

Photo Credit: CDC/Strategic National Stockpile Communications Team, 2016

Background

Health departments often use data on how, where, and when people die related to a disaster to determine how to prevent deaths in future disasters. Therefore, it is important for public health staff to understand how this information is identified, tracked, and reported by partners in their jurisdiction. These partners may include medical examiners or coroners (ME/Cs),[ii] vital registrars, and emergency management staff.

This section includes background information on common approaches used to identify, track, and report disaster-related deaths, along with a description of the roles and responsibilities of key partners. To note, these processes may differ depending on local jurisdictional and state processes.

Identifying Disaster-related Deaths

Medicolegal death investigators, under the supervision of ME/Cs, conduct death scene investigations and collect other information about how the person died, also known as the circumstances of death. ME/Cs use this information along with their examination of the body (e.g., external exam, autopsy) and diagnostic tests (e.g., X-ray, toxicology) to determine the cause and manner of death and ultimately whether the death was disaster-related.

ME/Cs determine if the forces or consequences of the disaster caused or contributed to the death, or in other words, whether the death was directly or indirectly related to the disaster. The Centers for Disease Control and Prevention (CDC) encourages ME/Cs to use a standard definition of directly and indirectly related disaster deaths to increase the uniform identification of disaster-related deaths and consistent reporting on the death certificate. The proposed standard definition included in Table 1 is adapted from CDC's *2017 Reference Guide for Certification of Deaths in the Event of a Natural, Human-induced, or Chemical/Radiological Disaster*.[1]

ii Death investigation systems vary by jurisdiction and include centralized state medical examiner offices, county/district-based medical examiners' offices, county-based mixture of medical examiners' and coroners' offices, and county/district-based coroners' offices. In Texas, justices of the peace perform coroner duties; however, throughout this document we will refer to ME/Cs. More information on laws by state can be found here.

Table 1. Directly and Indirectly Related Disaster Deaths

Type	Definition
Directly Related	Attributable to the forces of the disaster or by the direct consequences of these forces, such as structural collapse, flying debris, radiation exposure, or exposure to excessive environmental heat (e.g., heat wave).[1–3]
Indirectly Related	Attributable to unsafe or unhealthy conditions that are present during any phase of a disaster (i.e., before impact or while preparing for the disaster, during the disaster, or after the disaster's impact during cleanup and recovery) or a loss of disruption of usual services (e.g., power outage) and contributed to a death.[1–3]

Additionally, the National Association of Medical Examiners (NAME) developed a position paper, *Recommendations for the Documentation and Certification of Disaster-related Deaths*,[3] that provides questions for ME/Cs to help determine if a death is disaster-related. The position paper also describes how ME/Cs can indicate the involvement of the disaster when certifying deaths. For example, the position paper recommends including the disaster by name (e.g., 2018 Camp Fire, Hurricane Ida, Texas 2021 Winter Storm) on the death certificate when possible. In the instance that the disaster is not specifically named (e.g., some snowstorms, thunderstorms), the position paper suggests using the date of the disaster.[3] Using a standard naming convention and sharing this information with all ME/Cs in your jurisdiction can increase the likelihood that all disaster-related deaths will be identified, with reference to the disaster captured on the death certificate.

Tracking Disaster-related Deaths

Generally, the ME/C office will serve as the lead for tracking disaster-related deaths. ME/C offices may use a line list or log to track disaster-related deaths initially. A line list is a table or spreadsheet that includes a row for each disaster-related death, with columns for key variables, such as demographic information or date of death.

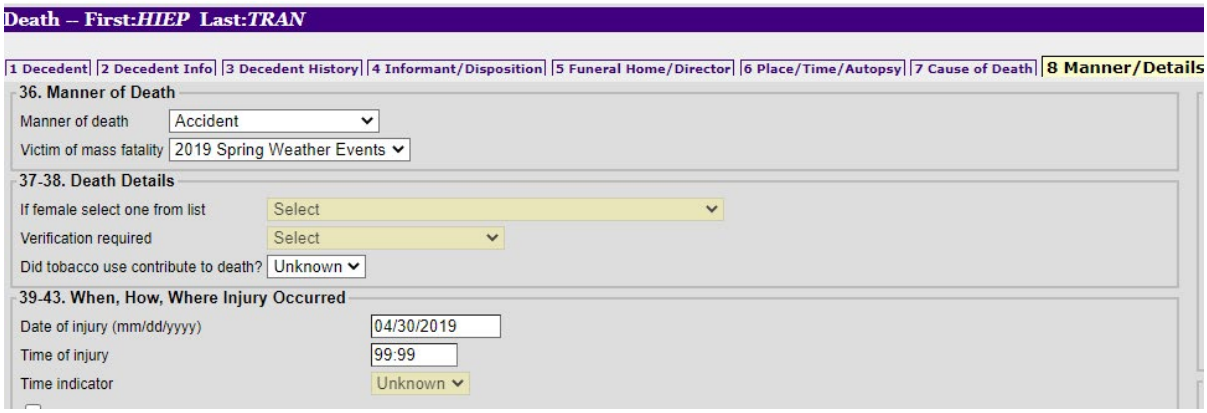
ME/Cs, vital records staff, and public health staff may track disaster-related deaths using different data systems, including:

- **ME/C Electronic Case Management System (CMS)—**Software used by ME/Cs to input, manage, and store case-related data. The CMS standardizes data entry and often allows for data aggregation and querying.
- **Electronic Death Registration System (EDRS)—**Secure, web-based, data management system operated by jurisdictional vital records' offices that is used to electronically complete, certify, and register deaths. An EDRS enhances communication between ME/Cs, funeral directors, and vital records office staff as they work together to register and certify deaths.[4]
- **Other public health data systems—**Public health staff may conduct active surveillance to identify disaster-related deaths in near real-time. These data are often stored in a separate database and may include data from ME/Cs.

Some jurisdictions implement features within their CMS or EDRS to improve the consistency of tracking disaster-related deaths. For example, alerts or pop-up boxes can help remind ME/Cs to include the naming convention of the disaster, disaster terms, and/or provide instructions for

where to document the death as disaster-related. Additionally, creating a disaster variable in the EDRS, such as a drop-down box, specific form field, or another alert, will denote that the death certificate record was disaster-related. This variable allows vital records staff to easily query and track deaths during a disaster. For example, as shown in Figure 1, the Oklahoma EDRS includes an incident-fatality marker of "2019 Spring Weather Events" for the "victim of mass fatality" drop-down. Incident fatality flags have been shown to improve sensitivity and accuracy in capturing disaster-related deaths.[5,6]

Figure 1. Example from Oklahoma EDRS of Incident-Fatality Marker



Reporting Disaster-related Deaths

Generally, the ME/C office will report data on disaster-related deaths to their jurisdiction's health department, vital records office, and/or emergency management agency. ME/C offices may use a line list of deaths reported daily, or more frequently, that contains new disaster-related deaths processed by the ME/C office. In some jurisdictions, public health staff may also report deaths identified through active surveillance to emergency management. Information about disaster-related deaths will also likely be reported to the governor's office or other state and local government officials, federal agencies, as well as the media or public. This process differs depending on the state and local jurisdiction; state response plans can outline this information in detail.

Summary of Roles and Responsibilities of Partners

Several partners contribute to efforts to identify, track, and report disaster-related deaths. Table 2 provides examples of the roles and responsibilities of health departments and their key partners.

Table 2. Roles and Responsibilities of Partners Involved in Identifying, Tracking, and Reporting Disaster-related Deaths

Office	Key Partners	Potential Roles and Responsibilities
Offices of the Medical Examiner or Coroner	ME/C, justice of the peace, forensic pathologist, medicolegal death investigators	• Conduct a death scene investigation to collect information on the death, such as basic decedent information and circumstances of the death to assist in determining the cause and manner of death • Complete death certificates indicating determined cause, manner of death, and circumstance(s) attributing the death to the disaster, if known • Report or provide a line list of deaths and circumstances of deaths to their leadership, emergency operations, and possibly health department • Serve as the spokesperson for jurisdiction regarding deaths
Vital Records Offices	Vital registrar, vital statistics staff	• Maintain the state or jurisdiction EDRS and provide just-in-time notices to remind ME/Cs how to complete the death certificates • Initiate pop-up boxes/alerts or flags in the EDRS • Review death certificate data submitted to EDRS • Compile data on disaster-related deaths and/or create reports to assist with reconciling the number of deaths for redundancy during an incident and for any post-disaster after-action reviews
Office of Emergency Management	Emergency response manager	• Work with state or local government to activate the Incident Command System and disaster response plan • Share aggregate or summary data on disaster-related deaths with the media to keep the public informed • Mortality information often is included in any daily situational reports • Ensure personal identifiable information is protected in any information shared publicly
Health Department	Epidemiologists, public health preparedness staff	• Conduct active mortality surveillance • Develop and issue public health messaging based on leading or emerging causes of death tracked through active surveillance or the ME/C office • Review data on disaster-related deaths and conduct descriptive analyses of the circumstances of death, risk factors, and demographic characteristics of the decedents after the disaster's impact • Conduct excess mortality analysis for disasters where disaster-related deaths may be underreported, such as disasters with long duration or natural deaths associated with the disaster (e.g., cardiovascular deaths during a period of extreme cold weather)

Public Health Activities: Before, During, and After a Disaster's Impact

Public health staff can contribute to key functions before, during, and after a disaster's impact, which will ultimately improve processes for identifying, tracking, and reporting disaster-related deaths and use of critical data. Before a disaster's impact, health departments can help with planning and preparedness efforts to improve protocols and increase the capabilities of both public health staff and ME/Cs by promoting trainings and exercises. During disaster response, health departments can conduct active surveillance and use the data collected to inform the public about the status of the disaster and ongoing hazards. During the response and recovery period, health departments can work with ME/Cs and emergency management staff to confirm the accurate number of deaths attributable to the disaster and identify areas for improvement in protocols as a part of evaluating the disaster response. Additionally, health departments can contribute to after-action reports documenting actions taken during the disaster response and lessons learned. Conducting more in-depth analysis of mortality data can also inform public health efforts to prevent future disaster-related deaths. This section provides resources and examples for public health staff related to each activity, as described in Table 3.

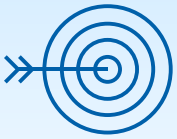
Table 3. Public Health Activities Before, During, and After a Disaster

Phase	Activity	Goals
Before a Disaster's Impact	Planning	• Establish common protocols with clear roles and responsibilities for identifying, tracking, and reporting deaths, such as a standard operating procedure (SOP), that all partners can follow during disaster response and recovery periods • Strengthen and formalize relationships between key partners and agencies (i.e., establish data licensing agreements [DLAs], data use agreements [DUAs], or memoranda of understanding [MOUs])
	Conducting trainings and participating in jurisdictional response exercises	• Increase capabilities of public health staff and partners to accurately identify, track, and report disaster-related deaths and educate them on existing definitions of directly and indirectly related disaster deaths to promote consistency in how these deaths are counted across jurisdictions. • Strengthen partnerships and understanding of roles and responsibilities by participating in jurisdictional response exercises.
During Disaster Response	Conducting active mortality surveillance	• Identify ongoing mortality risk factors for the current disaster to inform public health response efforts (e.g., removing hazards, informing the public) • Inform resource allocation with accurate and timely counts of disaster-related deaths
	Using data to inform the public	• Alert the public to ongoing mortality risk factors • Build trust with the public by providing accurate and timely updates on the impact of the disaster
After Disaster Response and Recovery	Contributing to after-action reports	• Reconcile differences in counts of disaster-related deaths to allow for an accurate assessment of the severity of the disaster • Identify areas f or improvement in protocols
	Analyzing Data	• Understand the "who, what, where, when, why" of disaster-related deaths, for example, by conducting descriptive analyses of mortality data • Inform public health efforts to prevent deaths in future disasters

Before a Disaster's Impact

Before a disaster's impact, health departments can support activities related to planning and conducting trainings and exercises. Public health staff can help confirm that their jurisdiction's protocols clearly articulate how to and who will identify, track, and report disaster-related deaths in what situations. Jurisdictions may describe these procedures in Emergency Operations Plans (EOPs), epidemiology and surveillance response plans, fatality management plans, or specific weather-related emergency plans. Public health staff can also promote existing trainings and conduct exercises to improve the capabilities of staff and key partners.

Planning



GOALS

- **Establish common protocols with clear roles and responsibilities for identifying, tracking and reporting deaths, such as an SOP, that all partners can follow during disaster preparedness, response, and recovery**
- **Strengthen and formalize relationships between key partners and agencies (i.e., establish DLAs, DUAs, or MOUs)**

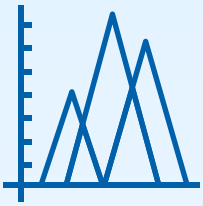
While reviewing protocols for disaster mortality tracking and reporting, it is useful to assess how these protocols align with the Public Health Emergency Preparedness (PHEP) capabilities outlined in CDC's *Public Health Emergency Preparedness and Response Capabilities: National Standards for State, Tribal, Local, and Territorial Public Health*.[7] The Council for State and Territorial Epidemiologists (CSTE) also developed a tool[8] that combines disaster epidemiology with PHEP capabilities to demonstrate how disaster epidemiology tools, resources, and trainings can assist health departments.

It may be helpful to convene key partners to review existing protocols or create new protocols. In a meeting, all partners can discuss strengths and gaps in existing protocols for identifying, tracking, and reporting disaster-related deaths. The questions in Figure 2 can be used to improve existing protocols for each process (i.e., identifying, tracking, and reporting).

Figure 2. Key Questions for Procedures to Identify, Track, and Report Disaster-related Deaths

IDENTIFYING

- Is there clear guidance for what constitutes a disaster-related death? Does the ME/C consider indirectly related disaster deaths?
- What information do death investigators collect during an investigation of a disaster-related death? Do they use a standard tool/form that collects sufficient evidence to assist the ME/C in attributing the death to the disaster?
- What is the process for ensuring that all necessary information to document the death as disaster-related is included on death certificates? Are alerts, flags, or pop-up boxes used in the EDRS?
- Which office is responsible for determining when active surveillance should be deployed?



TRACKING

- What data systems will be used by ME/Cs, vital registrars, emergency management, and public health staff to track disaster-related deaths?
- What information (e.g., cause of death, manner of death, location, demographics) will be tracked for disaster-related deaths? What is the trigger for starting to track deaths?
- What information will be sent to the Emergency Operations Center (EOC), or other partners?
- Who is responsible for analyzing data on disaster-related deaths to identify ongoing risk factors for disaster-related deaths and response (if needed)?

REPORTING

- Who is the lead for including disaster-related deaths in after-action reports and reporting those deaths to other partners, the media, and the public? How will you manage instances where inaccurate information from less reputable sources is shared publicly?
- How will data (including internal) be reported to other agencies and to the public throughout the response? What is the trigger to start the reporting process?
- What DLAs, DUAs, or MOUs are needed to share information across agencies?
- How do you ensure personal identifiable information is protected in any data sharing?
- Is there a process to reconcile differences in mortality counts from different data sources (e.g., ME/Cs, vital records, and emergency management)?

Photo Credit: James Gathany, 2020

Below are examples of guidance and planning documents for disaster response efforts. These materials may serve as helpful examples of incorporating partner roles/responsibilities, mortality tracking, and reporting processes into existing disaster response planning documents.

- Arizona Department of Health Services Disaster Epidemiological Response Guidance[9]

  This document provides an overview of surveillance activities, standardized forms/data collection templates, and checklists which can be used during a disaster or public health incident.

- Florida County Health Department Epidemiology Hurricane Response Toolkit[10]

  This toolkit was designed primarily for a county health department that is functioning locally and trying to respond to health needs and concerns in a post-hurricane situation. The toolkit includes recommendations and guidelines, sample forms and reports, plus sample spreadsheets with built-in calculations.

- State of Maine Department of Health and Human Services/Maine CDC All Hazards Emergency Operations Plan[11]

  This plan describes the roles and responsibilities in responding to a public health emergency in Maine. The plan describes how key public health preparedness and response activities are coordinated with medical resources, healthcare services, and other preparedness and response partners.

- Maryland Department of Health Extreme Cold Emergency Plan[12]

  This plan guides Maryland Department of Health actions during an extreme cold event and provides guidance for local health departments to support them as they fulfill their roles during the disaster.

Conducting Trainings and Participating in Jurisdictional Response Exercises

GOALS

- Increase capabilities of public health staff and partners to accurately identify, track, and report disaster-related deaths and educate them on existing definitions of directly and indirectly related disaster deaths to promote consistency in how these deaths are counted across jurisdictions.
- Strengthen partnerships and understanding of roles and responsibilities by participating in jurisdictional response exercises.

Trainings can help establish a common understanding of mortality tracking processes before a disaster, promote consistency across partners, and strengthen the response to fatalities during emergencies. The training modules and resources in Table 5 are appropriate for public health staff, medicolegal death investigators, ME/Cs, emergency responders, and public information officers. Continuing education credits (CEUs) are available for many of these trainings.

Additionally, public heatlh staff can participate in exercises led by other agencies in their jurisdiction (e.g., emergency management agency) to strengthen these relationships and establish a better understanding of each agency's roles and responsabilities. It is important for protocols regarding mortality tracking and reporting to be included in these exercises.

Table 5. Disaster Mortality Trainings and Resources

Training or Resource	Audience(s)	Purpose	CEUs
Guidance for Certification of Deaths in the Event of a Natural, Human-Induced, or Radiological/ Chemical Disaster*[2]	ME/Cs, vital registrars, public health staff	Provides guidance on capturing complete and accurate evidence about disaster-specific circumstances to determine cause of death and relation to disaster through a 30-minute eLearning	Yes
Disaster Epidemiology eLearning Modules*[13]	Public health staff	Provides modules on public health impacts of disasters, public health emergency management, Community Assessment for Public Health Emergency Response (CASPER), and disaster surveillance	Yes
Disaster Epidemiology 101: Tools for Public Health Preparedness, Response, and Recovery^[14]	Public health staff	Defines disaster epidemiology and its role in planning, response, and recovery efforts. Discusses the role of an epidemiologist throughout the disaster cycle and describes how epidemiologists can partner with emergency management	No
Death Scene Investigation After Natural Disasters or Other Weather-Related Events Toolkit*[15]	Medicolegal death investigators, ME/Cs	Provides guidance on capturing complete and accurate evidence about the disaster-specific circumstances to determine cause of death and relation to the disaster	No
Crisis and Emergency Risk Communication (CERC) Training*[16]	Emergency responders, public health staff	Offers webinars and training on how to communicate more effectively in an emergency	No, but plans to offer CEUs in the future
Emergency Management Institute (EMI) Public Information Officer (PIO) Training Program#[17]	Public information officers	Provides the opportunity to learn and practice gathering, verifying, coordinating, and disseminating public information at all levels of government	Yes

*Developed by CDC
^Developed by the CSTE
#Developed by the Federal Emergency Management Agency (FEMA)

During Disaster Response

During disaster response, public health staff may conduct active mortality surveillance using multiple data sources, including information from ME/Cs on disaster-related deaths. These data are used to understand how deaths are occurring in near real-time and to inform resource allocation. Additionally, public health staff can use data on disaster-related deaths to inform the public of any ongoing mortality risk factors and the impact of the disaster.

Conducting Active Mortality Surveillance

GOALS

- **Identify ongoing mortality risk factors for the current disaster to inform public health response efforts (e.g., removing hazards and informing the public)**
- **Inform resource allocation with accurate and timely counts of disaster-related deaths**

If feasible and appropriate, public health staff can conduct active mortality surveillance to collect near real-time mortality data, including demographic information and circumstances of death. Some jurisdictions use the CDC Disaster-related Mortality Surveillance Form[18] to collect information on disaster-related deaths. The data elements from this form can be captured electronically through a data system such as REDCap® or Epi Info™ | CDC[19] and merged into a central tracking document that all partners can access, such as a line list of disaster-related deaths. It is important to establish DLAs, DUAs, or MOUs to facilitate data sharing, as discussed previously. Examples of how select health departments conduct active mortality surveillance are provided in Table 6.

Table 6. Disaster-related Active Mortality Surveillance Examples

State	Staff Involved	Surveillance Methods
Texas	Texas Department of State Health Services (DSHS)	Vital statistics staff add a broadcast message to the EDRS alerting death certifiers[iii] to input a key term that indicates the death is disaster-related. For example, death certifiers would enter "Winter Storm 2021" in the "Cause of Death" section or "How Injury Occurred" box on the death certificate. With a DUA in place with the Vital Registrar's office, DSHS staff can review death certificates and identify the term used by death certifiers to confirm a death is disaster-related. DSHS staff also use Google Alert and manual searches on different internet browsers to identify deaths reported through the media. As deaths are identified, disaster epidemiologists reach out to death certifiers to complete a Disaster Mortality Surveillance Form[20] for every death that is disaster-related in near real-time. DSHS staff also review each death certificate for language suggestive of disaster involvement but lacking the key term and then contact the appropriate death certifier to ascertain whether the death is disaster-related. DSHS uses a line list to organize information about the disaster deaths that are identified by DSHS or reported to them.
Kentucky	Kentucky Department of Public Health (KDPH) Mortality Review Committee (epidemiologists, physicians, and nurses)	Regional epidemiologists, county coroners, and regional preparedness coordinators identify deaths that have potentially occurred because of the disaster and inform the KDPH. Regional epidemiologists enter this initial data into a disaster mortality database that initiates an investigation and then work with coroners to gather all pertinent information on the identified deaths. A KDPH mortality team reviews data from the death record (if available), information compiled by regional epidemiologists or preparedness coordinators in the field during disaster response efforts, and—for each death—determines if it was directly or indirectly related to the disaster.
Oklahoma	Oklahoma State Department of Health Injury Prevention Service (IPS)	IPS conducts surveillance through hospital medical records and medical examiner report reviews. The IPS reviews both hospital medical records (if available) and medical examiner reports for disaster-related decedents. The IPS receives and reviews medical examiner reports daily for all non-natural deaths. When a disaster occurs, the IPS can carefully review incoming reports for disaster-related injuries and incidents.

iii Death certifiers in Texas include ME/Cs and justices of the peace.

Photo Credit: Cade Martin, 2009

Using Data to Inform the Public

GOALS

- Alert public to ongoing mortality risk factors
- Build trust with public by providing accurate and timely updates on the impact of the disaster

Based on the leading causes and circumstances of the identified disaster-related deaths, public health staff can rapidly disseminate messaging that alerts the public to high-risk activities and safety precautions that may prevent additional deaths. Disaster-related mortality data can help public health staff strategically determine which messages to elevate based on the circumstances of the specific disaster. For example, health departments can target messaging about avoiding driving in flooded areas to prevent drownings or to using generators outdoors within a safe distance from their residence to minimize the risk of carbon monoxide poisoning if those types of deaths are occurring in a specific area. The National Weather Service's Turn Around Don't Drown® campaign is an example of messaging for ongoing hazards.[21] Health departments can distribute external communication and public health messaging to the public via social media messaging campaigns, press releases, agency memos, radio, or other communication channels. Communicating with the public is important for building trust, particularly by providing accurate and timely updates on the impact of the disaster.

Below are examples of public health messaging strategies that can be used for disaster response efforts. These materials provide guidance on best practices for using social media to communicate with the public, disaster-specific messaging examples, and broader guidance for risk communication strategies. These examples may be helpful for public health and emergency operations staff or a public information officer, depending on which office has a lead role in communications during a disaster.

- CDC's Preparedness and Safety Messaging for Hurricanes, Flooding, and Similar Disasters[22]

  This document serves as a resource for all jurisdictions to use before, during, and after a response for their communication planning. Messages can be adapted for web, press releases, media talking points, social media, fact sheets, and other communications materials.

- CDC's Hurricane Key Messages for Employers, Workers, and Volunteers[23]

  This document was developed in response to Hurricanes Harvey, Irma, and Maria. The resource focuses on key messages for employers, workers, and volunteers responding to the disasters including safety recommendations.

- CDC's Access and Functional Needs Toolkit: Integrating a Community Partner Network to Inform Risk Communication Strategies[24]

  This document provides guidance for emergency management officials, public health professionals, and other stakeholders to enhance effective risk communication by using preparedness planning and developing messages for the whole community.

- CDC's Public Service Announcements (PSAs) for Disasters[25]

  This website provides links to CDC public service announcements for natural disasters and severe weather. The media resources are available in a variety of formats including text, audio, and video.

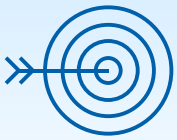
- World Health Organization's Communicating Risk in Public Health Emergencies[26]

  The World Health Organization produced recommendations and evidence-based guidance on how risk communication should be practiced in an emergency. The recommendations also offer guidance on building capacity for communicating risk during health emergencies.

After Disaster Response and Recovery

After the disaster response period, public health staff may participate in a hot wash, debrief, and/or after-action report. These efforts help identify areas for improvement in the protocols used for identifying, tracking, and reporting disaster-related deaths and ensure the accuracy of the confirmed number of disaster-related deaths. During and after the recovery period, public health staff may also conduct additional data analysis to further understand the impact of disaster-related deaths and inform efforts to prevent future deaths.

Contributing to After-Action Reports



GOALS

- **Reconcile differences in counts of disaster-related deaths to allow for an accurate assessment of the severity of the disaster**
- **Identify areas for improvement in protocols**

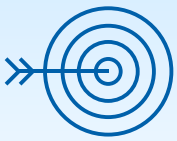
Through hot wash, debriefing, or after-action reporting, partners can discuss what worked well when identifying, tracking, and reporting disaster-related deaths. Partners can compare counts of disaster-related deaths by bringing their agency's line list of deaths to reconcile any inconsistencies identified in the vital records system. A discrepancy in death counts poses challenges to conveying the impact of the disaster to state officials and the public. Additionally, large discrepancies can create public distrust in the agencies that report this information. Death certificates can be amended as needed and other corrective actions determined. Information gathered during the debrief will be incorporated into after-action reports.

Potential questions to discuss include the followingPublic health staff may provide input on the overall agency after-action report, specifically contributing to the epidemiology and surveillance sections.

- What was supposed to happen? Did the process of identifying, tracking, and reporting disaster-related deaths go according to plan?
- What were the strengths of the process to identify, track, and report disaster-related deaths during the response?
- What improvements need to be implemented?
- Were relevant partners' roles and responsibilities clearly defined?
- Were the mortality counts, causes of death, and other data elements sent by the ME/C in a format that could be easily analyzed by others?
- Did vital records staff track deaths during the disaster, to ensure accurate reporting?
- Did vital records staff review whether death certificates included the disaster's terms or name (if applicable)? Did all death certificates with disaster terms receive a disaster ICD-10 code?

- Was there any discord between the number of deaths reported in the response and the number reported in EDRS?
- Were sources other than government partners disseminating information on disaster-related deaths that were vastly different than the official numbers? How was this inaccurate information addressed?
- How easily were partners able to share and transfer information across agencies, and/or across jurisdictions? Were there any challenges establishing any necessary DLAs, DUAs, or MOUs (if applicable)?
- How easily was information disseminated to the public?
- Were data on disaster-related deaths reported in a timely manner to appropriate individuals?
- What additional resources are needed for future disaster responses?

Analyzing Data



GOALS

- **Understand the "who, what, where, when, why" of disaster-related deaths, for example, by conducting descriptive analyses of mortality data**
- **Inform public health efforts to prevent deaths in future disasters**

Public health staff analyze disaster-related mortality data to understand more clearly the disaster's human impact and determine leading causes of death with the goal of preventing similar disaster-related deaths in the future. For example, descriptive analyses to review the demographic characteristics of the decedents can help identify potential disparities among populations disproportionately affected by the disaster. Understanding the common causes of disaster-related deaths can inform public health messaging for future disasters. Additionally, staff can evaluate the effectiveness of processes they used to identify, track, and report disaster-related deaths.

More complex analyses, such as excess mortality modeling, can provide a deeper understanding of the true impact of different types of disasters over time. Excess mortality is the difference between the observed number of deaths from all causes that occur during a specific time period and the number of deaths that would be expected during that time period had the disaster not occurred.[27]

When possible, jurisdictions can publish and disseminate the results of this data analysis to contribute to a broader understanding of deaths during disasters. Infographics, fact sheets, videos, and other communication products can describe the impact and importance of tracking disaster-related deaths. Dissemination strategies may include the following:

- Releasing public reports (e.g., press release)
- Making presentations at public health, emergency management, or ME/C conferences
- Publishing journal articles
- Sharing information with partners (e.g., the vital records office)
- Participating in existing meetings (e.g., the CSTE Disaster Epidemiology Workshop)

Below are examples of reports disseminated by different public health agencies across the United States. Examples include more informal reports documenting procedures employed during the disaster response and lessons learned, as well as peer-reviewed journal articles.

- Texas 2021 Winter Storm Mortality Surveillance Report[28]
  This report provides an overview of methodology used by the Texas Department of State Health Services to conduce disaster-related mortality surveillance and reports breakdowns of disaster-related deaths by county and decedent demographics.
- 2020 Oregon Wildfire Mobile Morgue Operation–Lessons Learned and Preparation for Future Mass Fatality Response[29]
  This document details the mobile morgue operations and State Medical Examiner's response to the wildfires in September 2020. It outlines the successes, challenges, and lessons learned in fatality management during this incident.
- New York City's evaluation of using EDRS for mortality surveillance following Hurricane Sandy[5]
  This peer-reviewed journal article describes findings from an evaluation of New York City's EDRS to conduct mortality surveillance during and after Hurricane Sandy.
- New York City's comparison of EDRS and American Red Cross Mortality Surveillance systems following Hurricane Sandy[30]
  This peer-reviewed journal article describes findings from a study that compared New York City's EDRS and the American Red Cross paper-based tracking system on accuracy of capturing disaster-related deaths during and after Hurricane Sandy.
- New York City's heat-related mortality report[31] and methods[32] appendix
  The mortality report provides information to the public on heat stress deaths and extreme heat incidents from 2010-2019, broken down by decedent demographics. The methods appendix provides detailed information on how the analyses were conducted.

Summary

Public health staff can actively participate in all phases of disaster management—preparedness, response, recovery, and mitigation—to improve the identification, tracking, and reporting of disaster-related deaths. Before a disaster strikes, health departments can coordinate with other key partners, such as ME/Cs, vital records, and emergency management to ensure that protocols are in place that clearly outline the roles and responsibilities of each partner. Health departments can also increase the capabilities of public health staff and partners by conducting training and exercises. During disaster response, public health staff may conduct active surveillance of disaster-related deaths and inform the public of identified risk factors to prevent additional deaths. After disaster response and recovery, public health staff can participate in debrief meetings to discuss what went well and areas for improvement during the disaster response. Health departments may consider conducting additional data analysis to identify groups that may have been disproportionately impacted by the disaster and use those findings to promote health equity during future disaster response efforts. Public health staff can also use this guide as a primer for understanding the overall process of identifying, tracking, and reporting deaths during a disaster and public health's role within that process.

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