

# INFECTIOUS DISEASE

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## Hazard Description

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An infectious disease is defined as a clinically evident disease resulting from the presence of pathogenic microbial agents. According to FEMA, infectious diseases are a major threat around the world, killing millions globally each year. Transmission of an infectious disease may occur through one or more means including physical contact with infected individuals. These infecting agents may also be transmitted through liquids, food, bodily fluids, contaminated objects, airborne inhalation or through vector-borne dissemination.

Three terms are commonly used to classify disease impacts: endemic, epidemic and pandemic. An endemic is present at all times at a low frequency (e.g., chicken pox in the United States). An epidemic is a sudden severe outbreak of disease (e.g., the bubonic plague during Medieval times) and a pandemic is an epidemic that becomes very widespread and affects a whole region, a continent, or the world (e.g., the 1957 flu pandemic caused at least 70,000 deaths in the United States and 1-2 million deaths worldwide). Fears of pandemic have risen in recent years as our globalized economy and growing population fosters large scale international travel and trade. Also, growing populations increase the vulnerability of all areas to disease as it can travel more quickly and creates difficulty in preventing the spread of infection.

The top 11 infectious diseases according to the World Health Organization based upon number of deaths are presented in Table 17-1.

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**Table 17-1. Worldwide Mortality Due to Infectious Disease**

RANK	CAUSE OF DEATH	APPROXIMATE WORLDWIDE DEATHS IN 2002	PERCENTAGE OF ALL DEATHS WORLDWIDE
1	Lower Respiratory Infections	3.9 million	6.9%
2	HIV/AIDS	2.8 million	4.9%
3	Diarrheal diseases	1.8 million	3.2%
4	Tuberculosis (TB)	1.6 million	2.7%
5	Malaria	1.3 million	2.2%
6	Measles	600,000	1.1%
7	Pertussis	290,000	0.5%
8	Tetanus	210,000	0.4%
9	Meningitis	170,000	0.3%
10	Syphilis	160,000	0.3%
11	Hepatitis B	100,000	0.2%

*Source: World Health Organization*

### Location

Pandemics are random, with a few happening every century. Wherever and whenever it starts, the disease impacts all areas of the world, and all areas are vulnerable. Third world countries have fewer resources to fight disease and may be more vulnerable than more industrialized nations. In the United States, the public health system works at the federal, state and local levels to monitor diseases, plan and prepare for outbreaks and prevent epidemics where possible. But, in the age of air travel and worldwide shipping, it is becoming increasingly difficult to contain localized outbreaks as infected or exposed people travel and work, sending the disease across the globe in a matter of hours.

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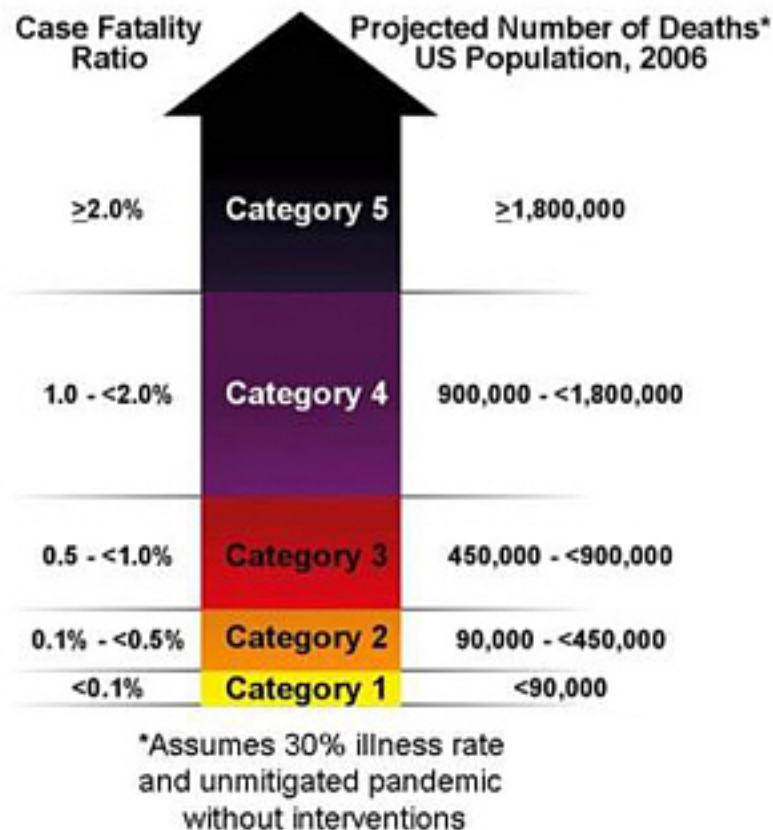
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## Extent

The severity of a pandemic virus can be evaluated from two perspectives: that of the individual who has been infected and from the population level – that is, how many complications and deaths might be expected as a whole. Measuring severity from either perspective in real time is a major challenge. The most common measure of severity is the case-fatality rate (CFR) as depicted in Figure 17-1.

The magnitude of a pandemic event is also evaluated from the population level in terms of warnings. Figure 17-2 illustrates the various warning levels for pandemic. Dr. Margaret Chan, Director General of the World Health Organization (WHO), announced in June of 2009 that H1N1 had reached Phase 6, Pandemic.

**Figure 17-1. Intensity Scale – Infectious Disease**



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Figure 17-2. Risk levels for Pandemic (World Health Organization)



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## Historical Occurrences

Statewide, outbreaks of infectious diseases are recorded by the Texas Department of State Health Services, Infectious Disease Control Unit (IDCU). The IDCU tracks reported cases of all non-genetic diseases. Table 17-2 below reports the infectious disease outbreaks in the State over the last 5 years. The total number of cases for these diseases range from one reported case to as many as 16,527 reported cases during the timeframe studied.

**Table 17-2. Infectious Disease Cases in the State of Texas 2004-2009.**

Infectious Disease	Number of cases reported per year in the State of Texas					
	2009	2008	2007	2006	2005	2004
<b>AIDS</b>	2,353	2,717	2,678	2,796	2,851	2,881
<b>Aseptic Meningitis</b>	1,858	1,747	2,126	1,740	1,878	2,521
<b>Bacterial Meningitis</b>	239	344	484	337	332	412
<b>Campylobacteriosis</b>	1,617	1,425	1,690	1,075	816	1,264
<b>Chlamydia</b>	103,829	98,707	84,784	75,319	71,621	70,186
<b>Cryptosporidiosis</b>	419	2,240	233	273	115	93
<b>Diarrheal diseases</b>	NR	NR	NR	NR	NR	NR
<b>Gonorrhea</b>	28,782	31,569	31,761	30,270	26,016	24,339
<b>Hepatitis A</b>	184	259	264	330	461	6,224
<b>Hepatitis B, acute</b>	420	562	741	833	742	687
<b>HIV/AIDS*</b>	4,355	4,161	4,098	3,956	4,326	4,398
<b>Lower Respiratory Infections</b>	NR	NR	NR	NR	NR	NR
<b>Malaria</b>	87	87	130	106	130	111
<b>Measles</b>	1	0	7	0	3	0
<b>Meningococcal Disease</b>	53	70	55	45	61	72
<b>Mumps</b>	40	20	21	58	25	23
<b>Pertussis</b>	3,358	2,046	1,051	954	2,224	1,184
<b>Rubella</b>	0	0	0	0	0	1
<b>Salmonellosis</b>	3,964	5,583	3,534	3,060	3,145	2,665
<b>Shigellosis</b>	2,295	4,665	2,358	2,065	3,100	3,336
<b>Streptococcus Disease, invasive</b>	NR	NR	NR	NR	NR	NR
<b>Syphilis</b>	6,989	6,321	5,573	4,961	4,374	4,191
<b>Tetanus</b>	1	3	0	1	0	2
<b>Tuberculosis</b>	1,501	1,500	1,507	1,566	1,524	1,671
<b>Varicella (Chicken Pox)</b>	4,445	7,839	10,061	11,768	8,336	8,544

\*New HIV diagnoses regardless of disease status

Source: Texas Department of State Health and Human Services, Infectious Disease Control Unit

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### H1N1

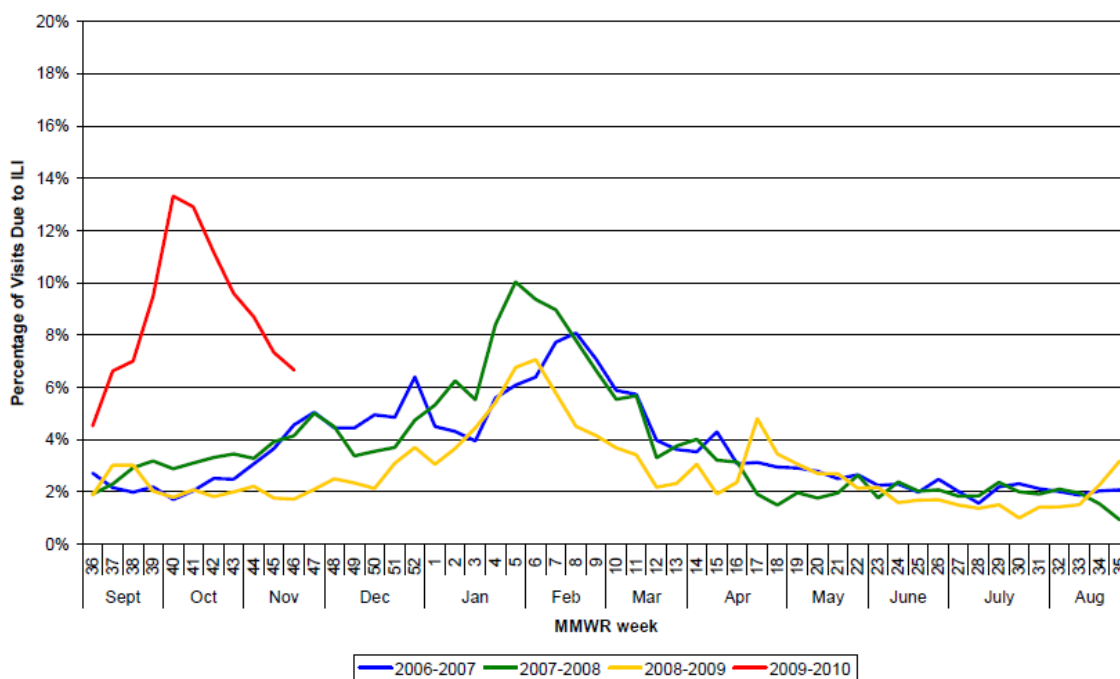
In March of 2009, a novel strain of Influenza A (H1N1 or “Swine Flu”) virus was detected in Mexico and the United States. The virus has since spread worldwide. As of September 27, 2009, more than 340,000 cases of Swine Flu have been confirmed worldwide and approximately 4,100 deaths have been reported<sup>1</sup>.

The most commonly reported symptoms include cough, fever, sore throat and gastrointestinal symptoms such as vomiting and diarrhea. Most cases with H1N1 did not require hospitalization and had symptoms that lasted four days<sup>2</sup>.

Since June 9, 2009, the Center for Disease Control (CDC) has reported antigenic characterization results from 25 novel influenza A (H1N1) viruses and 1 seasonal influenza A (H1N1) virus received from the Texas Department of State Health Services (DSHS) Laboratory since April 26, 2009.

Figure 17-3 illustrates the percentage of visits to Texas hospitals for influenza-like symptoms. Figure 17-4 displays nationwide influenza activity.

**Figure 17-3. Percentage of Visits Due – Flu-Like Illness, Texas (2006-2010 Seasons)**



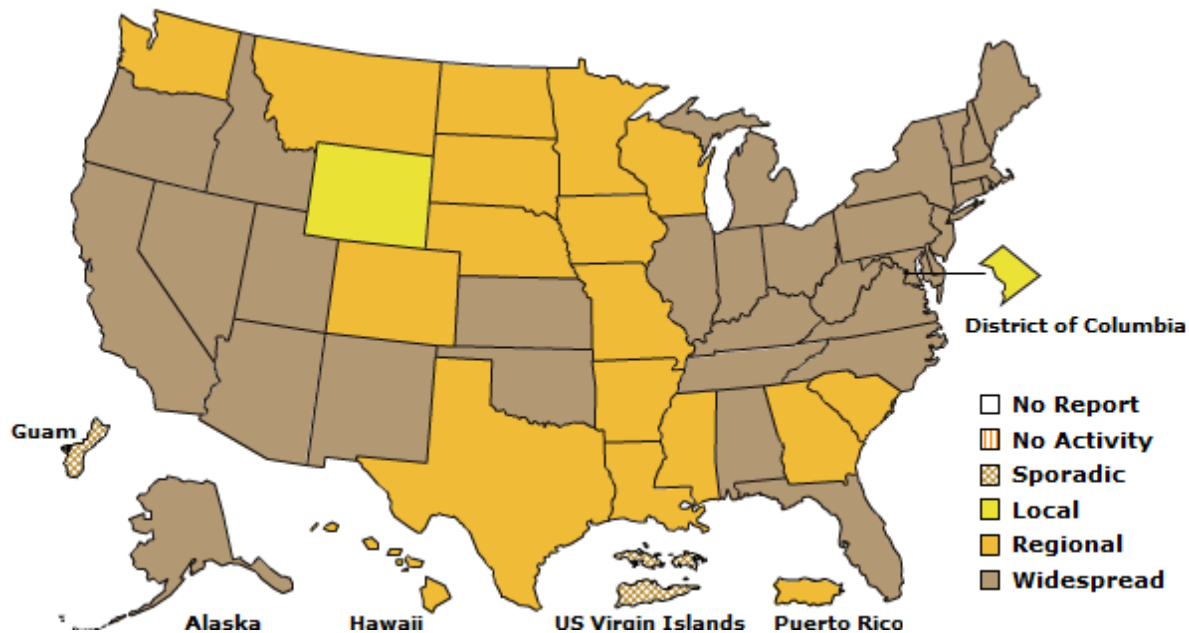
<sup>1</sup> World Health Organization

<sup>2</sup> Carrat, F. et al. Timelines of Infection and Disease in Human Influenza: A Review of Volunteer Challenge Studies. *American Journal of Epidemiology*, 2008, 167: 775–785.

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Figure 17-4. Influenza Summary by State – Activity Estimates, Nov. 2009



### Probability of Future Occurrences

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Disease impacts all areas of the world and all areas are vulnerable. Third world countries have fewer resources to fight disease and may be more vulnerable than more industrialized nations. In the United States, the public health system works at the federal, state and local levels to monitor diseases, plan and prepare for outbreaks and prevent epidemics where possible. But, in the age of air travel and worldwide shipping, it is becoming increasingly difficult to contain localized outbreaks as infected or exposed people travel and work, sending the disease across the globe in a matter of hours. Future occurrence is highly likely.

It is likely that an event is probable in the next three years. There is no seasonal pattern associated with infectious disease outbreaks. Outbreaks can last weeks or months at a time. There is no warning time. Infectious disease cannot be detected until it is diagnosed. Condensed populations within the Guadalupe Blanco River Authority region are more susceptible and rural areas are less susceptible.

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### **Impact and Vulnerability**

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Based on historic occurrence, the potential severity of impact of an infectious disease outbreak could be substantial resulting in multiple deaths and complete shutdown of facilities and public buildings for 30 days or more. Property may not be destroyed by directly by a disease outbreak.