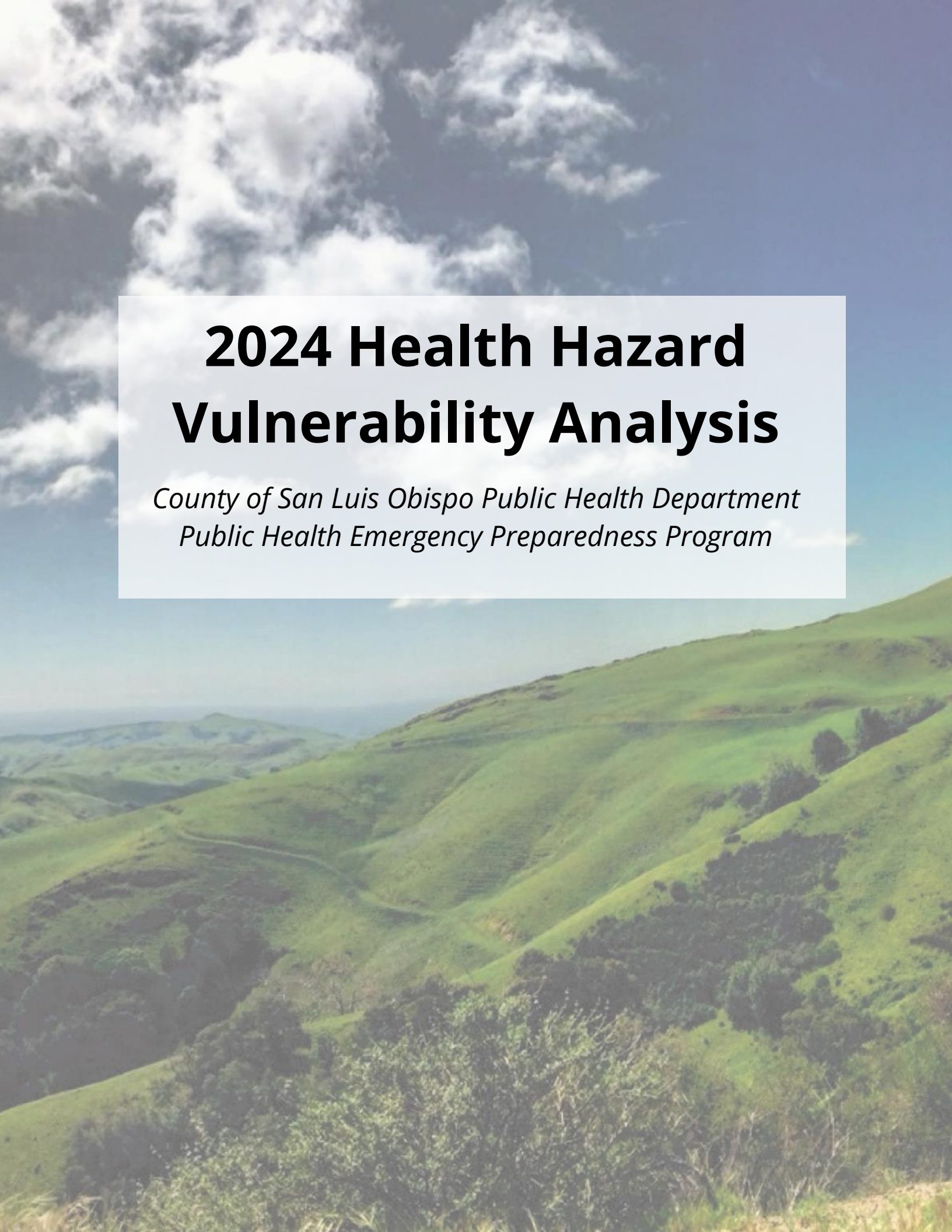

2024 Health Hazard Vulnerability Analysis

County of San Luis Obispo Public Health Department
Public Health Emergency Preparedness Program

Participants

Adventist Health Central Coast
Arroyo Grande Community Hospital
Atascadero State Hospital
Cambria Community Healthcare District
Central Coast Home Health
Community Health Centers
County of San Luis Obispo Disaster Healthcare Coalition
County of San Luis Obispo Office of Emergency Services
County of San Luis Obispo Public Health
- *Clinical and Communicable Disease Services*
- *Emergency Medical Services Agency*
- *Environmental Health*
- *Epidemiology*
- *Health Care Access*
- *Health Equity*
- *Health Officer*
- *Maternal & Child Health*
- *Planning, Evaluation, & Policy*
- *Public Health Emergency Preparedness Program*
- *Public Health Laboratory*

DaVita Pismo Beach Dialysis
DaVita Templeton Dialysis
Endoscopy Centers of the Central Coast
French Hospital Medical Center
Kallos Surgery Center
Long Term Care Ombudsman Services of San Luis Obispo County
Oak Park Surgery Center
San Luis Ambulance, Inc.
Tri-Counties Regional Center
Valhalla Surgery Center
Vineyard Hills Health Center

Introduction

The Health Hazard Vulnerability Analysis (HVA) is a report that details the vulnerabilities, impacts, and preparedness and response measures for the top ten hazards identified by the 2024 Health Risk Assessment. This HVA will be used as a reference to inform Public Health Emergency Preparedness planning, training, and exercises.

Vulnerabilities are characteristics of our community that increase susceptibility to a hazard and its impacts. These may be physical characteristics such as aging infrastructure or non-physical characteristics like public lack of knowledge on a hazard. Impacts are the effect a hazard may have on the community and its health. These can be physical impacts like damaged buildings or non-physical like delayed preventative care. Preparedness and response measures are actions that can be taken to help mitigate the effects of these hazards on the health of the community.

This report provides an overview of each hazard. It is likely that not all vulnerabilities, impacts, and preparedness and response measures are included, as the true list of these elements is extremely expansive. This document should be used as a general reference and not an exclusive list of vulnerabilities.

Methods

The Public Health Emergency Preparedness Program collected the information in this report through various methods. We used a risk assessment template from Los Angeles County to provide base calculations for our assessment. This template has been used in previous years' risk assessments and has proven effective.

For this assessment, we ensured that access and functional needs populations, the people most affected by disasters, were included. To accomplish this, we referenced the Pennsylvania Public Health Risk Assessment Tool to replicate their quantitative approach to inclusion. This approach used population characteristics to provide scores for the effect each type of hazard could have on populations most affected by disaster. The population characteristics and source of the data we used can be found in table 1 below.

Characteristic	Source
Hearing Disability	US Census - S1810 Disability Characteristics
Vision Disability	US Census - S1810 Disability Characteristics
Ambulatory Disability	US Census - S1810 Disability Characteristics
Cognitive Disability	US Census - S1810 Disability Characteristics
Limited English Proficiency	countyhealthrankings.org
Poverty	SLOhealthcounts.org
Chronic Diseases (Diabetes)	SLOhealthcounts.org
Children 18 and under	US Census - S0101 Age and Sex
Elderly 65 and over	US Census - S0101 Age and Sex

Table 1

Using the population characteristics and the methodology from the Pennsylvania tool, we created a score for the effect of each disaster on access and functional needs populations. These scores were used in the final impact calculations.

To calculate a frequency score, we used the past scores from the most recent risk assessment as a starting point. Most frequency scores stayed unchanged. However, some were increased or decreased based on updated risk information.

We divided participants into two groups, public health and healthcare, to align with the system impact scoring on the assessment template. Each participant received a survey to rate the impact of each hazard on the system they represented. The average for each hazard was calculated from the received responses and incorporated into a presentation.

We met with both the public health and the healthcare system groups to discuss the survey results and make any changes to the finalized scores for each hazard. We also consulted with the County of San Luis Obispo Office of Emergency Services for insight into the responder agency resources score and the community resource agencies scores. We provided the scores from the previous risk assessment, and they provided any necessary changes.

After the risk assessment portion was completed, the top 10 health hazards were identified. We created a survey for all participants to note the vulnerabilities, impacts, and preparedness and response measures for each of the top 10 hazards. This information was compiled and added to a presentation. We then met with all participants to review the survey information and make any additions or changes to the final report.

The information in this report is a compilation of the information collected during this process. We used Chat GPT to sort the information for each hazard into categories to aid with the outline process, but artificial intelligence was not used in the writing of this report.

Top Ten Health Hazards for the County of San Luis Obispo

1. Major Earthquake
2. Pandemic Flu
3. Pandemic Emergent Disease
4. Wildfire
5. Climate Change
6. Cyber Attack
7. Moderate Earthquake
8. Electrical Failure
9. Flood
10. Extreme Summer Weather

Hazard 1: Major Earthquake

Category: Natural Hazard

Vulnerabilities

A major earthquake stands to cause catastrophic damage to the County of San Luis Obispo infrastructure and healthcare systems due to several vulnerabilities. The county has one two-lane major highway for EMS response, evacuations, and supply deliveries. Access to people living in rural areas, elderly living alone, those without vehicles, and people with in-home medical devices would be most at-risk. The county is also home to Diablo Canyon Nuclear Power Plant, creating a potential secondary emergency in the event of a major earthquake. At the facility level, those without redundant communications would be without contact due to downed power lines or cell towers. Some facilities are older buildings that would face structural damage. Both hospitals in San Luis Obispo are two miles apart and likely would sustain similar damage. With a patient surge, there are limited medical support supplies as well as fuel supplies to maintain generators and vehicles.

Probability of Occurrence

The probability of occurrence for major earthquake was rated “occasional.” This means that the hazard is likely to occur at least once in the next 25 years.

Impact

A major earthquake in San Luis Obispo County would have a significant impact to the healthcare and emergency response systems. Damage to buildings, roadways, water and power lines would hinder emergency response efforts like transportation, communication, access, and medical support. The additional

staff needed for effective support may not be available due to injuries or inability to access facilities. People may become displaced and would need additional resources. Supplies may not be readily available because of damage to inventory or lack of access to deliver supplies.

Preparedness and Response Measures

Preparing for a major earthquake involves regularly assessing and maintaining buildings to ensure they are in line with earthquake resilience codes. Facilities should have a cache of emergency water and backup generators as well as a plan to obtain fuel. Redundant communications should be regularly tested and staff trained on emergency operations and plans. Create county-wide messaging that is multi-lingual and culturally relevant to reach as many people as possible.

Hazard 2: Pandemic Influenza

Category: Biological Hazard

Vulnerabilities

In the event of a surge related to pandemic flu, healthcare facilities may struggle with a lack of staffing and limited medical support equipment, such as beds, ventilators, medications, and oxygen tanks. Some facilities may not be able to accommodate proper separation of patients due to a lack of beds and private rooms. Older adults, people with pre-existing conditions, people who are pregnant, children, and those in low-income or crowded housing are most at risk. Additionally, those with a lack of healthcare access, such as those not fluent in English or Spanish, people experiencing homelessness, or those living in rural areas, may experience disparities. A lack of information or misinformation related to pandemic flu may also hinder medical assistance. Delay in response to pandemic flu could be related to low political support, lack of personal protective equipment, or supply chain hinderance.

Probability of Occurrence

The probability of occurrence for pandemic influenza was rated “occasional.” This means that the hazard is likely to occur at least once in the next 25 years.

Impact

Pandemic flu would have a great impact on the healthcare system due to the likelihood of a patient surge and increased medical support. Spread of illness would be more difficult to control in small, impacted facilities with a lack of private rooms. Staff shortages are likely to occur with a higher demand for workers coupled with personnel unable to report due to sickness. Along with

staff shortages, strain would be put on the emergency medical response system as 911 calls increase, and staff become burnt-out. With more patients, a demand for supplies could cause shortages and delays in medical care. Elective procedures may be cancelled or businesses closed altogether. There may also be an increase in deaths as well as patients needing long-term medical support.

Preparedness and Response Measures

When preparing for pandemic flu, it is important to ensure a well-stocked cache of supplies is maintained, especially including personal protective equipment. PPE is vital for maintaining operations in healthcare facilities and out in the field for first responders. To mitigate the spread of illness, vaccinations should be dispensed as early as possible. The use of mobile vaccination units will create greater access in rural areas and within communities of higher risk to slow the spread. Effective communication of information to the public around prevention and when to seek care may decrease impacts on the healthcare system. Communication regarding the situation and supply status/needs will help to mitigate shortages.

Hazard 3: Pandemic Emergent Disease

Category: Biological Hazard

Vulnerabilities

The vulnerabilities for pandemic flu would exist for pandemic emergent disease. In addition, due to the novelty of an emergent disease, there is the potential for lack of familiarity with that disease which may impact medical understanding and patient awareness. A case definition for the disease may not exist yet and needs development. There will also be an initial lack of availability to test for the disease. Additionally, the movement of migrant workers along with the heavy tourism of the area increases the potential for disease spread.

Probability of Occurrence

The probability of occurrence for pandemic emergent disease was rated "occasional." This means that the hazard is likely to occur at least once in the next 25 years.

Impact

In addition to the public health impact factors described for pandemic flu, pandemic emergent disease has a few more potential impacts. Depending on the disease, previously healthy people may become disabled due to the disease, further straining the healthcare system. Public panic could increase for diseases with less common symptoms like bleeding or seizures. There will be an increased need for lab services to confirm probable cases and test exposed individuals.

Preparedness and Response Measures

Building off of the considerations for Pandemic Flu, syndromic surveillance could help identify unusual patterns of disease in the county to allow a response to begin more quickly. We would rely on CDPH and CDC as subject matter experts.

Hazard 4: Wildfire

Category: Natural Hazard

Vulnerabilities

At the county level, high vegetation poses a risk for wildfires. Rural areas are at an even greater risk because of overgrowth and limited road access. The North County areas experience extreme heat in the summer, increasing the threat of wildfires. In the healthcare system, there are no medical burn units and limited emergency medical support equipment, such as oxygen. There may be a lack of community resilience when faced with the need to evacuate.

Probability of Occurrence

The probability of occurrence for wildfire was rated “frequent.” This means that the hazard is likely to occur cyclically or annually within the next 25 years.

Impact

Wildfires pose a significant threat to San Luis Obispo County. Building damage would cause displacement or injury, putting strain on emergency medical services. Damage or threat of damage to healthcare facilities would lead to challenging evacuations of patients. Those working or living outside may be more impacted by smoke and poor air quality. Prolonged air-quality issues increase the need for respiratory therapy treatments. In summer months, Public Safety Power Shutoffs would impact the use of air conditioning and other in-home medical devices. An increased need for respirators may cause supply chain issues.

Preparedness and Response Measures

Facilities should maintain and train on evacuation plans as well as maintain a cache of respirators. Evacuation plans should include alternative means of transportation to reduce the need for ambulance services. Plan for medical shelters if patients need to be discharged. Fire roads should also be maintained and vegetation managed. Alert systems and notifications should be multi-lingual, culturally relevant, and timely.

Hazard 5: Climate Change

Category: Natural Hazard

Vulnerabilities

In high summer heat, the electric grid may not be able to sustain increased demand. There is a lack of staffing and coordination to support climate resilience centers. Our county has a higher population of people over 65 than the average. The elderly are more susceptible to heat-related illness/injury. Many homes do not have air conditioning and would struggle to manage high-heat events. The supply chain in America is susceptible to impacts from disasters in other parts of the country/world caused by climate change. A disaster does not have to happen here to impact our medical and public health system. We host many migrant workers throughout the year who are more vulnerable to the effects of extreme weather events.

Probability of Occurrence

The probability of occurrence for climate change was rated “frequent.” This means that the hazard is likely to occur cyclically or annually within the next 25 years.

Impact

Climate change has the potential to create multiple other hazards such as floods, extreme heat, drought, wildfires, and rising sea levels. Hot days can put a strain on HVAC systems at healthcare facilities. Air quality issues can increase the strain on our healthcare system. There could be an increased need for mental health support for people affected by extreme weather events. Climate change will impact the distribution of insect vectors that can increase or bring in

new disease. People with chronic diseases can experience worsened symptoms from changes in weather and extreme weather.

Preparedness and Response Measures

Ensure healthcare facilities have a backup generator or alternate power supply in case of outages. Identify climate resilience hubs in neighborhoods. Increase the availability of cooling centers during extreme heat. Ensure insect vectors of disease are appropriately surveilled and implement vector control programs. Increase public messaging and education to ensure people are aware of the protective actions they can take during extreme weather events. We would need to coordinate with existing climate resilience hubs to learn best practices and advice for setting up our own hub.

Hazard 6: Cyber Attack

Category: Technological Hazard

Vulnerabilities

Due to the heavy reliance on electronic documentation and housing sensitive information, healthcare entities are vulnerable to a cyber attack. Smaller facilities may be more at risk for lack of IT resources to provide strong security. Many communications systems, including dispatch and mapping, are connected to the internet and some facilities may not have a form of redundant communications. There may be a lack of back up non-cyber records for patient treatment and accessing information. Staff may also not be thoroughly trained in safeguarding electronic systems.

Probability of Occurrence

The probability of occurrence for cyber attack was rated “probable.” This means that the hazard is likely to occur several times within the next 25 years.

Impact

A cyber attack on a healthcare entity could breach personal health or financial information, violating HIPAA agreements and potentially leading to identity theft or stolen funds. Loss of access to healthcare records and reporting systems may delay or hinder patient care such as ordering and dispensing prescription medications. Patient trust in a facility’s ability to protect information may be compromised.

Preparedness and Response Measures

Training and exercises are vital when it comes to preparing for a cyber attack as staff are the first line of defense. Healthcare facilities should maintain staff dedicated to supporting cyber security. Emergency plans should have outlines for redundant systems and backups in the event of a cyber attack. A facility should report an attack immediately to inform other agencies.

Hazard 7: Moderate Earthquake

Category: Natural Hazard

Note: The information listed for Major Earthquake applies to a moderate earthquake, just in a reduced scale and/or severity. Please reference the "Hazard 1: Major Earthquake" section for information on this hazard.

Probability of Occurrence

The probability of occurrence for moderate earthquake was rated "occasional." This means that the hazard is likely to occur at least once in the next 25 years.

Hazard 8: Electrical Failure

Category: Technological Hazard

Vulnerabilities

Many medical support services rely on electricity such as dialysis, MRI machines, or other emergency medical equipment. People who need in-home medical support devices and are without access to backup power or emergency aid may face difficulties in the event of an electrical failure. There are limited capabilities when using a generator or e-power and a failure of backup power would significantly increase risks to facilities and the patients. Access to fuel supplies may be limited as demand increases. Most communications rely on electricity to

Probability of Occurrence

The probability of occurrence for electrical failure was rated “probable.” This means that the hazard is likely to occur several times within the next 25 years.

Impact

An electrical failure would greatly disrupt or hinder healthcare and emergency medical services as many support functions need electricity to operate. Some smaller facilities may close due to a lack of backup power. Facilities and ambulances with generators will need fuel to keep running which may be difficult to obtain. Care will be limited with loss of access to electronic medical records and equipment that may not be operable. Individuals living with an in-home medical device may face injury or fatality. In summer seasons, an electrical failure could cause an increase in heat related illness with no air conditioning. Communications issues may arise if these systems are connected to the main power supply.

Preparedness and Response Measures

Emergency plans should include sufficient backup power sources such as generators and battery packs, redundant communications systems, and resource access like fuel and water. Additionally, staff should be trained on plans and operating procedures of an electrical failure. Residential facilities should note individuals who rely on a power supply for medical devices and have a plan in place for an outage. Messaging that is multi-lingual and culturally relevant should be used to inform the public on what to do during an electrical failure.

Hazard 9: Flood

Category: Natural Hazard

Vulnerabilities

A major vulnerability in the event of a flood is limited access on roads. There is only one major highway and few routes to access hospitals and rural communities. The Cuesta Grade is a significant section of the highway and is more prone to mudslides due to the steep surrounding hills. Those who work outside or who are experiencing homelessness may not have a safe place to relocate.

Probability of Occurrence

The probability of occurrence for flood was rated “probable.” This means that the hazard is likely to occur several times within the next 25 years.

Impact

Patients needing treatments, such as those on dialysis, may not be able to get to a healthcare facility. This could put a strain on the EMS system to transport people needing assistance. Staff may also not have access to report to work. Flooding could also cause water damage to facilities, limiting available services and creating exposure to mold. There may be a shortage of supplies if there is no access to deliver needed resources. People may become displaced if evacuations are needed, or they cannot access their home. Additionally, flood water creates the high potential for infectious disease.

Preparedness and Response Measures

To mitigate the impact of a flood, facilities should be prepared with flood control supplies like sandbags. Waterways and surrounding land should be maintained to reduce damage. Emergency plans should be up to date and flood scenarios exercised with staff. Facilities should coordinate with partners and provide situation reports. Messaging that is multi-lingual and culturally relevant should be used to inform the public on what to do during a flood.

Hazard 10: Extreme Summer Weather

Category: Natural Hazard

Vulnerabilities

Many facilities have old and outdated infrastructure such as HVAC systems and insulation. Some buildings may not have any form of air conditioning. Individuals living in rural areas or those who are not mobile may not be able to access a cooling center. There also is a lack of facilities and staff to provide cooling centers.

Probability of Occurrence

The probability of occurrence for extreme summer weather was rated "frequent." This means that the hazard is likely to occur cyclically or annually within the next 25 years.

Impact

Extreme summer weather can have various impacts throughout the county. There may be an increased number of patients with heat-related illnesses and injury. High heat also increases the risk of wildfires and the need for public safety power shutoffs. These power shutoffs in extreme weather could disrupt healthcare services and put more people at risk for heat-related illnesses. Environmental factors like drought could lead to other issues such as valley fever and an increase in vectors.

Preparedness and Response Measures

Ahead of extreme summer weather, it is important to identify populations that do not have access to cooling or water. Planning for extra resources, cooling

centers, and public messaging about the signs of heat-related illness/injury may mitigate health effects of extreme summer weather.