

# HAZARD IDENTIFICATION

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ALAMO AREA COUNCIL OF GOVERNMENTS  
REGIONAL MITIGATION ACTION PLAN UPDATE

## 6.5.13 Pandemic (Human and Animal)

### 6.5.13.1 Hazard Identification

#### Description of the Pandemic (Human and Animal) Hazard

Pandemic hazards, also known as biohazards, refer to illnesses that pose a threat to the health of living organisms, primarily that of humans and domesticated animals, including livestock. In humans, these can include seasonal illnesses, such as colds or influenza viruses, or more specific outbreaks, such as H1N1 or bird flu. In animals, this can include a variety of illnesses, some of which are transmittable to humans.

A zoonosis is any infectious disease that can be transmitted (in some instances, by a vector) from non-human animals, both wild and domestic, to humans or from humans to non-human animals (the latter is sometimes called reverse zoonosis or anthroponosis). Of the 1415 pathogens known to affect humans, 61% are zoonotic. The emergence of a pathogen into a new host species is called disease invasion. The emerging interdisciplinary field of conservation medicine, which integrates human and veterinary medicine, and environmental sciences, is largely concerned with zoonoses.

#### Severity of the Pandemic Hazard

The United States' Centers for Disease Control and Prevention (CDC) categorizes various diseases in levels of biohazard, Level 1 being minimum risk and Level 4 being extreme risk.

- **Biohazard Level 1:** Bacteria and viruses including *Bacillus subtilis*, canine hepatitis, *Escherichia coli* (*E. Coli*), varicella (chicken pox), as well as some cell cultures and non-infectious bacteria. At this level precautions against the biohazardous materials in question are minimal, most likely involving gloves and some sort of facial protection. Decontamination procedures for this level are similar in most respects to modern precautions against everyday viruses (i.e.: washing one's hands with anti-bacterial soap, washing all exposed surfaces of the lab with disinfectants, etc). In a lab environment, all materials used for cell and/or bacteria cultures are decontaminated via autoclave.
- **Biohazard Level 2:** Bacteria and viruses that cause only mild disease to humans, or are difficult to contract via aerosol in a lab setting, such as hepatitis A, B, and C, influenza A, Lyme disease, salmonella, mumps, measles, scrapie, dengue fever, and HIV. Research work (including co-cultivation, virus replication studies, or manipulations involving concentrated virus) can be done in a BSL-2 facility, using BSL-3 practices and procedures. Virus production activities, including virus concentrations, require a BSL-3 facility and use of BSL-3 practices and procedures.
- **Biohazard Level 3:** Bacteria and viruses that can cause severe to fatal disease in humans, but for which vaccines or other treatments exist, such as anthrax, West Nile virus, Venezuelan equine encephalitis, SARS virus, variola virus (smallpox), tuberculosis, typhus, Rift Valley fever, Rocky Mountain spotted fever, yellow fever, and malaria. Among parasites *Plasmodium falciparum*, which causes Malaria, and *Trypanosoma cruzi*, which causes trypanosomiasis, also come under this level.

# HAZARD IDENTIFICATION

ALAMO AREA COUNCIL OF GOVERNMENTS  
REGIONAL MITIGATION ACTION PLAN UPDATE

- Biohazard Level 4:** Viruses and bacteria that cause severe to fatal disease in humans, and for which vaccines or other treatments are *not* available, such as Bolivian and Argentine hemorrhagic fevers, H5N1(bird flu), Dengue hemorrhagic fever, Marburg virus, Ebola virus, hantaviruses, Lassa fever, Crimean-Congo hemorrhagic fever, and other hemorrhagic diseases. When dealing with biological hazards at this level the use of a Hazmat suit and a self-contained oxygen supply is mandatory. The entrance and exit of a Level Four biolab will contain multiple showers, a vacuum room, an ultraviolet light room, autonomous detection system, and other safety precautions designed to destroy all traces of the biohazard. Multiple airlocks are employed and are electronically secured to prevent both doors opening at the same time. All air and water service going to and coming from a BSL- 4 lab will undergo similar decontamination procedures to eliminate the possibility of an accidental release.

The Center for Disease Control and Prevention (CDC) determines the severity of pandemics and communicable disease outbreaks based on a measurement system is known as the Pandemic Severity Index. The index focuses less on how likely a disease will spread worldwide-that is, become a pandemic-and more upon how severe the epidemic actually is. The main criterion used to measure pandemic severity will be case-fatality ratio (CFR), the percentage of deaths out of the total reported cases of the disease.

The analogy of “category” levels was introduced to provide an understandable connection to hurricane classification schemes, with specific reference to the recent aftermath of Hurricane Katrina. Like the Saffir-Simpson Hurricane Scale, the PSI ranges from 1 to 5, with Category 1 pandemics being most mild (equivalent to seasonal flu) and level 5 being reserved for the most severe "worst-case" scenario pandemics (such as the 1918 Spanish flu).

**Table 6.5.13.1-1  
Centers for Disease Control and Prevention Pandemic Severity Index**

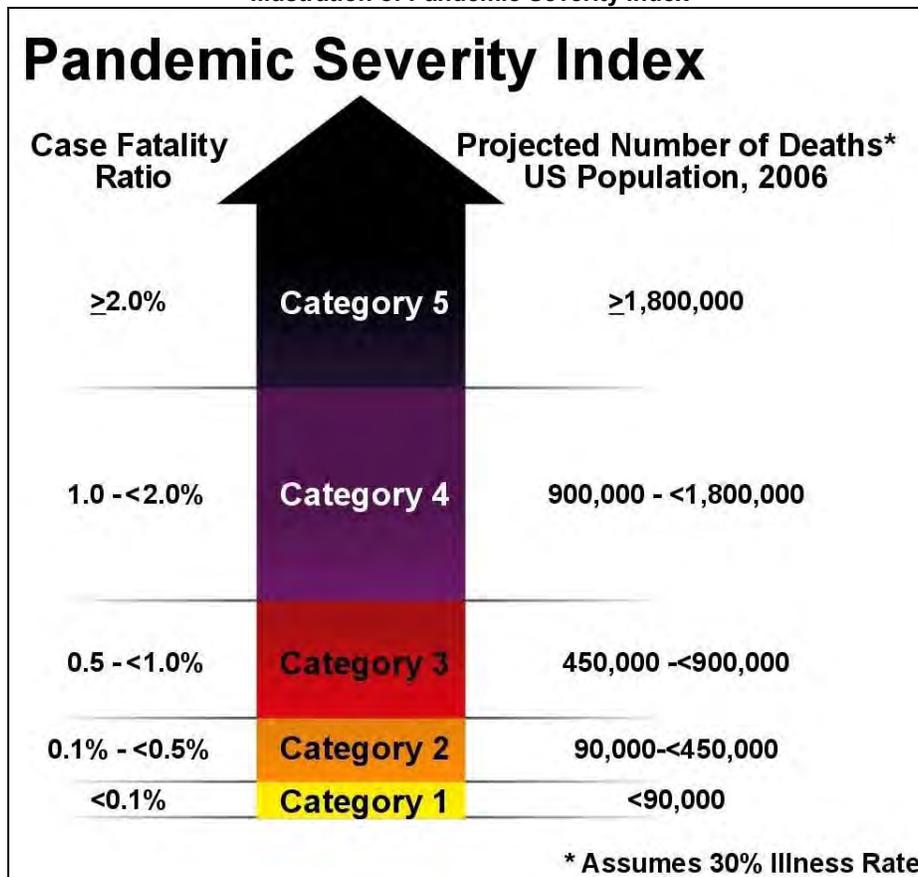
Category	Case Fatality Ratio	Example(s)
1	less than 0.1%	Seasonal Flu and Swine Flu
2	0.1% to 0.5%	Asian Flu and Hong Kong Flu
3	0.5% to 1%	No examples provided
4	1% to 2%	No examples provided
5	2% or higher	Spanish flu

The following image, obtained from the CDC’s website, illustrates the practical application of the above described Pandemic Severity Scale.

# HAZARD IDENTIFICATION

ALAMO AREA COUNCIL OF GOVERNMENTS  
REGIONAL MITIGATION ACTION PLAN UPDATE

Figure 6.5.13.1-1  
Illustration of Pandemic Severity Index



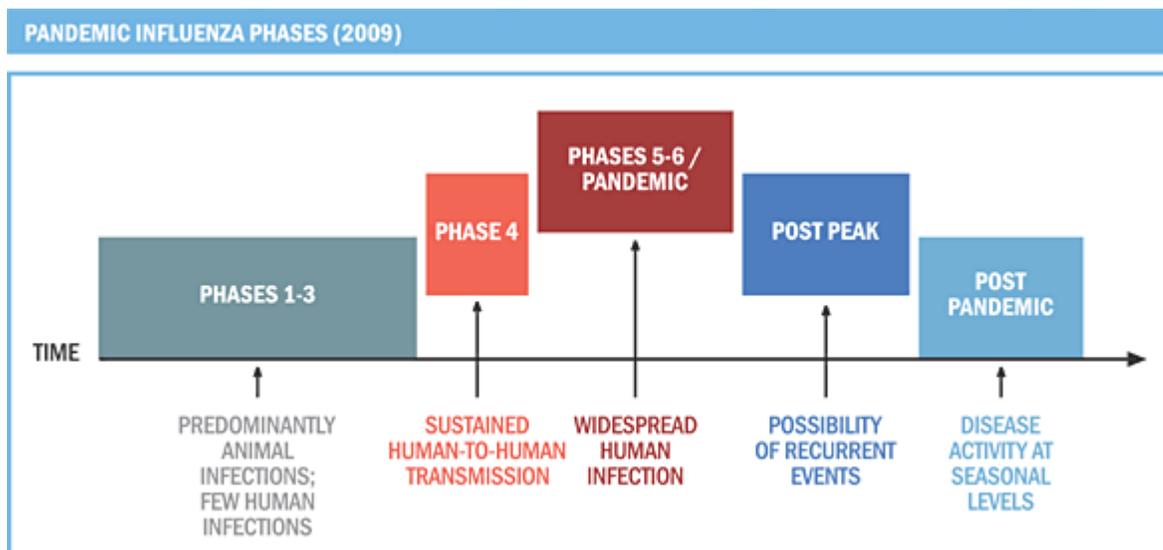
Source: Center for Disease Control and Prevention.

The World Health Organization (WHO) monitors animal disease outbreaks for signs of pandemic spread or transference to humans. Figure 6.5.13.1-2 illustrates the WHO's determined phases of pandemic influenza transmission from animals to humans and from human-to-human transmission. A discussion of the phases depicted appears below the figure.

# HAZARD IDENTIFICATION

ALAMO AREA COUNCIL OF GOVERNMENTS  
REGIONAL MITIGATION ACTION PLAN UPDATE

Figure 6.5.13.1-2  
World Health Organization Pandemic Flu Phases



Source: The World Health Organization.

In nature, influenza viruses circulate continuously among animals, especially birds. Even though such viruses might theoretically develop into pandemic viruses, in **Phase 1** no viruses circulating among animals have been reported to cause infections in humans.

In **Phase 2** an animal influenza virus circulating among domesticated or wild animals is known to have caused infection in humans, and is therefore considered a potential pandemic threat.

In **Phase 3**, an animal or human-animal influenza reassortant virus has caused sporadic cases or small clusters of disease in people, but has not resulted in human-to-human transmission sufficient to sustain community-level outbreaks. Limited human-to-human transmission may occur under some circumstances, for example, when there is close contact between an infected person and an unprotected caregiver. However, limited transmission under such restricted circumstances does not indicate that the virus has gained the level of transmissibility among humans necessary to cause a pandemic.

**Phase 4** is characterized by verified human-to-human transmission of an animal or human-animal influenza reassortant virus able to cause "community-level outbreaks." The ability to cause sustained disease outbreaks in a community marks a significant upwards shift in the risk for a pandemic. Any country that suspects or has verified such an event should urgently consult with WHO so that the situation can be jointly assessed and a decision made by the affected country if implementation of a rapid pandemic containment operation is warranted. Phase 4 indicates a significant increase in risk of a pandemic but does not necessarily mean that a pandemic is a foregone conclusion.

**Phase 5** is characterized by human-to-human spread of the virus into at least two countries in one WHO region. While most countries will not be affected at this stage, the declaration of Phase 5 is a strong signal that a pandemic is

# HAZARD IDENTIFICATION

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## ALAMO AREA COUNCIL OF GOVERNMENTS REGIONAL MITIGATION ACTION PLAN UPDATE

imminent and that the time to finalize the organization, communication, and implementation of the planned mitigation measures is short.

**Phase 6**, the pandemic phase, is characterized by community level outbreaks in at least one other country in a different WHO region in addition to the criteria defined in **Phase 5**. Designation of this phase will indicate that a global pandemic is under way.

During the post-peak period, pandemic disease levels in most countries with adequate surveillance will have dropped below peak observed levels. The post-peak period signifies that pandemic activity appears to be decreasing; however, it is uncertain if additional waves will occur and countries will need to be prepared for a second wave.

Previous pandemics have been characterized by waves of activity spread over months. Once the level of disease activity drops, a critical communications task will be to balance this information with the possibility of another wave. Pandemic waves can be separated by months and an immediate “at-ease” signal may be premature.

In the post-pandemic period, influenza disease activity will have returned to levels normally seen for seasonal influenza. It is expected that the pandemic virus will behave as a seasonal influenza A virus. At this stage, it is important to maintain surveillance and update pandemic preparedness and response plans accordingly. An intensive phase of recovery and evaluation may be required.

### Impact to People and Property from the Pandemic Hazard

Communicable disease outbreaks and pandemics will have the most immediate impact on life and health safety. The extent of the impact will be contingent on the type of infection or contagion, the severity of the outbreak, and the speed at which it is transmitted. Property and infrastructure could be affected if large portions of the population were affected and unable to perform maintenance and operations tasks. For example, if a large percentage of municipal or county staff were taken ill, the ability of the county or local governments to fulfill their governmental obligations may be negatively impacted.

### Occurrences of the Pandemic Hazard

Occurrences of the biological event hazard are fairly common. In recent history, there have been a number of *E. coli* and *Salmonella* outbreaks traced to issues or deficiencies in the nation’s food supply, or to particular restaurants or chains. Recent mutations in the influenza virus resulted in the World Health Organization (WHO) declaring H1N1 to be a global pandemic.

In Texas, there have been several occurrences of biological hazards, as reported by the CDC. In 2005, there were cases of dengue fever reported in South Texas, near the border with Mexico. Also in 2005, in the Houston area, approximately 1,100 evacuees from Hurricanes Katrina and Rita were infected with norovirus. During the winter of 2009 and early spring of 2010, 429 cases of the mumps were reported in the greater Houston area.

In 2001, several cases of anthrax were reported in both humans and cattle in South Texas and in the San Antonio area, including Bandera County, where a fatality occurred, based on information obtained from the CDC.

In 2005, a petting zoo that exhibited at two Florida fairs and a festival was traced as the source of an *E. coli* outbreak. Sixty-three people who had visited the Florida State Fair, the Central Florida Fair, or the Florida Strawberry Festival

# HAZARD IDENTIFICATION

---

## ALAMO AREA COUNCIL OF GOVERNMENTS REGIONAL MITIGATION ACTION PLAN UPDATE

reported illness to investigators for the Florida Department of Health. A case-control study revealed that illness was associated with exposure to a petting zoo exhibit present at all three events.

In early 2010, at least four cases of rabies were found in skunks in Guadalupe County. Rabies is transmitted from infected animals to people through a bite, and is 100% fatal in both animals and humans.

### Probability of Future Occurrences of the Pandemic Hazard

Based on historic occurrence and local knowledge, the probability of a future occurrence of the pandemic hazard is moderate.

### Location and Extent of the Pandemic Hazard

Biological events are typically non-spatial, unless an effective quarantine can be established. All locations within the planning area are potentially at risk from this hazard. Given the limited number of occurrences, and the lack of relationship between the hazard and geography, no maps have been produced to illustrate the locations of this hazard.

# HAZARD IDENTIFICATION

ALAMO AREA COUNCIL OF GOVERNMENTS  
REGIONAL MITIGATION ACTION PLAN UPDATE

## 6.5.13.2 Risk Assessment

This subsection of the Plan Updates provides estimates of future pandemic losses, i.e. risk. Each of the loss calculations is based on best available data, but they must be considered estimates because highly detailed engineering was not performed as part of this planning process.

### Methodology and Limitations

After discussion and review of the best available data regarding this hazard, and in consideration of the potential impacts of this hazard to the planning area, the EMC determined that the risk assessment should be limited to a qualitative analysis. At the time of this update, insufficient data exists to quantify the planning area's risks from and exposure to this hazard.

#### Qualitative

Each participating jurisdiction was asked to provide a qualitative risk assessment ranking regarding the pandemic (human and animal) hazard. (For definitions of these rankings, please see Table 6.4-1, earlier in this section.) The results of this assessment are presented in the table below.

**6.5.13.2-1  
Qualitative Risk Assessment Results – Pandemic (Human and Animal)**

Jurisdictions Ranking Hazard as Low	Jurisdictions Ranking Hazard as Moderate		Jurisdictions Ranking Hazard as High
City of Live Oak City of St. Hedwig City of Somerset City of Terrell Hills City of Windcrest Comal County City of Garden Ridge City of Bulverde City of New Braunfels City of Dilley Karnes County City of Karnes City of Runge City of Falls City City of La Vernia	City of Alamo Heights City of Balcones Heights City of Helotes City of Kirby City of Universal City Frio County Gillespie County City of Fredericksburg Guadalupe County City of New Berlin City of Schertz City of Seguin City of Kenedy	Kerr County City of Ingram City of Kerrville Medina County City of Castroville City of Devine City of Hondo City of Natalia City of Stockdale San Antonio River Authority	Atascosa County City of Charlotte City of Christine City of Jourdanton City of Lytle City of Pleasanton City of Poteet Bandera County City of Bandera Bexar County City of Converse City of Leon Valley City of San Antonio City of Von Ormy City of Pearsall Wilson County

Data to collect in order to improve this methodology prior to the Plan Update includes:

- Critical facilities and systems requiring human interaction for operation

### Risk Assessment Conclusions

# HAZARD IDENTIFICATION

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ALAMO AREA COUNCIL OF GOVERNMENTS  
REGIONAL MITIGATION ACTION PLAN UPDATE

The majority of the participating jurisdictions ranked the pandemic hazard as moderate impact. However, this is not a hazard for which many mitigation actions are available. The jurisdictions may choose to consider more preparedness and mitigation activities for the future.