

SCENARIO PLANNING ASSUMPTIONS: SMALLPOX EPIDEMIOLOGY

Total Infected During Attacks: 84,000

- 8,000 infected in Istanbul on January 1 (Grand Bazaar)
- 16,000 infected in Frankfurt on January 2 (Frankfurt Airport)
- 8,000 infected in Rotterdam on January 2 (Metro)
- 12,000 infected in Warsaw on January 2 (Metro)
- 16,000 infected Los Angeles on January 4 (LAX airport)
- 24,000 infected in New York on January 4 (Penn Station)

Emergence of Cases: Epidemiological curve for the emergence of smallpox cases was based on: Figure 4.7, in Fenner, et al., *Smallpox and Its Eradication*. Geneva, Switzerland: World Health Organization; 1988:188. It was assumed that:

- Smallpox symptoms began (as early as 7 days after infection) with 2 days of fever, followed by a rash.¹
- Initial diagnoses in European countries on January 13 were made in people who had at least day 3 of rash. This assumption is based on pictures in Fenner, et al.,² and the expert medical opinion of the Center for Biosecurity's medical doctors, including Dr. D. A. Henderson.
- By January 14, numbers of suspect smallpox cases would begin to reflect reports of smallpox cases in much earlier stages of development (day 1, 2, or 3 of rash). Once the attacks are recognized, smallpox will be suspected in people who exhibit rash or fever but who are, in fact, not infected with smallpox.

Accumulation of cases from 9 a.m. to 1:30 p.m. on January 14 (start to end of exercise) was calculated based on the assumption that by 1:35 p.m. EST on January 14, between 10% and 30% of patients with day one rash and beyond would be reported to health authorities. These reports would include some "false positive" cases.

Calculations of total casualties and deaths for the final video: We assumed a 25% case fatality rate. We assumed a modest decrease in the historic case fatality rate of 30% due to access to modern health care for some victims and some degree of residual immunity in a modest number of adults vaccinated before 1980.

- Person-to-person spread in the first generation of cases was 1:3 in all countries.³
- Person-to-person spread in second generation was 1:0.25
- This lower transmission rate is used because highly effective disease control measures had been established by mid-February, including vaccinatation of millions of contacts and healthcare workers in all the countries that were attacked.
- It was assumed that leaders of countries with large vaccine stockpiles would share vaccine with affected countries that had small vaccine stockpiles.
- It was also presumed that large-scale vaccination would begin within days after January 14, that countries would impose strict isolation of cases, and that residents in affected countries would self-impose social distancing (e.g., cancellation of big public events).
- The spread and fatality assumptions were necessary to create a final video that depicted a possible outcome of the players' decisions. The *Atlantic Storm* participants may have chosen different actions than what exercise designers believed they would take.



Site of Attacks	1st Generation visible by ~Jan 21	2nd Generation visible ~Jan 21 to Feb 3 (rate of spread = 1:3)	3rd Generation ~Feb 3 to Feb 28 (rate of spread=1:0.25)	Cumulative cases / deaths by end of February
U.S.	40,000	120,000	30,000	190,000 / 47,500
Netherlands	8,000	24,000	6,000	38,000 / 9,500
Germany	16,000	48,000	12,000	76,000 / 6,250
Poland	12,000	36,000	9,000	57,000 / 14,500
Turkey	8,000	24,000	6,000	38,000 / 9,500

¹ Fenner F, Henderson DA, Arita I, Jezek Z, Ladnyi ID. *Smallpox and Its Eradication*. Geneva, Switzerland: World Health Organization; 1988:1460.

² Ibid

³ Centers for Disease Control and Prevention. What We Learn about Smallpox from Movies—Fact or Fiction? Available at: http://www.bt.cdc.gov/agent/smallpox/disease/movies.asp. Accessed January 5, 2005.