

# Infectious Disease Outbreaks, Pandemics, and Hollywood—Hope and Fear Across a Century of Cinema

Walter Dehority, MD, MSc

**M**ovies are a shared cultural experience that have historically depicted infectious disease outbreaks and pandemics and reflected accompanying hopes, fears, and at times, uncomfortable realism about contagion. To better characterize this phenomenon, a search of [IMDb.com](https://www.imdb.com) (Internet Movie Database, an online database of film and TV information) was conducted in February and March 2020 to update a 2017 search<sup>1</sup> using 163 infection-related search terms (eBox in [Supplement 1](#)) to identify films with a major focus on infectious diseases (as assessed

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Supplemental content

by review of plot synopses on IMDb, the American Film Institute database, or Wikipedia) through December 31, 2019. The search yielded 373 films released in US theaters (eFigure in [Supplement 1](#)). Of these, 142 (38.1%) featured a human infectious disease outbreak (increase in expected cases of an infectious disease in a population) or pandemic (outbreak over multiple countries or continents), as defined by the Centers for Disease Control and Prevention,<sup>2</sup> with the outbreak/pandemic (or the threat or aftermath of one) as an important component of the story (eTable in [Supplement 2](#)). Eighty films were selected as culturally relevant, defined as having box office earnings of at least \$10 million (adjusted to 2019 dollars using a [Bureau of Labor Statistics online tool](#), equating to  $\geq 1$  million tickets sold); winning an Academy Award; or having 1 or more long-gap connections, defined as cultural reference to a film (eg, in television or another movie) at least 25 years after release<sup>3</sup> (eTable in [Supplement 2](#)). All 80 culturally relevant films were viewed and thematically analyzed, and a subset are reviewed here for thematic illustration.

Eight of the 9 earliest outbreak depictions (1914-1957) feature the selfless heroism of medical professionals. In *The Green Light* (1937), a physician halts a spotted fever outbreak through development of a vaccine (culminating with a test of the vaccine upon himself). In *The Painted Veil* (1934), a physician's dedication to fighting cholera nearly costs him his marriage, while in *Arrowsmith* (1931) and *The Rains Came* (1939), physicians fight outbreaks of plague while their significant others die from the disease. This theme continued into the early 1950s, with the Oscar-winning *Panic in the Streets* (1950) presenting the successful resolution of a plague outbreak in New Orleans.

After Sputnik launched the space race in 1957,<sup>4</sup> films began depicting the dangers of alien microbes (eg, *Space Master X-7* [released in 1957], wherein a deadly alien fungus returns to earth on a satellite, and *The Angry Red Planet* [1959], in which astronauts return from Mars carrying a dangerous infection). Such alien infections threatened our



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newfound confidence in antibiotics. Though these fears may seem fantastical now, many forget that until 1970, Apollo astronauts were quarantined for 3 weeks after their return to earth for just such a concern.<sup>5</sup> Interestingly, *Space Master X-7* presented the first detailed depiction of globalization contributing to a potential pandemic, as an exposed woman is shown boarding a train to Los Angeles followed by a plane bound for Honolulu.

The 1960s and 1970s produced 16 films, and in keeping with the dawning ecological movement of the time, ushered in a darker era of pandemic movies portraying environmental destruction. For the first time, portrayals of postapocalyptic earth were featured (*Beyond the Time Barrier* [1960], *The Last Man on Earth* [1964], and *The Omega Man* [1971]). The 1980s and 1990s featured only a dozen films, of which the most culturally relevant provided the first cinematic depictions of the HIV pandemic. Though Hollywood was slow to address

HIV, many cathartic films were eventually produced, including *Longtime Companion* (1989), *Common Threads: Stories from the Quilt* (1989), and *Philadelphia* (1993). Releases after 2000 contributed half of all the movies studied and \$2.6 billion in ticket sales. Increasingly bleak cinematic offerings were presented, populated with postapocalyptic landscapes (20 films) and hordes of the undead.

Many themes were consistent throughout the 80 films (Table). Infection was frequently used as an explanation for the transformation of the infected into something less than human (eg, zombies) and represented the most common theme (29 movies). This began with *Beyond the Time Barrier* (1960) and continued into the new millennium (23 films). Loss of one's humanity was often emphasized in such films, with the transformed frequently portrayed simply as objects to be destroyed (23 movies, 18 over the last 2 decades). The infected often feared the loss of their humanity more than the loss of life, as exemplified by requests to be killed after infection rather than suffer transformation (eg, *Day of the Dead* [1985]).

Acts of biowarfare were also commonly featured (28 films), beginning with *Counterblast* (1948), wherein a former Nazi physician continues with plague experiments after the war. Films with the biowarfare theme have continued to be released in every decade thereafter. Postapocalyptic themes were featured in 27 films, 14 of which depicted a pandemic due to human malfeasance or hubris. Four such films depicted an inability to manage an infectious agent engineered for medical purposes (eg, a vaccine in *I Am Legend* and a viral-based therapy in 3 *Planet of the Apes* films). The remaining films portrayed consequences of biowarfare.

A theme of untrustworthy leadership and government was present in 20 films, beginning with *The Satan Bug* (1965) and featured every decade since. The theme encompassed deceit (eg, *The Alpha Incident* [1978], wherein citizens infected with a Martian plague are given lethal poison misrepresented as a cure by the government to cover up the outbreak), unethical research (eg, *Warning Sign* [1985], in which a military bioweapon is secretly tested in a small-town agricultural plant), and orchestrated apocalypses (eg, *Resident Evil: the Final Chapter* [2016]). The use of unethical methods for outbreak containment was a component of this as well, including draconian quarantine methods (9 films over 4 decades) and outright murder (21 films over 4 decades). In *The Cassandra Crossing* (1976), soldiers weld metal plates over the windows and doors of a train, trapping people exposed to plague inside. In *Doomsday* (2008), the border between Scotland and Britain is sealed behind armor-plated 30-foot walls that are welded shut as citizens are desperately trying to escape a viral outbreak. In *The Crazies* (1973), the president of the United States contemplates exploding a nuclear weapon over a town to contain an outbreak from an accidentally released bioweapon. In the 2010 remake by the same name and in *Resident Evil: Apocalypse* (2004), such a weapon is detonated. In later films, soldiers are shown shooting indiscriminately into crowds of infected and uninfected citizens to preserve containment (eg, *28 Weeks Later* [2007]).

Stigmatization of people who were infected was featured in 19 films dating back to the 1940s (eg, the treatment of peas-

**Table. Common Themes in Infectious Disease Outbreak and Pandemic Films**

Theme (No.)	Notable examples (year)	Comments
Dehumanization (29)	<i>Resident Evil</i> series (2002, 2004, 2007, 2010, 2012, 2016)	Most commonly "living dead" ( <i>zombification</i> ) as manifestation of infection
	<i>Dawn of the Dead</i> (2004)	The infected are often viewed as objects undeserving of sympathy and as recipients and perpetrators of violence
	<i>World War Z</i> (2013)	
Biowarfare (28)	<i>The Omega Man</i> (1971)	Frequently apocalyptic with postpandemic change in social order
	<i>Inferno</i> (2016)	Also represented by the threat of biowarfare, often by terrorists or criminal organizations
	<i>Fast &amp; Furious Presents Hobbs and Shaw</i> (2019)	
Failed leadership (20)	<i>The Crazies</i> (1973, 2010)	Government often turns against its own citizens in attempts to destroy infected populations and contain an outbreak
	<i>28 Weeks Later</i> (2007)	
	<i>Doomsday</i> (2008)	
Stigmatization of the other (19)	<i>The Seventh Seal</i> (1957)	Prominent in HIV and plague films; portrayed as stigmatization or ostracism of the infected, often out of fear of infection and ignorance
	<i>Longtime Companion</i> (1989)	
	<i>Philadelphia</i> (1993)	
Social class and disparities (18)	<i>Masque of the Red Death</i> (1964)	Elites unsuccessfully try to self-quarantine; some groups receive privileged access to protections unavailable to others
	<i>The Pied Piper</i> (1972)	
	<i>Contagion</i> (2011)	
Selfless physician (16)	<i>Arrowsmith</i> (1931)	Emphasizes the sacrifice of typically male physicians
	<i>The Green Light</i> (1937)	
	<i>The Rains Came</i> (1939)	

ants with suspected plague in *Monsieur Vincent* [1947], and blaming women for outbreaks of plague in *The Seventh Seal* [1957]). Blaming people who were infected was also a prominent feature of films about HIV (*Longtime Companion* [1989]; *Philadelphia* [1993]), as well as *V for Vendetta* (2005), wherein religious extremists are falsely accused of an act of bioterrorism. This theme of stigmatization mirrors the ostracism of the "other" in society during infectious outbreaks, be it HIV-infected individuals,<sup>6</sup> the Hopi and Navajo people following the 1993 Hantavirus outbreak in the Four Corners region,<sup>7</sup> or contemporary references to COVID-19 as the "Chinese flu."<sup>8</sup>

Health disparities and disruption of social class were depicted in 18 films. Fortified castles and city walls portrayed in *The Masque of the Red Death* (1964), *The Pied Piper* (1972), and *The Season of the Witch* (2010) were ultimately unable to keep the plague from the more privileged residents therein, just as the wall built around Jerusalem in *World War Z* (2013) was ultimately unable to protect its inhabitants from the coming pandemic. However, differential access to medical care was a feature of 9 films, with the more privileged having more ready access. In *The Crazies* (1973), a preexisting vaccine is available for the military but not the citizens of an affected town, foreshadowing the *Resident Evil* series, in which a limited supply of antiserum is only available to leaders of the Umbrella Corporation. Dr Reed's knowledge of a plague outbreak (*Panic in the Streets* [1950]) led him to change his potentially infected clothes prior to interacting with his wife, while the wife of an exposed café owner was not

so fortunate. Similarly, a Centers for Disease Control and Prevention physician in *Contagion* (2011) shares information not publicly available with his family in order to protect them.

Interestingly, within one month of the first case of COVID-19,<sup>9</sup> *Contagion* (2011) was back among iTunes' top 10 most-downloaded movies.<sup>10</sup> Many may remember the development of a successful vaccine at the end of the movie. Perhaps, as we collectively enter an uncertain future wrought by COVID-19, some of these films will help us share not only a moment of communal reminiscence but of hope as well.

**Author Affiliation:** University of New Mexico School of Medicine, Division of Infectious Diseases, Department of Pediatrics, Albuquerque.

**Corresponding Author:** Walter Dehority, MD, MSc, Division of Infectious Diseases, Department of Pediatrics, The University of New Mexico, MSC10 5590, 1 University of New Mexico, Albuquerque, NM 87131-0001 (wdehority@salud.unm.edu).

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