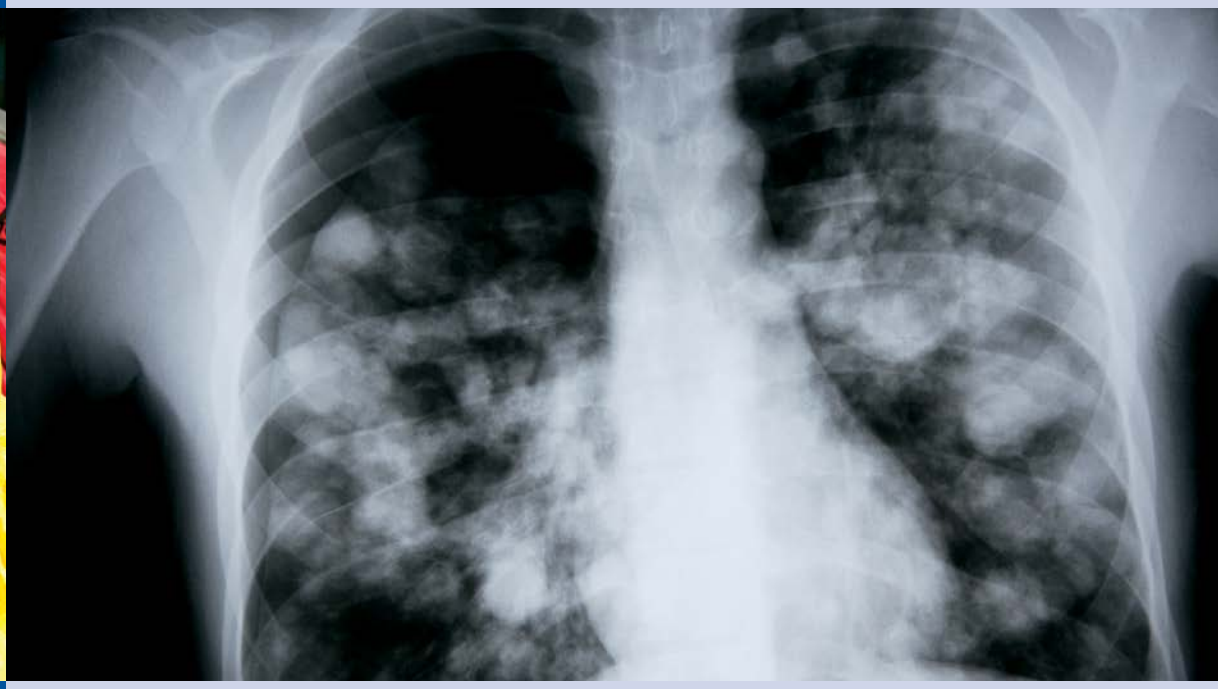
ISSUE REPORT

# Outbreaks:

## PROTECTING AMERICANS FROM INFECTIOUS DISEASES 2013



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Robert Wood Johnson Foundation

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# Acknowledgements

**Trust for America's Health** is a non-profit, non-partisan organization dedicated to saving lives by protecting the health of every community and working to make disease prevention a national priority.

**The Robert Wood Johnson Foundation** focuses on the pressing health and health care issues facing our country. As the nation's largest philanthropy devoted exclusively to health and health care, the Foundation works with a diverse group of organizations and individuals to identify solutions and achieve comprehensive, measurable, and timely change. For more than 40 years the Foundation has brought experience, commitment, and a rigorous, balanced approach to the problems that affect the health and health care of those it serves. When it comes to helping Americans lead healthier lives and get the care they need, the Foundation expects to make a difference in your lifetime. For more information, visit www.rwjf.org. Follow the Foundation on Twitter at www.rwjf.org/twitter or on Facebook at www.rwjf.org/facebook.

TFAH would like to thank RWJF for their generous support of this report.

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# Introduction

Infectious diseases, from antibiotic-resistant superbugs to *Salmonella* to the seasonal flu, disrupt lives and communities and cost the country more than $120 billion each year.[1]

Since the 1940s, there have been tremendous advancements in infectious disease prevention efforts, vaccinations, antibiotics and other treatments that have saved countless lives. The successes in infectious disease control have made it possible for the majority of Americans to live significantly longer lives — which also means most Americans reach the ages where they develop and live with a range of chronic diseases — often for decades. This sea change in the health of Americans has also led to a shift in attention and resources toward managing and treating chronic disease — but it is important to remember the threat that infectious diseases continue to pose.

Millions of Americans still contract infectious diseases each year and, worldwide, they are the leading cause of death of people under the age of 60.[2, 3, 4]

Fighting infectious disease requires constant vigilance. Policies and resources must be in place to allow scientists and public health and medical experts to have the tools they need to: control ongoing outbreaks — such as HIV/AIDS, bacterial infections in hospitals and foodborne illnesses; detect new or reemerging outbreaks — such as Middle East Respiratory Syndrome (MERS), whooping cough and drug-resistant infections; and even monitor for potential bioterrorist threats — such as anthrax or smallpox.

Reports from the Centers for Disease Control and Prevention (CDC), the Institute of Medicine (IOM) and other expert organizations have stressed the importance of having fundamental abilities in place to detect and control the transmission of infectious diseases and ensure consistent, basic levels of protection across the country.[5, 6]

CDC's *Framework for Preventing Infectious Diseases: Sustaining the Essentials and Innovating for the Future* stresses the importance of:

- Strengthening public health fundamentals, including infectious disease surveillance, laboratory detection and epidemiologic investigations;
- Identifying and implementing high-impact strategies — such as vaccinations, infection control, rapid diagnosis of disease and optimal treatment practices — to limit the spread of diseases and systems to reduce the diseases transmitted by animals or insects to humans; and
- Developing and advancing policies such as integrating clinical infectious disease preventive practices into U.S. healthcare; educating and working with the public to understand how to limit the spread of diseases; and working with the global health community to quickly identify new diseases and reduce rates of existing diseases.[7]

However, efforts to prevent and control infectious diseases continue to be hampered by outdated systems and limited resources.

The Trust for America's Health (TFAH) and Robert Wood Johnson Foundation (RWJF) issued the *Outbreaks: Protecting Americans from Infectious Diseases* report to examine the country's policies to respond to ongoing and emerging infectious disease threats.

Protecting the country from infectious disease threats is a fundamental role of government, and all Americans have the right to basic protections no matter where they live.

Government at all levels has the ability to set policies and establish practices based on the best science available to better protect Americans from infectious disease threats.

To help assess policies and the capacity to protect against infectious disease outbreaks, this report examines a range of infectious disease concerns and a series of 10 indicators in each state that, taken collectively, offer a composite snapshot of strengths and vulnerabilities as well as a range of national and global infectious disease priorities. While federal, state and local health departments and healthcare providers all have roles to play, states have the primary legal jurisdiction and responsibility for the health of their citizens.[8] These indicators help illustrate the types of fundamentals that are important to have in place not just to prevent the spread of disease in the first place but also to detect, diagnose and respond to outbreaks.

In addition, fighting infectious diseases requires more than just governmental action, it also requires cooperative efforts with the healthcare sector; pharmaceutical, medical supply and technology companies; community groups, schools and employers; and families and individuals.

The *Outbreaks* report provides the public, policymakers and a broad and diverse set of groups involved in public health with an objective, nonpartisan, independent analysis of the status of infectious disease policies; encourages greater transparency and accountability of the system; and recommends ways to assure the public health system meets today's needs and works across boundaries to accomplish its goals.

The report focuses on areas with high-priority policy concerns for infectious disease prevention and control, including:

### I. Foundational Capabilities and Funding for Public Health

**Indicator 1:** State Public Health Budgets

### II. Vaccine-Preventable Diseases

**Indicator 2:** Whooping Cough Vaccination of Children

**Indicator 3:** Human papillomavirus (HPV) Immunization Laws

**Indicator 4:** Flu Vaccination Rates

### III. Emerging Infectious Diseases

**Indicator 5:** Climate Change and Infectious Diseases

**Indicator 6:** Mandatory Reporting of Healthcare Associated Infections

### IV. Emergency Outbreaks: Bioterrorism and High-Risk New Diseases

**Indicator 7:** Laboratory Capabilities for Tracking Novel Disease Outbreaks

**Indicator 8:** Laboratory Capacity to Transport Disease Samples for Testing

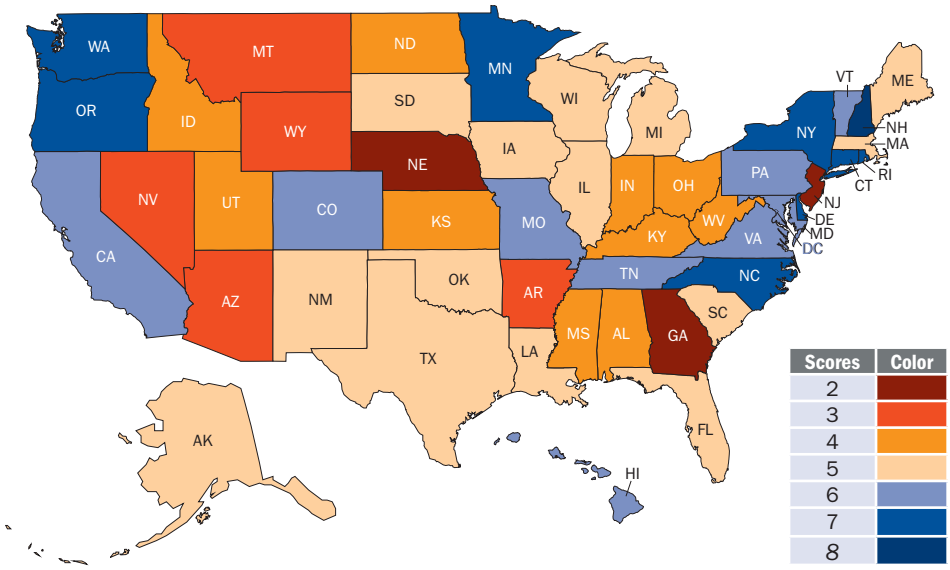
**Indicator 9:** Laboratory Capabilities during Emergency Events or Drills

### V. Foodborne and Waterborne Illnesses

### VI. HIV/AIDS, Viral Hepatitis and Tuberculosis (TB) Prevention

**Indicator 10:** Medicaid Coverage of Routine Human Immunodeficiency Virus (HIV) Screening

## MAJOR INFECTIOUS THREATS AND KEY FINDINGS




**SCORES BY STATE**

| 8 (1 state) | 7 (8 states) | 6 (9 states & D.C.) | 5 (14 states) | 4 (10 states) | 3 (5 states) | 2 (3 states) |
|---|---|---|---|---|---|---|
| New Hampshire | Connecticut<br>Delaware<br>Minnesota<br>New York<br>North Carolina<br>Oregon<br>Rhode Island<br>Washington | California<br>Colorado<br>D.C.<br>Hawaii<br>Maryland<br>Missouri<br>Pennsylvania<br>Tennessee<br>Vermont<br>Virginia | Alaska<br>Florida<br>Illinois<br>Iowa<br>Louisiana<br>Maine<br>Massachusetts<br>Michigan<br>New Mexico<br>Oklahoma<br>South Carolina<br>South Dakota<br>Texas<br>Wisconsin | Alabama<br>Idaho<br>Indiana<br>Kansas<br>Kentucky<br>Mississippi<br>North Dakota<br>Ohio<br>Utah<br>West Virginia | Arizona<br>Arkansas<br>Montana<br>Nevada<br>Wyoming | Georgia<br>Nebraska<br>New Jersey |

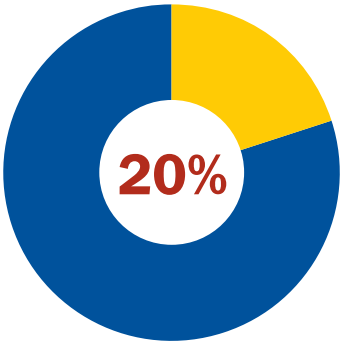
Infectious disease control and prevention is a concern in every state. Policies and programs vary from state-to-state. This report includes a series of 10 indicators based on high-priority areas and concerns. It is not a comprehensive review, but collectively, it provides a snapshot of the efforts that states are taking to prevent and control infectious diseases. The indicators were selected after consulting with leading public health and healthcare officials. Each state received a score based on these 10 indicators. States received one point for achieving an indicator and zero points if they did not. Zero is the lowest possible score and 10 is the highest. Scores ranged from a high of eight in New Hampshire to a low of two in Georgia, Nebraska and New Jersey.

Scores are not intended to serve as a reflection of the performance of a specific state or local health department, since they reflect a much broader context, including resources, policy environments and the health status of a community, so many of the indicators are impacted by factors beyond the direct control of health officials.

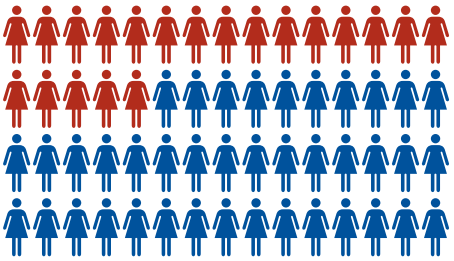
- **The Flu:** An average of 62 million — or 20 percent of — Americans get the seasonal flu each year. Between 3,000 and 49,000 Americans die each year from the flu and 226,000 are hospitalized, leading to economic losses of more than $10 billion in direct medical expenses and more than $16 billion in lost earnings.[9, 10] Experts also warn that flu pandemics — novel strains of the flu virus that humans have little-to-no immunity against — emerge three to four times a century.[11] Only 41.5 percent of adults were vaccinated against the flu last year, and only 72.0 percent of healthcare workers were vaccinated.[12]
  - *Only 12 states vaccinated at least half of their population (ages 6 months and older) for the seasonal flu in 2012.*
- **Whooping Cough, Measles:** Childhood vaccinations prevent an estimated 14 million cases of disease and save $9.9 billion in direct healthcare costs and $33.4 billion in indirect costs for each birth cohort vaccinated. More than 2 million children under the age of 3 do not receive all recommended vaccinations, leaving them vulnerable for preventable diseases like measles and whooping cough, which have both experienced recent resurgences in areas of the United States.
  - *Only two states and Washington, D.C. meet the U.S. Department of Health and Human Services (HHS) goal of vaccinating 90 percent of young children — ages 19- to 35-months old — against whooping cough.*
- **Human Papillomavirus and Cervical Cancer:** 79 million Americans carry HPV, which leads to 20,000 new cases of cancer in women and 12,000 in men each year.[13] Only 33 percent of female teens receive the recommended vaccinations to help prevent HPV and thus cervical cancer.
  - *Only 25 states and Washington, D.C. require the HPV vaccine for teens or fund HPV vaccination efforts or educate the public about the HPV vaccine.*
- **Emerging and Re-emerging Threats:** Since 2012, CDC and global health agencies have been tracking two serious new threats: As of October 25, 2013, there have been 136 confirmed cases of a new strain of the flu — H7N9, first reported in China — which has led to 45 deaths (as of November 2013), and as of November 12, 2013, 153 cases (42 percent fatal) in nine countries of the new MERS coronavirus. In the United States in recent years, CDC and state and local health officials have been tracking a number of re-emerging infectious diseases, including the largest outbreak of West Nile Virus (WNV) since 2003 and the highest rates of malaria cases in the United States since 1970 (1,925 cases in 2011). Climate change, increased international travel and increased food imports are some factors that contribute to the rise of new diseases or the re-emergence of diseases that were thought to be largely under control. As of 2000, World Health Organization (WHO) had identified more than 200 new diseases that were first spread to humans by animals or insects, including severe acute respiratory syndrome (SARS), pandemic flu and HIV/AIDS.[14]
  - *Only 15 states have completed climate change adaptation plans, which includes understanding and planning for the changing risk for emerging and re-emerging infectious diseases due to changing temperatures and weather patterns.*

## MAJOR INFECTIOUS THREATS AND KEY FINDINGS

**20 percent of Americans get the seasonal flu each year.**




**Only 33 percent of female teens receive the recommended vaccinations to help prevent Human Papillomavirus (HPV)**



## MAJOR INFECTIOUS THREATS AND KEY FINDINGS

- **Healthcare-Associated Infections (HAIs):** Approximately one out of every 20 hospitalized patients will contract an HAI. Risk of infection increases if a person is having invasive surgery, if they have a vein or bladder catheter, if they are on a ventilator or are on a prolonged course of antibiotics. There were an estimated 98,987 deaths due to HAIs in 2002, the last year an official estimate was released.
  - *Only 35 states and Washington, D.C. require that healthcare facilities in their state report healthcare-associated infections to CDC's National Healthcare Safety Network (NHSN) or another system.*
- **Superbugs/Antibiotic Resistance:** CDC has identified 18 priority strains of infections that are resistant to treatment by antibiotics — ranging from diseases as commonplace as strep throat and ear infections to tuberculosis (TB) and *Salmonella* to Methicillin-resistant Staphylococcus aureus (MRSA) and other healthcare-associated infections. Each year more than two million Americans develop antibiotic-resistant infections, and at least 23,000 of these individuals die as a result. These are considered to be very conservative estimates, since current surveillance and data collection capabilities cannot capture the full burden. Antibiotic resistance leads to more than eight million extra days Americans spend in the hospital a year and costs the country an extra $20 billion in direct medical costs and at least $35 billion in lost productivity. The number of antibiotics currently prescribed for humans per year in the United States is enough to treat four out of five Americans.
  - *Kentucky had the highest rate of antibiotics prescribed per person, Alaska had the lowest, as of 2010.*
- **Emergency Outbreaks and Bioterrorism:** In 2001, through a deliberate act of bioterrorism, at least 22 Americans victims contracted anthrax, with five people dying from the infection. Since 2001, the country has prioritized developing strategies to respond to major disease outbreaks and other health emergencies, whether caused by nature, accident or a bioterrorism.
  - *Only 37 state public health laboratories and Washington, D.C. report having a plan and capability to handle a significant surge in testing over a six to eight week period in response to an outbreak that increases testing over 300 percent — which is what could be needed during a major new disease outbreak. (July 1, 2012 to July 30, 2013).*
  - *46 state public health laboratories and Washington, D.C. report having the capacity in place to assure the timely transportation (pick-up and delivery) of samples 24/7/365 to the appropriate Public Health Laboratory Response Network (LRN) Reference Laboratory in the last year (July 1, 2012 to July 30, 2013).*
  - *Only 27 state public health laboratories reported evaluating the functionality of their Continuity of Operations Plan (COOP) via a real event or an exercise last year (July 1, 2012 to July 30, 2013).*

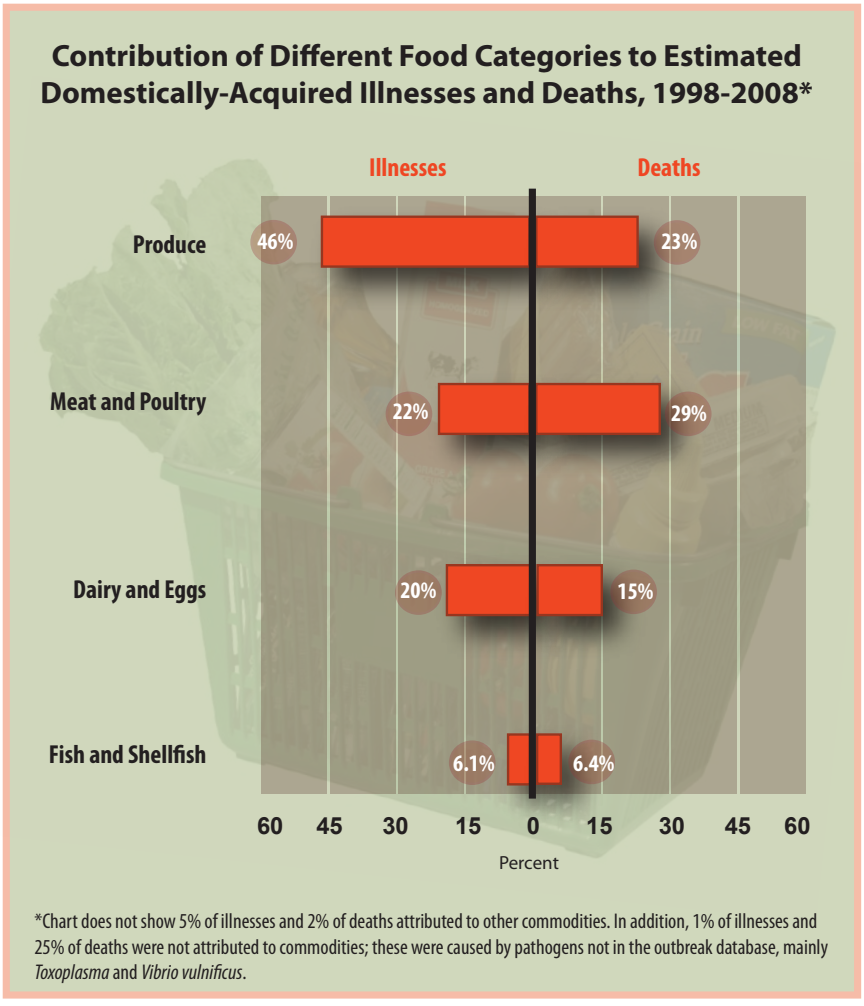


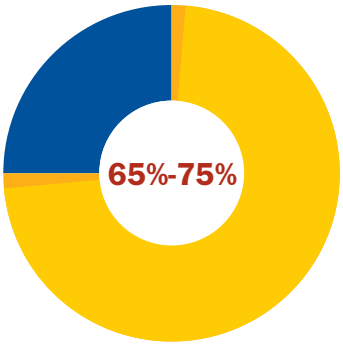

*Chart does not show 5% of illnesses and 2% of deaths attributed to other commodities. In addition, 1% of illnesses and 25% of deaths were not attributed to commodities; these were caused by pathogens not in the outbreak database, mainly *Toxoplasma* and *Vibrio vulnificus*.

Source: Painter JA, Hoekstra RM, Ayers T, Tauxe RV, Braden CR, Angulo FJ, Griffin PM. Attribution of foodborne illnesses, hospitalizations, and deaths to food commodities by using outbreak data, United States, 1998–2008. Emerg Infect Dis [Internet]. 2013 Mar [date cited]. http://dx.doi.org/10.3201/eid1903.111866

- **Foodborne and Waterborne Illnesses:** More than 48 million Americans suffer from foodborne illnesses each year. These illnesses result in 128,000 hospitalizations and around 3,000 deaths. In addition, more than 4,100 persons become ill from contaminated drinking water and more than 13,000 persons become ill from recreational water disease outbreaks annually in the United States.[15, 16]
  - *The leading pathogen responsible for foodborne illness is Norovirus, while Salmonella is the leading cause of hospitalization and death.*[17]
  - *Produce (a combination of six plant food categories) is the top cause of illness, while meat and poultry (a combination of four animal food categories) are the top causes of death.*[18]
- **HIV/AIDS:** More than 1.1 million Americans are living with HIV/AIDS, and almost one in five do not know they are infected. Since the epidemic began more than 636,000 Americans have died from AIDS.[19] There is an alarming increase in new infections among gay men — accounting for the majority of the nearly 50,000 new HIV diagnoses in 2011.[20]
  - *Only 33 states and Washington, D.C. cover routine HIV screening under their Medicaid programs. Knowing HIV-status is important to help get individuals into treatment and stop the spread of the disease.*
- **Hepatitis B Virus (HBV) and C (HCV):** Around 5 million Americans have HBV or HCV, but between 65 and 75 percent do not know they have it. HBV and HCV put people at risk for developing serious liver diseases and cancer. Two-thirds of Americans infected with HCV are Baby Boomers, and one in 10 Asian Americans has HBV.
- **TB:** From 1953 to 1984, tuberculosis declined from 84,304 cases, with a rate of 52.6 per 100,000 people in the United States (the first year for which national statistics were compiled), to 22,255 cases and a rate of 9.4 per 100,000. However, the country experienced a TB resurgence in the mid-1980s due to deficient public health infrastructure, drug-resistant TB, HIV/AIDS and changing immigration patterns with more people arriving from countries with a high TB burden. Health officials responded with improvements in treatment, case finding, laboratory capacity and infrastructure and cases began to decline. There were nearly 10,000 cases of TB in the United States in 2012 with 63 percent of these cases occurring in persons born outside the United States.
- **Funding for Public Health:** 34 states cut funding for public health from Fiscal year (FY) 2011 to 2012 to FY 2012 to 2013, diminishing their capacity to respond to infectious disease outbreaks in addition to other public health priorities. In addition, at a federal level, CDC's overall budget sustained a $577 million cut from FY 2012 to FY 2013, according to the American Public Health Association (APHA).[21]

## MAJOR INFECTIOUS THREATS AND KEY FINDINGS

**Percent of people infected with Hepatitis B or C who are unaware they are infected**



| STATE INDICATORS | | | | | | | |
|---|---|---|---|---|---|---|---|
| | (1) Increased or maintained level of funding for public health services from FY 2011-12 to FY 2012-13. | (2) Met the HHS goal of vaccinating at least 90 percent of 19- to 35-month-olds against whooping cough. | (3) Requires the HPV vaccine for teens — or funds HPV vaccination efforts or educates the public about the HPV vaccine. | (4) State vaccinated at least half of their population (ages 6 months and older) for the seasonal flu of fall 2012 to spring 2013. | (5) State has a complete climate change adaptation plan that include focusing on the impact of human health. | (6) State mandates that healthcare facilities in their state report healthcare-associated infections. | |
| Alabama | | | | | | ✓ | |
| Alaska | ✓ | | | | ✓ | | |
| Arizona | | | | | | | |
| Arkansas | | | | | | ✓ | |
| California | | | | | ✓ | ✓ | |
| Colorado | ✓ | | ✓ | | | ✓ | |
| Connecticut | ✓ | ✓ | | | ✓ | ✓ | |
| Delaware | | ✓ | | ✓ | | ✓ | |
| D.C. | | ✓ | ✓ | | | ✓ | |
| Florida | | | | | ✓ | ✓ | |
| Georgia | ✓ | | | | | ✓ | |
| Hawaii | | | | ✓ | | ✓ | |
| Idaho | | | ✓ | | | | |
| Illinois | | | ✓ | | | ✓ | |
| Indiana | | | ✓ | | | ✓ | |
| Iowa | ✓ | | ✓ | ✓ | | | |
| Kansas | | | | | | | |
| Kentucky | | | | | | | |
| Louisiana | ✓ | | ✓ | | | | |
| Maine | | | ✓ | ✓ | ✓ | ✓ | |
| Maryland | | | ✓ | ✓ | ✓ | ✓ | |
| Massachusetts | | | | ✓ | ✓ | ✓ | |
| Michigan | ✓ | | ✓ | | | | |
| Minnesota | | | ✓ | ✓ | | ✓ | |
| Mississippi | ✓ | | | | | | |
| Missouri | | | ✓ | | | ✓ | |
| Montana | | | | | | | |
| Nebraska | | | | ✓ | | | |
| Nevada | | | ✓ | | | ✓ | |
| New Hampshire | ✓ | | ✓ | | ✓ | ✓ | |
| New Jersey | | | | | | ✓ | |
| New Mexico | | | ✓ | | | ✓ | |
| New York | | | ✓ | | ✓ | ✓ | |
| North Carolina | | | ✓ | ✓ | | ✓ | |
| North Dakota | ✓ | | ✓ | | | | |
| Ohio | | | | | | ✓ | |
| Oklahoma | | | | | | ✓ | |
| Oregon | ✓ | | ✓ | | ✓ | ✓ | |
| Pennsylvania | ✓ | | | | ✓ | ✓ | |
| Rhode Island | ✓ | | ✓ | ✓ | | ✓ | |
| South Carolina | ✓ | | | | | ✓ | |
| South Dakota | | | ✓ | ✓ | | | |
| Tennessee | | | | ✓ | | ✓ | |
| Texas | ✓ | | ✓ | | | ✓ | |
| Utah | ✓ | | ✓ | | | ✓ | |
| Vermont | ✓ | | | | ✓ | ✓ | |
| Virginia | | | ✓ | | ✓ | ✓ | |
| Washington | | | ✓ | | ✓ | ✓ | |
| West Virginia | | | | | | ✓ | |
| Wisconsin | | | ✓ | | ✓ | | |
| Wyoming | | | | | | | |
| **Total** | **17** | **2 + D.C.** | **25 + D.C.** | **12** | **15** | **35 + D.C.** | |

| | | (7) Public health lab reports having a plan and capability to handle a significant surge in testing over a six to eight week period in response to an outbreak that increases testing over 300%. | (8) Public health lab reports having the capacity in place to assure the timely transportation (pick-up and delivery) of samples 24/7/365 days to the appropriate public health LRN Reference Laboratory. | (9) Public health lab evaluated the functionality of COOP via a real event or exercise from July 1, 2012 to June 30, 2013. | (10) State covers routine HIV screening under their Medicaid programs. | 2013 Total Score |
|---|---|---|---|---|---|---|
| | Alabama | ✓ | ✓ | ✓ | | 4 |
| | Alaska | | ✓ | ✓ | ✓ | 5 |
| | Arizona | ✓ | ✓ | ✓ | | 3 |
| | Arkansas | ✓ | ✓ | | | 3 |
| | California | ✓ | ✓ | ✓ | ✓ | 5 |
| | Colorado | ✓ | ✓ | | ✓ | 6 |
| | Connecticut | ✓ | ✓ | | ✓ | 7 |
| | Delaware | ✓ | ✓ | ✓ | ✓ | 7 |
| | D.C. | ✓ | ✓ | | ✓ | 6 |
| | Florida | ✓ | ✓ | ✓ | | 5 |
| | Georgia | | | | | 2 |
| | Hawaii | ✓ | ✓ | ✓ | ✓ | 6 |
| | Idaho | ✓ | ✓ | | ✓ | 4 |
| | Illinois | ✓ | ✓ | | ✓ | 5 |
| | Indiana | ✓ | | ✓ | | 4 |
| | Iowa | ✓ | ✓ | | | 5 |
| | Kansas | ✓ | ✓ | ✓ | ✓ | 4 |
| | Kentucky | ✓ | ✓ | ✓ | ✓ | 4 |
| | Louisiana | | ✓ | ✓ | ✓ | 5 |
| | Maine | | ✓ | | | 5 |
| | Maryland | | ✓ | ✓ | | 6 |
| | Massachusetts | | ✓ | | ✓ | 5 |
| | Michigan | ✓ | ✓ | ✓ | | 5 |
| | Minnesota | ✓ | ✓ | ✓ | ✓ | 6 |
| | Mississippi | ✓ | ✓ | ✓ | | 4 |
| | Missouri | ✓ | ✓ | ✓ | ✓ | 6 |
| | Montana | ✓ | ✓ | | ✓ | 3 |
| | Nebraska | | ✓ | | | 2 |
| | Nevada | | | | ✓ | 3 |
| | New Hampshire | ✓ | ✓ | ✓ | ✓ | 8 |
| | New Jersey | | ✓ | | | 2 |
| | New Mexico | ✓ | ✓ | | ✓ | 5 |
| | New York | ✓ | ✓ | ✓ | ✓ | 7 |
| | North Carolina | ✓ | ✓ | ✓ | ✓ | 7 |
| | North Dakota | | ✓ | | ✓ | 4 |
| | Ohio | ✓ | ✓ | | ✓ | 4 |
| | Oklahoma | ✓ | ✓ | ✓ | ✓ | 5 |
| | Oregon | ✓ | ✓ | | ✓ | 7 |
| | Pennsylvania | ✓ | ✓ | | ✓ | 6 |
| | Rhode Island | ✓ | ✓ | | ✓ | 7 |
| | South Carolina | ✓ | ✓ | ✓ | | 5 |
| | South Dakota | ✓ | ✓ | ✓ | | 5 |
| | Tennessee | ✓ | ✓ | ✓ | ✓ | 6 |
| | Texas | | | ✓ | ✓ | 5 |
| | Utah | | ✓ | | | 4 |
| | Vermont | | ✓ | ✓ | ✓ | 6 |
| | Virginia | ✓ | ✓ | ✓ | | 6 |
| | Washington | ✓ | ✓ | ✓ | ✓ | 7 |
| | West Virginia | ✓ | ✓ | | ✓ | 4 |
| | Wisconsin | ✓ | ✓ | | ✓ | 5 |
| | Wyoming | ✓ | ✓ | | ✓ | 3 |
| | | **37 + D.C.** | **46 + D.C.** | **27** | **33 + D.C.** | |

## GERMS HAVE NO BOUNDARIES: FEDERAL, STATE AND LOCAL PUBLIC HEALTH RESPONSIBILITIES

The nation's public health system is responsible for improving the health of Americans. Public health laws "authorize and obligate the government to protect and advance the public's health," including against threats from infectious diseases.[22] Federal, state and local health departments have different responsibilities and jurisdictions — and must also work in partnership with healthcare providers, the insurance, pharmaceutical and medical device industries, other areas of government and community groups to effectively prevent and control diseases. Policies and programs to control infectious diseases are particularly complex since many of the core responsibilities are based in states, but diseases can be spread across state lines and around the globe.

The federal government sets national health goals and priorities for the country. The federal government can track and report on information about diseases, conduct biomedical and prevention research, stockpile resources to supplement state and local response capabilities and provide technical assistance to states and localities.[23] Federal policies can steer efforts across the country by setting joint strategic priorities and establishing programs and then providing funds, often through grants, to carry them out in states or local communities. Since "communicable" diseases pose threats to national security and across states, Congress authorized the tracking of infectious disease threats starting in 1878.[24] CDC, in consultation with state, local and tribal health departments and the Council of State and Territorial Epidemiologists (CSTE), establishes and routinely updates a list of "notifiable" diseases that states are required to report to CDC so they can be tracked and strategies can be developed to limit their spread.[25] There are more than 85 notifiable infectious diseases, ranging from anthrax to yellow fever.[26]

### NOTIFIABLE DISEASES IN THE UNITED STATES

The federal government also has authority to isolate or quarantine patients infected with certain diseases when they pose a threat to others or the national interest. This authority derives from the Commerce Clause of the Constitution. The U.S. Secretary of Health and Human Services is authorized to take measures to prevent the entry and spread of communicable diseases from foreign countries into the United States and between the states (section 361 of the Public Health Services Act (§42 U.S. Code 264).[27] CDC has the responsibility for implementing these functions as deemed necessary to protect the public. Although rare, CDC may detain, medically examine and release persons arriving into the United States, people traveling between states or people who may come into contact with others who are traveling between states and are suspected of carrying communicable diseases of public concern.

Federal isolation and quarantine are currently authorized by Executive Order of the President for cholera, diphtheria, infectious TB, plague, smallpox, yellow fever, viral hemorrhagic fevers, SARS and influenza viruses that are causing or having the potential to cause a pandemic.[28] The President can revise the list by Executive Order. It is the duty of U.S. Customs and Coast Guard officers to aid in the enforcement of quarantine rules and regulations.[29]

Breaking a federal quarantine order is punishable by fines and imprisonment.[30]

States bear most of the legal responsibility for protecting the health, safety and welfare of their citizens, granted by "police power" functions. States vary in how they are structured and many share different degrees of responsibility with local governments, but still maintain the ultimate power within their borders.[31] This authority "underlie[s] communicable disease laws authorizing surveillance, testing, screening, isolation and quarantine."[32] Every state has the general public health authority to act to control communicable diseases, but state laws, programs and funding levels vary significantly. For instance, some states have very specific or very broad quarantine laws. In most states, breaking a quarantine law is a criminal misdemeanor.[33] Public health laws can be controversial in terms of finding an appropriate balance between protecting against the risk to the public versus the rights of an individual or group. In most states, for most conditions, "liberty principles" and "informed consent" allow individuals to decide whether to treat an illness they may have, but this may then lead to required isolation for a patient if the disease can be easily spread and pose a danger to others.[34]

U.S. infectious disease control strategies are complicated not just by interstate travel, but by international travel and immigration. In many cases, people carrying diseases are often not identified when crossing borders. Individuals may have an infection or illness but are not aware of it or they may have not developed severe enough symptoms to warrant special notice or attention. And, even in cases where a patient suspected of having a dangerous infectious disease has been identified, carrying out quarantine and isolation laws in a timely manner and across different jurisdictions can present a challenge. Disease outbreaks anywhere around the world, therefore, are of concern to every other every nation.

WHO revised a set of International Health Regulations (IHR) in 2005 in the wake of the outbreak of a new deadly disease called SARS to help improve global disease surveillance and detection and encourage the adoption of stronger standardized disease control policies worldwide.[35] IHR sets standards for and requires notification to WHO of any "public health emergency of international concern," or of any significant evidence of public health risks outside their territory that may lead to or cause the international spread of disease. More than 190 nations have signed onto the IHR.[36]

Even with laws in place, infectious disease prevention and control policies can have major challenges in practice. For instance, the ability of different nations to effectively detect and monitor diseases and to institute disease control practices varies significantly. Many countries do not adequately fund public health programs, have large endemic public health crises, do not have strong healthcare systems and do not have a tradition of setting standards for adopting evidence-based disease control practices or for adopting principles of objectivity, fairness and transparency.[37] Efforts like the WHO and CDC's Global Disease Detection (GDD) program help provide some additional support to less wealthy nations, but there is wide variance and major gaps in public health programs around the world to control ongoing threats like HIV/AIDS and malaria to the ability to quickly identify and contain new diseases.

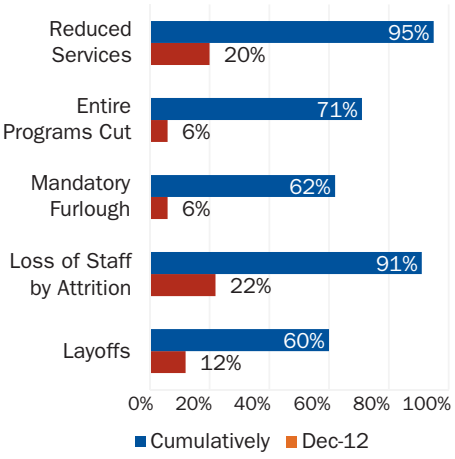
# Funding for Public Health and Foundational Capabilities

The ability to detect and control infectious diseases requires having a strong, stable public health system. Public health departments around the country have the unique role and responsibility for improving health in schools, workplaces and neighborhoods, through identifying top public health problems and developing strategies for improvement.

Some keys to an effective 24/7 approach to infectious disease threats include:

- Strong surveillance to be able to identify and monitor ongoing and newly emerging infectious disease outbreaks;
- Intensive investigative capabilities — including an expert scientific and medical workforce and comprehensive laboratory capabilities — to quickly diagnose outbreaks;
- Containment strategies, including medicines and vaccines to stop the spread of a disease and isolate and quarantine when necessary;
- Streamlined and effective communication channels so health workers can swiftly and accurately communicate with each other, other front line workers and the public about 1) the nature of the disease threat; 2) the risk of exposure and how to seek treatment when needed; and 3) any actions they or their families should take to protect themselves;
- A focused and effective response strategy, including targeted communications, to address the concerns of at-risk populations, such as children, the elderly and groups or areas that are particularly susceptible to a particular threat;
- Coordination and partnership with the healthcare sector, to ensure people in need have access to and receive the best available treatment at any stage of an outbreak — including surge capacity for mass outbreaks when necessary;
- An informed and involved public that can provide material and moral support to professional responders, and can render aid when necessary to friends, family, neighbors and associates; and
- A strong research capacity to rapidly be able to development new vaccines or medical treatments to counter new threats.

**Percentage of State and Territorial Health Agencies Experiencing Reduced Workforce Capacity and Programs, December 2012 and Cumulatively (since July 2008)**




Most Americans expect — and take for granted — that federal, state and local health departments are able to carry out basic disease prevention and food and water protection programs — but, unfortunately, these fundamental capabilities are often hampered due to limited funds.

Public health departments at all levels of government have been chronically underfunded for decades.[38] Funding comes through a combination of federal, state and local dollars. Each level of government has different, but important responsibilities for protecting the public's health.

According to a 2008 analysis by The New York Academy of Medicine (NYAM), there was a shortfall of $20 billion per year in spending on federal, state and local public health.[39]

- At the federal level, the budget for CDC decreased from a high of $6.62 billion in 2005 to $6.32 billion in 2011 (adjusted for inflation). Between FY 2010 and FY 2012, federal public health spending was reduced 8 percent. In FY 2012, federal public health spending through CDC averaged only $19.54 per person. The amount of federal funding ranged significantly from state to state, with a low of $13.72 per capita in Indiana and a high of $53.07 in Alaska. Federal funds are distributed through a mixture of population-based formula grant programs, formulas based on disease rates, and a series of competitive grants which provide funding to some states but not others. In most cases, there is no officially defined mode of coordination for targeting or strategically focusing the funds.

- According to a 2013 report by the Association of State and Territorial Health Officials (ASTHO), 48 states, three territories and Washington, D.C. have reported budget cuts, and 91 percent of all state and territorial health agencies (SHAs) experienced job losses through a combination of layoffs and attrition. SHAs have reported cuts to programs as a result, including to public health hospitals and clinics; HIV/ AIDS and STD prevention services; disease specific programs; family health and nutrition programs; maternal and child health programs; tobacco prevention and control; immunizations; and for programs for children with special healthcare needs. Fifteen SHAs reported cuts to their FY 2013 budgets.[40]

- During 2012, close to one-half (48 percent) of all local health departments (LHDs) reduced or eliminated services in at least one program area. Immunization, maternal and child health and emergency preparedness services were the three most affected program areas. Since 2008, LHDs lost almost 44,000 jobs, and 31 percent of all LHDs expect cuts in the upcoming fiscal year.[41]

## INDICATOR 1: STATE FUNDING

KEY FINDING: 33 states and Washington, D.C. cut funding for public health from FY 2011 to 2012 to FY 2012 to 2013.

| 17 states increased or maintained public health funding from FY 2011 to 2012 to FY 2012 to 2013 (1 point). | 33 states and Washington, D.C. cut public health funding from FY 2011 to 2012 to FY 2012 to 2013 (0 points). | |
|---|---|---|
| Alaska (14.1%) | Alabama (-7.1%) | Missouri (-5.3%)^ |
| Colorado (20.7%) | Arizona (-1.3%)^ | Montana (-1.8%)^ |
| Connecticut (9.9%) | Arkansas (-4.0%)* | Nebraska (-1.5%)^ |
| Georgia (6.0%) | California (-5.2%) | Nevada (-0.5%)^ |
| Iowa (1.8%) | Delaware (-0.7%) | New Jersey (-5.2%)^ |
| Louisiana (2.6%) | **D.C. (-1.8%)** | New Mexico (-1.1%)^ |
| Michigan (6.5%) | Florida (-8.8%)* | New York (-3.9%) |
| **Mississippi (22.6%)** | **Hawaii (-8.2%)** | North Carolina (-17.1%) |
| New Hampshire (8.4%) | Idaho (-2.3%) | Ohio (-2.3%)* |
| North Dakota (32.8%) | Illinois (-4.0%)^ | Oklahoma (-4.1%) |
| Oregon (18.1%) | Indiana (-1.8%) | South Dakota (-1.4%)^ |
| Pennsylvania (1.6%) | Kansas (-3.9%)^ | Tennessee (-0.9%)* |
| Rhode Island (5.3%) | Kentucky (-3.1%)^ | Virginia (-4.4%)^ |
| South Carolina (0.9%) | **Maine (-10.6%)^** | Washington (-29.5%)^ |
| Texas (2.7%) | Maryland (-1.1%)^ | West Virginia (-18.6%)^ |
| **Utah (12.6%)** | Massachusetts (-0.6%) | Wisconsin (-1.2%) |
| Vermont (14.8%) | Minnesota (-1.2%) | Wyoming (-0.6%) |

NOTES: **Bolded** states did not respond to the data check TFAH coordinated with ASTHO that was sent out October 24, 2013. States were given until December 3, 2013 to confirm or correct the information. The states that did not reply by that date were assumed to be in accordance with the findings.

*Budget decreased for second year in a row

^Budget decreased for third year in a row

This indicator, adjusted for inflation, illustrates a state's commitment and ability to provide funding for public health programs that support the infrastructure and workforce needed to improve health in each state, including the ability to prevent and control infectious disease outbreaks.

Every state allocates and reports its budget in different ways. States also vary widely in the budget details they provide. This makes comparisons across states difficult. For this analysis, TFAH examined state budgets and appropriations bills for the agency, department, or division in charge of public health services for FY 2011 to 2012 and FY 2012 to 2013, using a definition as consistent as possible across the two years, based on how each state reports data. TFAH defined "public health services" broadly to include all state-level health spending with the exception of Medicaid, CHIP or comparable health coverage programs for low-income residents.

Based on this analysis, 33 states and Washington, D.C. made cuts in their public health budgets. Twenty states cut their budget for two or more years in a row, and 16 made cuts for three or more years in a row. The median spending in FY 2012 to FY 2013 was $27.49 per person, down from $33.71 in FY 2008.

Public health funding is discretionary spending in most states and, therefore, is at high risk for significant cuts during economic downturns. States rely on a combination of federal, state and local funds to support public health activities, including infectious disease prevention, immunization services and preparedness activities. The overall infrastructure of other public health programs supports the ability to carry out all of their responsibilities, which includes infectious disease prevention, immunization services and health emergency preparedness.

It is important to note that several states that received points for this indicator may not have actually increased their spending on public health programs. The ways some states report their budgets, for instance, by including federal funding in the totals or including public health dollars within healthcare spending totals, make it very difficult to determine "public health" as a separate item.

This indicator is limited to examining whether states' public health budgets increased or decreased, it does not assess if the funding is adequate to cover public health needs in the states and it should not be interpreted as an indicator or surrogate for a state's overall performance.

For additional information on the methodology of the budget analysis, please see *Appendix D: Methodology for Select State Indicators.*

## Key Federal Infectious Disease Program Funding

| CDC—INFECTIOUS DISEASES | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | FY 2006 | FY 2007 | FY 2008 | FY 2009 | FY 2010[1] | FY 2011[2] | FY 2012[3] | FY 2013 |
| Immunization and Respiratory Diseases | $519,858,000 | $585,430,000 | $684,634,000 | $716,048,000 | $721,180,000 | $748,257,000 | $778,947,000 | $678,935,000 |
| HIV/AIDS, Viral Hepatitis, STI and TB Prevention^ | $963,133,000 | $1,002,513,000 | $1,002,130,000 | $1,006,375,000 | $1,118,712,000 | $1,115,995,000 | $1,109,934,000 | $1,048,374,000 |
| Emerging and Zoonotic Infectious Diseases* | $212,165,000 | $221,643,000 | $217,771,000 | $225,404,000 | $281,174,000 | $304,193,000 | $304,226,000 | $291,073,000 |

*In 2011 CDC integrated two existing nationals centers: the National Center for Preparedness, Detection, and Control of Infectious Diseases and the National Center for Zoonotic, Vector-Borne, and Enteric Diseases to create the National Center for Emerging and Zoonotic Infectious Diseases.

^Viral Hepatitis was added in 2007
1 Includes PPHF funding for HIV/AIDS and Emerging and Zoonotic Infectious Diseases
2 Includes PPHF funding for Immunization and Respiratory Diseases, HIV/AIDS and Emerging and Zoonotic Infectious Diseases
3 Includes PPHF funding for Immunization and Respiratory Diseases, HIV/AIDS and Emerging and Zoonotic Infectious Diseases

**Immunization and Respiratory Diseases**
Source FY 2012-2013: http://www.cdc.gov/fmo/topic/Budget%20Information/appropriations_budget_form_pdf/FY2013_CDC_Full-Year_CR_Operating_Plan.pdf
Source FY 2009-2011: http://www.cdc.gov/fmo/topic/Budget%20Information/appropriations_budget_form_pdf/FY2014_CJ_CDC_FINAL.pdf, pg. 52
Source FY 2008: http://www.cdc.gov/fmo/topic/Budget%20Information/appropriations_budget_form_pdf/FY2013_CDC_CJ_Final.pdf, pg. 41
Source FY 2007: http://www.cdc.gov/fmo/topic/Budget%20Information/appropriations_budget_form_pdf/FY2012_CDC_CJ_Final.pdf, pg. 51
Source FY 2006: http://www.cdc.gov/fmo/topic/Budget%20Information/appropriations_budget_form_pdf/FY2011_CDC_CJ_Final.pdf, pg. 53

**HIV/AIDS, Viral Hepatitis, STI and TB Prevention**
Source FY 2012-2013: http://www.cdc.gov/fmo/topic/Budget%20Information/appropriations_budget_form_pdf/FY2013_CDC_Full-Year_CR_Operating_Plan.pdf
Source FY 2009-2011: http://www.cdc.gov/fmo/topic/Budget%20Information/appropriations_budget_form_pdf/FY2014_CJ_CDC_FINAL.pdf, pg. 74
Source FY 2008: http://www.cdc.gov/fmo/topic/Budget%20Information/appropriations_budget_form_pdf/FY2013_CDC_CJ_Final.pdf, pg. 60
Source FY 2007: http://www.cdc.gov/fmo/topic/Budget%20Information/appropriations_budget_form_pdf/FY2012_CDC_CJ_Final.pdf, pg. 70
Source FY 2006: http://www.cdc.gov/fmo/topic/Budget%20Information/appropriations_budget_form_pdf/FY2011_CDC_CJ_Final.pdf, pg. 73

**Emerging and Zoonotic Infectious Diseases**
Source FY 2012-2013: http://www.cdc.gov/fmo/topic/Budget%20Information/appropriations_budget_form_pdf/FY2013_CDC_Full-Year_CR_Operating_Plan.pdf
Source FY 2009-2011: http://www.cdc.gov/fmo/topic/Budget%20Information/appropriations_budget_form_pdf/FY2014_CJ_CDC_FINAL.pdf, pg. 108
Source FY 2006-2008: http://www.cdc.gov/fmo/topic/Budget%20Information/appropriations_budget_form_pdf/FY2011_CDC_CJ_Final.pdf, pg. 99

| CDC OFFICE OF PUBLIC HEALTH PREPAREDNESS AND RESPONSE FUNDING TOTALS AND SELECT PROGRAMS | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FY 2002 | FY 2003 | FY 2004 | FY 2005 | FY 2006 | FY 2007 | FY 2008 | FY 2009 | FY 2010 | FY 2011 | FY 2012 | FY 2013 |
| CDC Total* | $1,747,023,000 | $1,533,474,000 | $1,507,211,000 | $1,622,757,000 | $1,631,173,000 | $1,472,553,000 | $1,479,455,000 | $1,514,657,000 | $1,522,339,000 | $1,415,416,000 | $1,329,479,000 | $1,231,859,000 |
| State and Local Preparedness and Response Capability** | $940,174,000 | $1,038,858,000 | $918,454,000 | $919,148,000 | $823,099,000 | $766,660,000 | $746,039,000 | $746,596,000 | $760,986,000 | $664,294,000 | $657,418,000 | $623,209,000 |
| SNS | $645,000,000 | $298,050,000 | $397,640,000 | $466,700,000 | $524,339,000 | $496,348,000 | $551,509,000 | $570,307,000 | $595,661,000 | $591,001,000 | $533,792,000 | $477,577,000 |

* CDC Total also includes CDC Preparedness

**May include Public Health Emergency Preparedness (PHEP) cooperative agreements, All Other State and Local Capacity, Centers for Public Health Preparedness, Advanced Practice Centers (FY2004-09), Cities Readiness Initiative, U.S. Postal Service Costs (FY 2004), and Smallpox Supplement (FY 2003).

**CDC Funding**
Source: FY 2002-09: http://www.cdc.gov/phpr/publications/2010/Appendix3.pdf
Source: FY 2010-11: U.S. Centers for Disease Control and Prevention. "2011 Operating Plan." http://www.hhs.gov/asfr/ob/docbudget/2011operatingplan_cdc.pdf.
Source: FY 2012-13: http://www.cdc.gov/fmo/topic/Budget%20Information/appropriations_budget_form_pdf/FY2013_CDC_Full-Year_CR_Operating_Plan.pdf

| NATIONAL INSTITUTES OF HEALTH (NIH)—INFECTIOUS DISEASE | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FY 2002 | FY 2003 | FY 2004 | FY 2005 | FY 2006 | FY 2007 | FY 2008 | FY 2009 | FY 2010 | FY 2011 | FY 2012 | FY 2013 |
| National Institute of Allergy and Infectious Diseases | $2,367,313,000 | $3,706,722,000 | $4,304,562,000 | $4,402,841,000 | $4,414,801,000 | $4,417,208,000 | $4,583,344,000 | $4,702,572,000 | $4,818,275,000 | $4,775,968,000 | $4,486,473,000 | $4,231,498,000 |

* In 2003 NIAID added biodefense and emerging infectious diseases (BioD)
Source FY 2002-2011: http://officeofbudget.od.nih.gov/pdfs/FY12/Approp.%20History%20by%20IC%292012.pdf
Source FY 2012-2013: http://officeofbudget.od.nih.gov/pdfs/FY14/POST%20ONLINE_NIH.pdf

| OFFICE OF ASSISTANT SECRETARY FOR PREPARDNESS AND RESPONSE FUNDING TOTALS AND SELECT PROGRAMS | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FY 2002 | FY 2003 | FY 2004 | FY 2005 | FY 2006 | FY 2007 | FY 2008 | FY 2009 | FY 2010 | FY 2011 | FY 2012 | FY 2013 |
| ASPR Totals | -- | -- | -- | -- | $632,000,000 | $694,280,000 | $632,703,000 | $788,191,000 | $891,446,000 | $913,418,000 | $925,612,000 | $897,104,000 |
| HPP^ | $135,000,000 | $514,000,000 | $515,000,000 | $487,000,000 | $474,000,000 | $474,030,000 | $423,399,000 | $393,585,000 | $425,928,000 | $383,858,000 | $379,639,000 | $358,231,000 |
| BARDA** | -- | -- | -- | $5,000,000 | $54,000,000 | $103,921,000 | $101,544,000 | $275,000,000 | $304,948,000 | $415,000,000 | $415,000,000 | $415,000,000 |
| BioShield Special Reserve Fund | -- | -- | $5,600,000,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |

* One-time Funding
^HPP moved from HRSA to ASPR in 2007
** BARDA has been funded via transfer from Project BioShield Special Reserve Fund balances
Source: HPP FY 2002: http://archive.hhs.gov/budget/04budget/fy2004bib.pdf, p. 14
Source: HPP FY 2003: http://archive.hhs.gov/budget/05budget/fy2005bibfinal.pdf, p. 16
Source HPP FY 2004:http://archive.hhs.gov/budget/06budget/FY2006BudgetinBrief.pdf, p. 16
Source: HPP FY 2005: http://archive.hhs.gov/budget/07budget/2007BudgetInBrief.pdf, p. 20
Source: BARDA FY 2005-06: http://www.hhs.gov/asrt/ob/docbudget/2010phssef.pdf, p. 45.
Source: FY 2006: http://www.hhs.gov/asfr/ob/docbudget/2008budgetinbrief.pdf, p. 109
Source: FY 2007: http://www.hhs.gov/budget/09budget/budgetfy09cj.pdf, p. 288
Source: FY 2008-09: http://www.hhs.gov/asfr/ob/docbudget/2010phssef.pdf, p. 8
Source: FY 2010-11: http://www.hhs.gov/asfr/ob/docbudget/2011operatingplan_phssef.pdf
Source: FY 2012: http://www.hhs.gov/budget/safety-emergency-budget-justification-fy2013.pdf
Source: FY 2013: ASPR Operating Plan for FY 2013

## Trends for Federal Funding of Infectious and Preparedness Programs

### Impact of Budget Cuts and Congressional Inaction

2013 was a year marked by limited congressional action, a government shutdown, the implementation of sequestration, and a series of short-term continuing resolutions (CRs) to keep the government running for weeks at a time. Each of these conditions had a profound impact on the ability of the public health and health systems to protect Americans. Some examples of the effects of these events on public health include:

- Unreliable appropriations and a failure to pass a long-term funding measure could hamper the federal medical countermeasure (MCM) enterprise. Funding for Project BioShield, which allows procurement of MCM products, and the Biomedical Advanced Research and Development Authority (BARDA), ran out at the end of FY 2013. The short-term CR passed in October included language that would allow BARDA to keep operating at existing levels. However, without new funding, the biotechnology industry does not have the guarantee that the federal government will be a reliable partner. The Office of the Assistant Secretary for Preparedness and Response (ASPR) and expert organizations such as the UPMC Center for Health Security have reported that this unpredictability could result in industry partners abandoning MCM research and development.
- Between sequestration and the government shutdown, biomedical research funded by National Institutes of Health and other federal agencies was delayed or disrupted, including clinical trials.[42] The erosion of funding could have a long-term impact on the research infrastructure, as scientists have trouble finding funding or studies are interrupted.[43]
- The government shutdown occurred during a foodborne *Salmonella* outbreak and at the beginning of the 2013 flu season, while many CDC epidemiologists and investigators were furloughed.[44] Gaps in surveillance and response capacity at the time could not be made up for when the government reopened, potentially putting additional people at risk.
- Congressional gridlock can delay emergency response at critical moments. For example, amid debate over whether to offset funds, Congress approved most Hurricane Sandy relief money nearly three months after the storm.[45] In comparison, the bulk of Hurricane Katrina relief funds were approved within 10 days of the disaster.[46]

## RECOMMENDATIONS: Public Health Foundational Capabilities and Funding

The public health system — comprised of federal, state and local departments — must be modernized and funded at a level that allows it to fight both ongoing and newly emerging infectious disease threats.

Currently, there are key elements of the system that are outdated or need increased support to be able to function more effectively.

To achieve a more effective, efficient and modern approach to combatting infectious disease threats, TFAH recommends that health departments at the federal, state and local levels establish foundational capabilities to ensure consistent, basic levels of protection across the country — and public health departments at all levels must receive adequate funding to achieve these capabilities, including:

- **Defining, prioritizing and fully funding a set of foundational capabilities for public health departments at all levels of government:** Public health departments need the tools and skills that are necessary to provide basic public protections while adapting to and effectively addressing changing health threats. The IOM and the Transforming Public Health project, funded by the Robert Wood Johnson Foundation (RWJF), identified key foundational capabilities.[47, 48] Two states, Washington and Ohio, have begun their own assessment of foundational capabilities.[49] Some of the most important aspects for preventing and controlling infectious diseases include: modern, integrated, interoperable real-time surveillance capabilities; a trained, expert workforce; strong communication and coordination among public health departments, healthcare providers and other government officials at all levels of government; and engagement with the community including ongoing clear, honest, culturally-sensitive channels of communications and resiliency planning. The Transforming Public Health project also stresses the importance of accountability and using tools like accreditation to ensure standards and baseline consistency.
- **Increasing funding for public health at the federal, state and local levels:** To be able to carry out foundational capabilities, federal, state and local health departments must receive a sufficient level of funding, and some existing funding lines may need to be realigned. The use of all federal public health funds, and the outcomes achieved from the use of funds, must be transparent and clearly communicated with the public. Accreditation can be an important tool to measure if states and localities are meeting foundational capabilities.
- **Establishing systems where public health departments should only pay for direct services when they cannot be paid for by insurance:** The Affordable Care Act (ACA) has expanded the number of services covered by insurance, including eliminating co-payments for recommended vaccinations under new group and individual plans for in-network providers and for the Medicaid expansion population. Public health departments that provide direct services should make sure they have systems in place to be able to bill an individual's insurance provider, so they do not use their public health budgets to pay for services that should be billed to insurers. Some states already have these systems in place for some services, including billing for vaccinations. However, sensitive services, such as those for STDs, should be monitored to ensure that people do not avoid seeking these crucial prevention services due to confidentiality concerns.
- **Exploring new funding and business models to assure sufficient levels of funding to support foundational capabilities.** The federal government and states should develop a new financing system for public health that gives priority to foundational capabilities and assures that every American is served by a health department that has these capabilities. This can be achieved through new funding mechanisms or by giving states more flexibility with existing funding streams. Modernizing business practices and finding efficiencies may require innovative approaches such as regionalization, public-private partnerships and resource-sharing.
- **Increasing integration between public health departments and healthcare providers to help achieve maximum results for improving health and containing costs:** As health systems are reforming, they should be encouraged to incorporate public health and community-based prevention efforts into their systems. Integrating prevention and public health with the larger healthcare system can be implemented in a variety of ways, including through coordination between healthcare providers and existing public health programs and departments. And, public health departments must adapt to work with new entities and financing mechanisms in the reformed health system, such as by working with Accountable Care Organizations (ACOs) or within new capitalized care structures and global health budgets, to help improve health beyond the doctor's office. These relationships need to be carefully negotiated, particularly in the areas of infectious disease control (see, for example, discussion of preparedness and TB in the following sections) because of the unique responsibility health departments have to stop the spread of communicable diseases, while the health system can and should be treating them.

### Tracking Disease Threats: Biosurviellance

One of the most fundamental components of infectious disease prevention and control is the ability to identify new outbreaks and track ongoing outbreaks.

Currently, the United States lacks an integrated, national approach to biosurveillance — which limits the rapid detection and tracking of diseases. There are more than 300 different health surveillance systems or networks supported by the federal government.[50] These efforts, for the most part, are neither integrated nor interoperable, and serve an array of purposes.

- At a federal level, CDC runs the majority of national human health surveillance networks. Some of these include: the Arboviral Surveillance System (ArboNet), BioSense, Early Warning Infectious Disease Surveillance (EWIDS), Electronic Food-Borne Disease Outbreak Reporting System (eFORS), Emerging Infection Program (EIP), Environmental Public Health Tracking Network, Epidemic Information Exchange (Epi-X), GeoSentinel, Global Disease Detection and National Outbreak Reporting System (NORS).
- Within each state there are also often more than a dozen health surveillance systems that work independently and voluntarily feed data to the corresponding national network at CDC.
- In addition, other federal agencies and departments have their own biosurveillance systems, including the Environmental Protection Agency (EPA), the Department of Homeland Security (DHS), the Department of Agriculture (USDA), the Food and Drug Administration (FDA), the Department of Veterans Affairs (VA), the Department of Defense (DOD) and the Office of the Director of National Intelligence (ODNI).

## RECOMMENDATIONS: Modernizing Biosurveillance

Biosurveillance needs to be dramatically improved to become a true real-time, interoperable system, able to quickly identify outbreaks and threats and implement containment and treatment strategies. Advances in health information technology (HIT) and electronic health records (EHRs) provide new opportunities to integrate and improve systems. TFAH recommends full implementation of the 2012 National Biosurveillance Strategy and the 2013 National Biosurveillance and Technology Roadmap.[51] Implementation should include:

- **Modernizing and integrating systems:** The current structure of 300 separate biosurveillance systems is untenable in a modern era of HIT. The federal government should work to upgrade systems to the latest technologies to allow for real-time and interoperable tracking of diseases — to more efficiently collect and analyze data, to better identify threats and to understand how threats can be interrelated.
  - At a state and local level, many health departments still lack the basic hardware, software and staff training to be able to receive and interpret data from electronic health records or to be able to integrate or upgrade systems. Support for building and maintaining baseline capabilities should be a high priority.
- **Supporting new technological advances:** Even the most developed systems at CDC must continually be upgraded to take advantage of new technological advances. For instance, technologies to make point-of-care (POC) diagnostics increasingly available would greatly improve care and screen patients who truly need attention during mass emergencies and Advanced Molecular Detection (AMD) technologies hold the promise of building molecular sequencing and bioinformatics capacities, allowing public health to rapidly look for a pathogen's match, saving time and money in identifying an outbreak.[52,53]

  Some key public health benefits of AMD could include:
  - More rapid and accurate disease diagnoses;
  - Enhanced recognition of antimicrobial resistance;
  - Better targeting of prevention and treatment measures;
  - Improved surveillance information on the transmissibility of infections and the extent and spread of outbreaks;
  - Faster and more effective disease control efforts; and
  - Reduced diagnostic costs in the future. For example, states would no longer need to submit lab cultures to CDC to identify outbreak pathogens.
- **Leveraging Health Information Technology:** The increased widespread and consistent use of EHRs and electronic laboratory reporting (ELR) have the potential to provide public health officials with data in real time and offer two-way communication between healthcare providers and health departments. This can provide health departments with better, faster data to track outbreaks and let providers know about risks to their patients in a more timely way. The Office of the National Coordinator for Health Information Technology (ONC) must work with software developers, public health and providers to ensure information exchange is feasible and accessible while maintaining patient privacy. Governmental agencies should set standards for data, identify what health information is most relevant for public health purposes and ensure that public health agencies have ready access to these data and the capacity to analyze information.
- **Connecting disease tracking and community resilience:** Traditionally, tracing of infectious and chronic diseases has been siloed. There is an increasing recognition of the importance of understanding how underlying health make some individuals and groups more vulnerable to disease outbreaks and health disasters. Better tracking of the health of communities through health information exchanges, ACOs and other systems can help identify less healthy areas to help target resources and special response efforts during outbreaks and diseases.

# Vaccine-Preventable Diseases

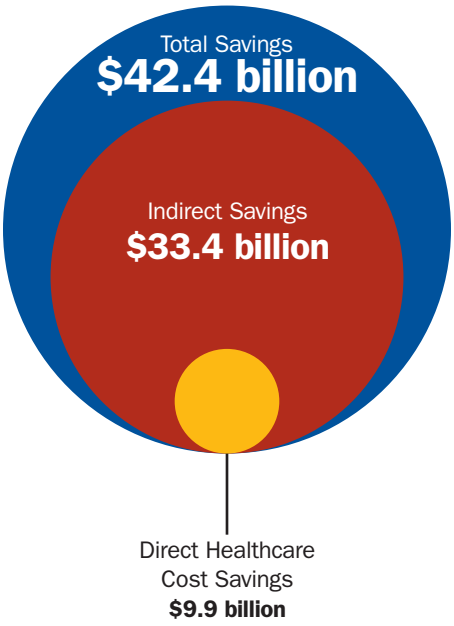
Vaccines are the safest and most effective way to manage many infectious diseases in the United States. Some of the greatest public health successes of the past century — including the worldwide eradication of smallpox and the elimination of polio, measles and rubella in the United States — are the result of successful vaccination programs.[54]

But, despite the recommendations of medical experts that vaccines are effective and that research has shown vaccines to be safe, on average, an estimated 45,000 adults and 1,000 children die annually from vaccine-preventable diseases in the United States.[55]

Many Americans are not receiving the recommended vaccinations. For instance, adult coverage remains low for most routinely recommended vaccinations and many preschool children (aged 19 to 35 months) and teens do not receive all the recommended vaccinations.[56, 57]

The failure to vaccinate all preschoolers with all of the recommended immunizations on time leaves 2.1 million young children unnecessarily vulnerable to preventable illnesses.[58]

**Childhood Vaccinations are Responsible for Significant Healthcare Cost Savings**




## Preschooler Immunization Gap

Vaccines are among the most cost-effective clinical services to prevent diseases among children and also provide a very high return on investment. Each birth cohort vaccinated with the routine immunization schedule saves 33,000 lives, prevents 14 million cases of disease, reduces direct healthcare costs by $9.9 billion and saves $33.4 billion in indirect costs for a total of $42.4 billion in savings due to vaccinations.[59] Worldwide, vaccinations prevent an estimated 2.5 million childhood deaths annually.[60]

Requirements for vaccinations before attending school mean around 95 percent of school-aged children receive vaccinations — but there is a much bigger gap in preschooler vaccination rates.

The immunization rates were higher for some of the recommended vaccines than others. For instance, coverage remained above the *Healthy People 2020* target of 90 percent for measles, mumps and rubella (90.8 percent); poliovirus (92.8 percent); rotavirus (69 percent); and varicella (90.2 percent), according to the 2012 National Immunization Survey.

However, not all vaccination rates reached the *Healthy People 2020* target of 90 percent, including hepatitis B (89.7 percent); diphtheria, tetanus and whooping cough (82.5 percent); pneumococcal (81.9 percent); and the childhood full series 4:3:1:3:3:1:4 (68.4 percent).[61]

In recent years, there have been a number of outbreaks of vaccine-preventable diseases among children, including measles and whooping cough. For instance, measles, a highly contagious, viral illness that can lead to health complications, such as pneumonia and encephalitis, and eventually death, was declared to be virtually eliminated in the United States as of 2000, with around 60 reported cases each year. However, individuals traveling from outside the country continued to import the disease. Unvaccinated individuals are far more likely to contract measles than those who have been vaccinated. From January through November 2013, 175 measles cases were reported in the United States, including the largest measles outbreak in more than a decade with 58 cases reported in New York City.[62] An investigation found that more than one-quarter of those infected got measles in other countries and brought the disease to the United States and spread it to others. However, most of the cases were in persons who were unvaccinated (82 percent) or had unknown vaccination status (9 percent).[63] Whooping cough outbreaks which began in 2012 have infected more than 48,000 individuals and caused 18 deaths.[64] This is the highest number of cases of whooping cough since 1955.[65]

## Teen Immunization Gap

The Advisory Committee on Immunization Practices (ACIP), the American Academy of Pediatrics (AAP) and the American Academy of Family Physicians (AAFP) recommends four routine vaccinations for adolescents (ages 11 to 18), including Tetanus and diphtheria toxoids and acellular pertussis vaccine (Tdap), HPV vaccine, Meningococcal conjugate vaccine, quadrivalent (MCV4) and for the seasonal flu.[66] Vaccinating children and teens against diseases like hepatitis A, pneumonia and the flu not only protects the children themselves, it is also the most efficient way to protect adults and the entire population, since it limits the spread of these diseases.

The recommended medical practice is that teens should receive their Tdap, MCV4 and the first HPV vaccine dose during a single visit. However, the 2012 National Immunization Survey-Teen (NIS-Teen) vaccination coverage data show that many teens are not receiving the MCV4 and HPV vaccines, which puts teens at risk for HPV and bacterial meningitis infections. In 2012, vaccination coverage among teens between the ages of 13 and 17 years was about 85 percent for at least one dose of Tdap vaccine, 74 percent for at least one dose of MCV4 vaccine, 75 percent for 2 doses of varicella vaccine, and, among males, 21 percent for at least one dose of HPV vaccine and 54 percent for females. Only 33 percent of female teens received all three recommended doses of the HPV vaccine series in 2012. One recent study also suggests how HPV vaccinations for both males and females can provide protection to the wider community, by not just protecting the individual but by reducing the risk of spreading illnesses to others. A 2013 study in *Pediatrics* found that Tdap vaccinations in adolescents may be partially effective in reducing whooping cough hospitalizations among infants.[67]

## Adult Immunization Gap

Millions of American adults go without routine and recommended vaccinations. The result is thousands of deaths from seasonal flu, invasive pneumonia, the effects of hepatitis B and other infectious diseases that could have been prevented if more adults were vaccinated.[68]

Adults need vaccinations for new diseases and "booster" shots for diseases that they were vaccinated against as children, because their immunity may wane over time. In addition, new vaccines are being developed against old diseases, and adults can benefit from these vaccines as they become available.

Vaccinations against diseases, such as pneumonia and influenza, are especially important for people at high risk, including those suffering from chronic illnesses such as heart disease, pulmonary disease, diabetes, alcoholism or chronic liver disease (cirrhosis), and for healthcare professionals and caregivers. Also, Americans who travel to certain foreign countries may need vaccines to protect against diseases that exist in those regions but are not prevalent in the United States.

According to the National Health Interview Survey, 2011:[69]

- Only 12.5 percent of eligible adults (19 to 64 years old) had the tetanus, diphtheria, and whooping cough vaccine (The HPV vaccine is recommended for males through the age of 20 and is optional for men 21 to 26 years old);
- Just under 16 percent of older patients (60 and over) ever had the shingles vaccine;
- Only 29.5 percent of eligible adult women (19 to 26 year olds) had the HPV vaccine; and
- Only 62.3 percent of seniors had the pneumococcal vaccine, which is far short of the CDC's goal of a 90 percent vaccination rate.[70]

**Some reasons attributed to the childhood, teen and adult vaccination gaps include:**

- **Limited Data Sharing:** An under-funded and underutilized immunization registry system for both childhood and adult vaccinations and failure to integrate into evolving electronic health records systems, including the inability to share immunization data across state lines.

- **Limited access for adults:** Currently, there is no real system or structure in place to ensure adults have access to or receive the vaccines they need unless they are part of institutions that have vaccine requirements, such as being enrolled in colleges or universities, serving in the military or working in a healthcare setting. Significant numbers of adults do not have regular well care exams, switch doctors or health plans often or only seek care from specialists who do not traditionally screen for immunization histories or offer vaccines, which makes it extremely difficult to set up ways for people to know what vaccinations they need and for doctors to track and recommend vaccines to patients.

- **Limited care and insurance coverage:** Historically, limits on health insurance coverage and high costs have traditionally been an obstacle. The ACA now requires no co-pay or cost sharing for in-network providers for recommended vaccinations for adults enrolled in group and individual plans or are part of Medicaid expansion, but co-pay requirements for the base Medicaid population continue to vary on a state-by-state basis. Medicare does not consistently provide first collar coverage for vaccines, and the different policies for what is covered under part B and Part D leaves many seniors with gaps in coverage. Beneficiaries can get their flu, pneumonia and HBV (for at-risk individuals) vaccine covered under Medicare Part B, but an out-of-pocket payment may be required, depending on the shot and provider. The rest of the recommended vaccines are covered under Medicare Part D, the prescription drug benefit, so the patient must find a provider who accepts Part D and carries the needed vaccine.

- **Misunderstanding and misinformation:** Many adults and parents are misinformed about the safety and effectiveness of vaccines. Many states allow children to opt-out of school-required vaccinations for religious or philosophical reasons, in addition to medical exemptions.

## INDICATOR 2: WHOOPING COUGH VACCINATIONS

KEY FINDING: Only two states and D.C. met the HHS goal of vaccinating 90 percent of 19- to 35-month-olds against whooping cough (four or more doses of any diphtheria and tetanus toxoids and pertussis vaccines including diphtheria and tetanus toxoids, and any acellular pertussis vaccine (DTaP/DTP/DT)).

| 2 states and D.C. met the HHS goal of vaccinating 90 percent of 19- to 35-month-olds against whooping cough (1 point). | 48 states did not meet the HHS goal of vaccinating 90 percent of 19-to 35-month-olds against whooping cough (0 points). | |
|---|---|---|
| Connecticut (91.3%) | Alabama (84.8%) | Nebraska (84.5%) |
| Delaware (90.9%) | Alaska (79.4%) | Nevada (81.0%) |
| D.C. (90.7%) | Arizona (82.7%) | New Hampshire (88.7%) |
| | Arkansas (79.8%) | New Jersey (84.7%) |
| | California (81.6%) | New Mexico (87.0%) |
| | Colorado (82.8%) | New York (83.8%) |
| | Florida (83.3%) | North Carolina (85.9%) |
| | Georgia (86.7%) | North Dakota (85.1%) |
| | Hawaii (87.9%) | Ohio (83.3%) |
| | Idaho (76.7%) | Oklahoma (79.1%) |
| | Illinois (85.3%) | Oregon (81.2%) |
| | Indiana (76.8%) | Pennsylvania (80.1%) |
| | Iowa (88.2%) | Rhode Island (89.0%) |
| | Kansas (79.0%) | South Carolina (80.9%) |
| | Kentucky (83.0%) | South Dakota (79.2%) |
| | Louisiana (77.8%) | Tennessee (82.0%) |
| | Maine (87.9%) | Texas (77.4%) |
| | Maryland (83.2%) | Utah (80.5%) |
| | Massachusetts (88.2%) | Vermont (86.0%) |
| | Michigan (81.5%) | Virginia (82.7%) |
| | Minnesota (84.2%) | Washington (84.0%) |
| | Mississippi (83.6%) | West Virginia (79.1%) |
| | Missouri (81.9%) | Wisconsin (87.8%) |
| | Montana (86.6%) | Wyoming (79.4%) |

This indicator examines how well states vaccinate children against pertussis (whooping cough). Only two states, Connecticut and Delaware, and Washington, D.C. met the goal set by HHS in the *Healthy People 2020* of vaccinating 90 percent of children ages 19 to 35 months against pertussis.[71] Connecticut had the highest rate of vaccinations at 91.3 percent, while Idaho had the lowest at 76.6 percent. Eleven states had rates below 80 percent. The national average in 2012 was 82.5 percent. Meeting vaccination rate goals serves as a marker for the ability to protect the population from infectious diseases, and a part of this role involves the ability to effectively communicate about the importance, safety and efficacy of vaccinations.

The ability to regularly vaccinate Americans, particularly children, is an important measure for how well the system can effectively reach and encourage vaccinations among the public. The need for this capability is amplified during a time of crisis, when it is often necessary to reach and encourage mass segments or the whole population of a community to get vaccinated against a new threat on a time-sensitive schedule.

Pertussis, commonly known as whooping cough, is a highly contagious bacterial respiratory infection that can be fatal in infants. Early symptoms mirror those of a cold, but infection progresses into a severe cough that can affect breathing. The best way to prevent pertussis is through vaccination.[72]

In 2012, the majority of states saw increases in the number of pertussis cases, as compared with 2011, and the United States has not seen this many cases since 1955.[73] Through 2012, over 41,880 cases and 18 deaths (most in infants younger than three months) were reported to CDC.[74] Rates have also increased in children ages 7 to 10 and in adolescents ages 13 to 14.[75] Observational studies suggest these outbreaks in children and adolescents may be a result of early waning of immunity due to reformulated vaccine in 1997.[76] However, some experts believe that reduced vaccination rates may also be a contributing factor. A 2013 study by the FDA found that acellular pertussis vaccines licensed by the FDA are effective in preventing the disease among those vaccinated, but suggests that they may not prevent infection from the bacteria that causes whooping cough in those vaccinated or its spread to other people, including those who may not be vaccinated.[77]

Several states allow parents to refuse vaccination for their children based on personal or philosophical reasons, and many of those states, including Wisconsin and Washington have seen the largest spikes in incidence. In communities facing an outbreak, reports have shown the response is far more costly than preventive action would have been, costing a local health department over $2,000 per case, compared to a few dollars per dose of vaccine.[78, 79]

In 2013 (as of October 19, 2013), there have been 18,553 reported cases of pertussis in the United States. Overall the majority of states have reported fewer cases of pertussis in 2013 to-date, but 13 states and Washington, D.C. have reported an increase compared with the same time during 2012.[81]

**States with an incidence of pertussis the same or higher than the national incidence in 2012, which is 13.4/100,000 persons.** [80]

| | | | | | |
|---|---|---|---|---|---|
| Wisconsin | 104.9 | Montana | 44.3 | Oregon | 23.3 |
| Vermont | 100.6 | Alaska | 43.3 | New Hampshire | 16.4 |
| Washington | 67.4 | Minnesota | 40.8 | Illinois | 14.5 |
| North Dakota | 54.4 | New Mexico | 35.7 | Pennsylvania | 14.5 |
| Iowa | 53.5 | Colorado | 28.9 | Idaho | 14.3 |
| Maine | 52.9 | Kansas | 25.5 | Missouri | 14.2 |
| Utah | 47.5 | New York | 23.6 | Arizona | 14.1 |

The Section 317 Immunization Program, which supports grants to states for vaccinating underinsured children and adults, received some additional funding through the Prevention and Public Health Fund and American Recovery and Reinvestment Act. The program includes support for vaccine purchase and infrastructure. However, recent reductions to the Prevention Fund and CDC funding have dropped the 317 program funding below FY 2011 levels. Appropriations have also not kept up with the cost increase of additional vaccine recommendations according to CDC. A FY 2012 CDC report to Congress outlined that the 317 program needs about $914 million to fully achieve its mission, about $350 million above the President's FY2013 request.[82] Meanwhile, National Association of County and City Health Officials (NACCHO) reports that 20 percent of local health departments cut immunization programs in 2012, while nearly a third of states and territories reduced vaccine programs as a result of budget cuts, according to ASTHO.[83, 84] These programs help ensure all Americans have access to vaccinations.

## INDICATOR 3: HUMAN PAPILLOMAVIRUS IMMUNIZATION POLICIES

Key Finding: 25 states and Washington, D.C. require the HPV vaccine, education for parents or guardians about the HPV vaccine, or fund HPV vaccinations.

| 25 states and D.C. require the HPV vaccine, education for parents or guardians about the HPV vaccine, or fund HPV vaccinations (1 point). | | 25 states do NOT require the HPV vaccine, education for parents or guardians about the HPV vaccine, or fund HPV vaccinations (0 points). | |
|---|---|---|---|
| Colorado | New Hampshire | Alabama | Mississippi |
| D.C. | New Mexico | Alaska | Montana |
| Idaho | New York | Arizona | Nebraska |
| Illinois | North Carolina | Arkansas | New Jersey |
| Indiana | North Dakota | California | Ohio |
| Iowa | Oregon | Connecticut | Oklahoma |
| Louisiana | Rhode Island | Delaware | Pennsylvania |
| Maine | South Dakota | Florida | South Carolina |
| Maryland | Texas | Georgia | Tennessee |
| Michigan | Utah | Hawaii | Vermont |
| Minnesota | Virginia | Kansas | West Virginia |
| Missouri | Washington | Kentucky | Wyoming |
| Nevada | Wisconsin | Massachusetts | |

*Source: National Council of State Legislatures, as of November 2013*

This indicator examines which states have passed school vaccination policies to support HPV vaccinations.

Approximately 79 million Americans are currently infected with HPV, and about 14 million people are newly infected each year.[85, 86] Most cases of HPV do not produce any symptoms — but the virus is responsible for nearly every case of cervical cancer, genital warts and the majority of oropharyngeal (middle of the throat) cancers in the United States. There are approximately 12,000 new cases of cervical cancer, 4,000 deaths from cervical cancer and 7,500 cases of oropharyngeal cancer each year.[87] Cervical cancer is the second leading cancer killer of women. There is no treatment for HPV, but there is a vaccination to prevent the virus.

In June 2006, the ACIP recommended that all 11 or 12 year old girls be vaccinated against HPV; the vaccine was also recommended for older girls and women through age 26 years who had not yet received any or all vaccine doses. In 2011, ACIP extended the recommendation to also include 11 or 12 year old boys; the vaccine was also recommended for older boys and men through age 21 years who had not yet received any or all vaccine doses.[88] The AAP also recommends the vaccination for both males and females at 11 or 12 years of age.[89]

Although ACIP has recommended routine vaccinations of girls at ages 11 or 12 since 2006, by 2012 only 33.4 percent of girls aged 13 to 17 had received the recommended three doses of the vaccine.[90] More

than half of girls received at least one dose of the vaccine, but three doses are recommended. Rates increased dramatically since 2007 when only 5.9 percent of girls received three doses, but rates have leveled off around 33 percent since 2010.

School vaccination policies are typically decided by state legislatures or state health departments. If they are decided by health departments, they still require state funding from legislatures to support the policy.[91] In Australia, where they have a school-based vaccination program, more than 1.9 million doses of the HPV vaccine were delivered to 12 to 17 year olds, resulting in 70 percent of girls in this age group being fully vaccinated.[92]

According to a review by the National Conference of State Legislatures (NCSL), there has been ongoing debate about the vaccine in many states. For instance, "some people who support availability of the vaccine do not support a school mandate, citing concerns about the drug's cost, safety and parent's right to refuse."[93] Multiple studies have found the HPV vaccine to be safe. The WHO global advisory committee on vaccine safety has reviewed HPV vaccines four times, most recently in June 2013, and each time has found the HPV vaccine to be safe based on available data.[94] A recent large scale study in Sweden and Denmark followed girls vaccinated in both countries from 2006 to 2010 totaling almost 700,000 doses of HPV and also found the vaccine to be safe. The authors report that the "HPV vaccine firmly indicates that concern about vaccine related adverse events is not a rational reason to forgo this potentially lifesaving vaccine."[95] A number of studies have also found no association between the HPV vaccine and risky sexual behavior.[96] A 2013 study in *Pediatrics* found that the HPV vaccination in recommended ages was not associated with increased sexual activity.[97] The ACA requires coverage of all ACIP recommended vaccinations without co-payments for all group and individual plans and for the Medicaid expansion population. CDC has made the HPV vaccine available through the Vaccines for Children (VFC) program in all 50 states.

Since 2006, at least 41 states and Washington, D.C. have introduced legislation related to the vaccine. Twenty-five states and Washington, D.C. have enacted legislation or requirements. Some states can change school immunization policy through a regulatory process.

## HPV

Genital HPV is the most common sexually transmitted infection (STI) and a major cause of cervical, genital and oropharyngeal cancer.[98] Ninety percent of HPV infections go away by themselves within two years, but, for some, HPV infections will persist and can cause a variety of serious health problems such as:[99]

- Cervical cancer, cancer on a woman's cervix;
- Other, less common, but serious cancers, including genital cancers (cancer of the vulva, vagina, penis, or anus), and a type of head and neck cancer called oropharyngeal cancer (cancer in the back of throat, including the base of the tongue and tonsils);
- Genital warts (warts on the genital areas); and
- Recurrent respiratory papillomatosis (RRP), a rare condition in which warts grow in the throat.

## Support for Vaccines for the Medicaid Population

Under the ACA, all individuals covered by new group or individual health plans or are part of Medicaid expansion are covered for all vaccinations recommended by ACIP without any co-payment or cost-sharing requirements. This eliminates an added cost burden for individuals — and by increasing the numbers of people vaccinated overall, helps protect the wider population by limiting the spread of disease.

States, however, are not required to eliminate co-pays for vaccinations for their existing or base adult Medicaid beneficiaries. Any given state can decide policies for their coverage of different vaccinations. To help incentivize states to expand coverage of recommended vaccinations without co-pays to their base Medicaid population, the ACA allows the Centers for Medicare and Medicaid Services (CMS) to offer states a 1 percent Federal Medical Assistance Percentage (FMAP) increase for these services. The Medicaid program typically provides certain levels of matching payments to states for different types of medical care.

As of December 2013, only five states have expanded coverage to allow all of the Medicaid beneficiaries to get all the medically recommended vaccinations without co-pays. Medicaid-eligible children can receive vaccinations through the VFC at no cost.

## RECOMMENDATIONS: Increasing Vaccination Rates and Improving Research and Development of New Vaccines

Improving the nation's vaccination rates would help prevent disease, mitigate suffering and reduce healthcare costs. TFAH recommends a number of actions that can be taken to increase vaccination rates for children, teens and adults around the country, including:

- **Increasing public education campaigns about the safety and effectiveness of vaccines:** Federal, state and local health officials, in partnership with medical providers and community organizations, should conduct assertive campaigns about the importance of vaccines, particularly stressing and demonstrating the safety and efficacy of immunizations. Targeted outreach should be made to high-risk groups and to racial and ethnic minority populations where the misperceptions about vaccines are particularly high.[100] The Community Preventive Services Task Force, which evaluates the available evidence base for public health programs and strategies, has found that when education is combined with other intervention components, these interventions were effective in improving vaccination rates.[101] States should make it more difficult to opt-out of recommended vaccinations.

- **Increasing provider education and standards of care:** Professional medical societies and medical and nursing schools should support ongoing education and expanded curricula on vaccines and vaccine-preventable diseases, and expand standard practice for providers to discuss and track vaccination histories for all patients — including adults — and offer vaccinations to adults during other doctor and hospital visits. The National Vaccine Advisory Committee (NVAC) has recommended including expansion of vaccination services offered by pharmacists and other community immunization providers, vaccination at the workplace, and increased vaccination by providers who care for pregnant women.[102] A routine adult vaccination schedule should be established, where healthcare providers are expected to purchase, educate, advise and administer immunizations to patients. The Community Preventive Services Task force also found that when provider education is combined with other interventions, it can help increase vaccination rates.[103] Providers should be incentivized to stock and administer vaccines.

- **Bolstering immunization registries and tracking:** Measures must be taken to encourage greater participation by healthcare providers, particularly private providers, in registries, which are a crucial source of information to ensure that immunizations are up-to-date — for both children and adults — and duplicative immunizations are avoided. Lifespan registries would also help better track patients' medical history to ensure they have received all needed vaccinations throughout their lives. Providers should take advantage of electronic health records or immunization registries to improve information sharing across providers and to generate reminders to providers and patients when their recommended routine vaccinations should be given. State health information exchanges can make this process simpler by integrating registries into electronic health records, and streamlined solutions should be found to enable immunization information systems (IIS) data exchange between states. The Community Preventive Services Task Force recommends immunization information systems on the basis of strong evidence of the effectiveness of increasing vaccination rates.[104]

- **Ensuring first dollar coverage of all recommended vaccines under Medicare:** Vaccines recommended by ACIP should be covered under both Medicare Part B and Part D without cost sharing, to ensure complete, equitable access to vaccines for all Medicare beneficiaries.

## RECOMMENDATIONS: Increasing Vaccination Rates and Improving Research and Development of New Vaccines (continued)

- **Continuing support for vaccine funding programs:** While the ACA expands no-cost coverage of recommended vaccines to most Americans, the VFC and Section 317 programs will continue to provide a safety net for individuals who are uninsured, have "grandfathered" plans that do not cover these vaccinations or remain outside of the traditional healthcare system, such as children who are eligible but not enrolled in Medicaid/State Children's Health Insurance Program (SCHIP). The Community Preventive Services Task Force has identified a number of evidence-based strategies that have been effective in increasing vaccination rates in younger children, including vaccination programs in Women, Infant and Children (WIC) Program settings, vaccination programs in schools and organized childcare centers and home visits.[105, 106, 107] VFC and Section 317 are the two existing national vaccine funding programs.

- **Providing adequate support for the purchase and administration of vaccines:** The cost to fully immunize children and adults continues to rise, due to the increasing costs to research and develop the new highly effective vaccines.

- **Supporting additional research for vaccines:** Sufficient funding and increased market incentives must be in place to support vaccine development and production to encourage development of new vaccines, such as a universal flu vaccine, and to help assure adequate supplies of vaccines, especially in times of crisis. Stabilizing the market includes assuring vaccines will be purchased once produced, such as by government guarantee purchase agreements.

- **Expanding school vaccination requirements to include the HPV vaccine:** ACIP has acknowledged the strong evidence that the HPV vaccine can greatly reduce an individual's risk for developing cervical cancer, but it can also stop the spread of the virus that puts others at risk. HPV-associated oropharyngeal cancers are increasing nationally. Medical experts recommend the vaccine be given to preteens, both boys and girls, so it does not have any direct correlation to the time when an individual becomes sexually active.

- **Facilitating the expansion of settings where vaccinations can be given and can receive adequate reimbursement:** Increase the use of pharmacies, schools, workplaces, faith-based organizations in providing vaccines. These types of settings should be linked to the IIS so that data can be shared with primary providers.

- **Requiring universal immunization of health care personnel for all ACIP recommended vaccinations:** The Infectious Diseases Society of American (IDSA), the Society for Healthcare Epidemiology of American (SHEA) and the Pediatric Infectious Diseases Society (PIDS) support universal immunization of healthcare personnel (HCP) by healthcare employers (HCE) as recommended by ACIP for HCPs. According to a joint policy statement by the three Societies, although some voluntary HCP vaccination programs have been effective when combined with strong institutional leadership and robust educational campaigns, mandatory immunization programs are the most effective way to increase HCP vaccination rates. As such, when voluntary programs fail to achieve immunization of at least 90 percent of HCP, the Societies support HCE policies that require HCP documentation of immunity or receipt of ACIP-recommended vaccinations as a condition of employment, unpaid service, or receipt of professional privileges. For HCP who cannot be vaccinated due to medical contraindications or because of vaccine supply shortages, HCEs should consider, on a case-by-case basis, the need for administrative and/or infection control measures to minimize risk of disease transmission (e.g., wearing masks during influenza season or reassignment away from direct patient care). The Societies also support requiring comprehensive educational efforts to inform HCP about the benefits of immunization and risks of not maintaining immunization.

## Vaccine Safety

Vaccines go through rigorous review and testing for effectiveness and safety by the FDA before they are released to the market. The safety of vaccines is also tracked post-FDA licensure through several monitoring systems to keep track of potential patterns of adverse side effects.

The Vaccine Adverse Event Reporting System (VAERS) is a joint CDC and FDA program that works with manufacturers, healthcare providers, and members of the public to report possible adverse events that people experience following vaccinations.[108] In addition, the Vaccine Safety Datalink (VSD) project is a collaboration between CDC's Immunization Safety Office (ISO) and eight large managed-care organizations to monitor safety and answer scientific questions about vaccine side effects.[109]

There have been numerous independent studies confirming the safety of recommended childhood vaccines. In 2004, the Institute of Medicine released its eighth report from the Immunization Safety Review Committee, which concluded vaccines, specifically the MMR vaccine and thimerosal-containing vaccines, do not have any causal link to autism.[110] The most recent study, released in March 2013 in the Journal of Pediatrics, also found no link between childhood vaccines and autism.[111] Researchers from CDC concluded that even when giving multiple vaccinations on the same day, there is no association to a higher risk of developing autism.[112]

Public health officials and scientific researchers continue to stress the importance of parents vaccinating their children. By choosing to delay or skip vaccinations parents put both their own children, and the children of others, at greater risk of illness and death.[113]

## Routine Vaccine Preventable Diseases

- **Diphtheria:** Diphtheria is a serious bacterial disease that frequently causes heart and nerve problems. Without treatment, 40 to 50 percent of infected persons die, with the highest death rates occurring in the very young and the elderly. Diphtheria has largely been eradicated in the United States and other industrialized nations through widespread vaccination. There were only seven reported cases of diphtheria between 1998 and 2009 in the United States.[114] However, children and adults who travel to endemic areas are still at risk for diphtheria.

- **Haemophilus influenza type b (Hib):** Prior to the vaccine, Hib meningitis killed 600 children each year and caused seizures among many survivors as well as permanent deafness and mental retardation. Since the vaccine's introduction in 1987, the incidence of serious Hib bacteria infection has declined by 98 percent in the United States.

- **Hepatitis A:** In 2011, there were 2,000 hepatitis A infections reported in the United States.[115] From 2007 to 2010, it resulted in between 70 to 100 deaths. Hepatitis A disease tends to occur in outbreaks sometimes attributed to many people having eaten the same contaminated food or transmission from person to person after exposure to hepatitis A in an endemic country. CDC confirmed an outbreak of 162 people ill with Hepatitis A in the United States in 2013.[116]

- **Hepatitis B:** In the United States, an estimated 800,000 to 1.4 million persons have chronic Hepatitis B virus infection. More than 90 percent of infected infants and up to 10 percent of infected adults develop chronic infection, increasing chances for chronic liver disease, cirrhosis and liver cancer. Hepatitis B-related liver disease kills about 5,000 people and costs $700 million annually in healthcare and productivity-related costs.[117]

- **Human Papillomavirus:** HPV is the most common STI and is a major cause of cervical and oropharyngeal (middle of the throat) cancer. Approximately 79 million Americans currently are infected with HPV, and another 14 million people become newly infected each year.[118] The HPV vaccine includes protection against the two HPV strains that cause 70 percent of all cervical cancers.

- **Influenza:** Many illnesses are erroneously called "flu." These include respiratory as well as gastrointestinal disorders and can be caused by a variety of infectious agents. Influenza, however, is a specific respiratory infection caused by influenza viruses. Influenza vaccine protects against influenza, not the other disorders. In an average year, influenza causes approximately 3,000 to a high of about 49,000 deaths and may contribute to approximately 200,000 hospitalizations in the United States.[119]

- **Measles:** As a result of widespread vaccination, measles is no longer endemic in the United States. However, because measles is still widespread in many countries, the United States is at risk of importation of the disease from international travelers and from U.S. residents who travel abroad, and if high immunity is not maintained in adults and children, there is a risk of re-establishment of endemic transmission. Measles is highly contagious. Each year, on average, 60 people in the United States are reported to have measles. But so far in 2013 the number is significantly higher—from January 1 to August 24, 2013, 159 people have been reported to have the disease. This is the second largest number of cases in the U.S. since measles was eliminated in 2000.[120]

- **Meningococcal disease:** Meningococcal disease is a serious bacterial illness, and is a leading cause of bacterial meningitis in children 2 through 18 years old in the United States. About 1,000 people get meningococcal disease each year in the United States and 10 percent to 15 percent of these people die. Infants, the elderly, young college students living in dormitories and military recruits living in barracks are especially vulnerable.

- **Mumps:** Prior to the mumps vaccine, on average 200,000 mumps cases were reported in the United States per year with 20 to 30 deaths. Since a second dose

of mumps vaccine was added to the standard childhood immunization series, annual cases are now in the hundreds rather than the thousands, but outbreaks still occasionally occur.

- **Pertussis:** Also known as whooping cough, pertussis is highly contagious and can result in prolonged coughing spells that may last for many weeks or even months. Approximately 50 out of every 10,000 people who develop pertussis die from the disease. Since the 1980s, the number of reported pertussis cases has steadily increased, especially among adolescents and adults.[121] In 2012, a total of 41,880 cases of pertussis were reported to the CDC, the highest number since 1955. Of these, 8,890, or 21 percent, occurred among those aged 20 or older.[122] Young infants who die from pertussis often may have caught the infection from an adult or adolescent.

- **Pneumococcal disease:** The pneumococcal bacterium is spread by coughing and sneezing. It is the most common cause of bacterial pneumonia, inflammation of the coverings of the brain and spinal cord (meningitis), bloodstream infection (sepsis), ear infections and sinus infections (sinusitis) in children under two years of age. The elderly are especially susceptible to this infection. There are more than 50,000 cases per year in the United States and rates are higher among elderly and very young infants. The fatality rate ranges from about 20 percent to 60 percent among the elderly.[123]

- **Rotavirus:** Rotavirus is a disease of the digestive tract. Infection causes acute gastroenteritis (vomiting and diarrhea), and humans of all ages are susceptible to rotavirus infection. According to CDC, before use of a rotavirus vaccine, each year rotavirus was responsible for more than 400,000 doctor visits; more than 200,000 emergency room visits; 55,000 to 70,000 hospitalizations; and between 20 and 60 deaths in the United States. Rotavirus vaccine now prevents an average of 40,000 to 50,000 hospitalizations a year among children under the age of 5 years old.

- **Rubella:** Before the rubella vaccine was introduced, widespread outbreaks mostly affected children in the 5 to 9 year age group. Between 1962 and 1965, rubella infections during pregnancy were estimated to have caused 30,000 still births and 20,000 children to be born impaired or disabled. Due to a successful vaccination program, rubella is no longer transmitted year round in the United States and fewer than 20 cases are reported every year. Rare cases of congenital rubella syndrome continue to be reported, almost all are acquired outside of the United States.

- **Tetanus:** Commonly known as lockjaw, tetanus is a severe disease that causes stiffness and spasms of the muscles, with approximately 30 percent of reported cases ending in death. Tetanus bacteria grow in soil and are an ongoing threat. In the United States, mortality due to tetanus has declined at a constant rate due to the widespread use of tetanus toxoid–containing vaccines since the late 1940s. According to CDC, from 2000 to 2008, 233 cases of tetanus were reported with 197 being fatal (84 percent).[124]

- **Varicella/Chickenpox:** Although usually a self-limiting illness, varicella (chickenpox) is a highly contagious virus that can lead to severe illness with complications such as secondary bacterial infections, severe dehydration, pneumonia, central nervous system deficits/disease and shingles. Each year, more than 3.5 million cases of varicella, 9,000 hospitalizations and 100 deaths are prevented by varicella vaccination in the United States.[125]

- **Zoster (Shingles):**[126] Zoster (shingles) is a very painful nerve infection caused by the same virus as chickenpox and is often accompanied by a localized skin rash with blisters and pain may persist for weeks or months after the rash resolves (postherpetic neuralgia). Anyone who has ever had chickenpox can develop shingles because the virus remains in the nerve cells of the body after the chickenpox infection clears and can emerge years later to cause shingles. The disease most commonly occurs in people 50 years and older, and those with compromised immune systems. There are approximately one million zoster cases annually; one in three Americans will get shingles in their lifetime. Shingles and post-herpetic neuralgia increase with age.

## INDICATOR 4: FLU VACCINATIONS AND PREPAREDNESS

Key Finding: Twelve states vaccinated at least half of their population (ages 6 months and older) for the seasonal flu of fall 2012 to spring 2013.

| 12 states vaccinated at least half of their population (ages 6 months and older) for the seasonal flu of fall 2012 to spring 2013 (1 point). | 38 states and D.C. did not vaccinate at least half of their population (ages 6 months and older) for the seasonal flu of fall 2012 to spring 2013 (0 points). | |
|---|---|---|
| Delaware (51.3%) | Alabama (45.7%) | Nevada (39.6%) |
| Hawaii (54.3%) | Alaska (39.7%) | New Hampshire (48.9%) |
| Iowa (50.4%) | Arizona (38.3%) | New Jersey (45.3%) |
| Maine (50.0%) | Arkansas (47.0%) | New Mexico (48.1%) |
| Maryland (53.1%) | California (44.2%) | New York (46.6%) |
| Massachusetts (57.5%) | Colorado (48.3%) | North Dakota (48.9%) |
| Minnesota (52.5%) | Connecticut (46.5%) | Ohio (44.8%) |
| Nebraska (50.3%) | D.C. (47.4%) | Oklahoma (46.1%) |
| North Carolina (50.1%) | Florida (34.1%) | Oregon (40.1%) |
| Rhode Island (56.7%) | Georgia (41.1%) | Pennsylvania (46.2%) |
| South Dakota (56.7%) | Idaho (37.8%) | South Carolina (44.8%) |
| Tennessee (50.8%) | Illinois (43.1%) | Texas (43.7%) |
| | Indiana (42.2%) | Utah (42.9%) |
| | Kansas (40.7%) | Vermont (49.6%) |
| | Kentucky (46.6%) | Virginia (49.4%) |
| | Louisiana (47.1%) | Washington (47.5%) |
| | Michigan (40.8%) | West Virginia (48.8%) |
| | Mississippi (40.8%) | Wisconsin (40.6%) |
| | Missouri (46.4%) | Wyoming (39.2%) |
| | Montana (41.7%) | |

Vaccination is the best prevention against the seasonal flu, and CDC recommends all Americans ages 6 months and older get vaccinated, yet fewer than half of Americans ages 6 months and older were vaccinated against the flu in the last two flu seasons (2011 to 2012 and 2012 to 2013).[127]

This indicator examines if at least half (50 percent) of a state's population (ages 6 months and older) was vaccinated against the seasonal flu in 2012. The highest vaccination rate was in Massachusetts at 57.5 percent and the lowest was in Florida at 34.1 percent. Twelve states vaccinated 50 percent of their population or higher and 44 states and D.C. vaccinated 40 percent or higher. Nationally, 45 percent of Americans ages 6 months and older were vaccinated.

The vaccinations rates are lower for adults (ages 18 and older): just over 40 percent (41.5) received a flu vaccination during the 2012 to 2013 flu season. The rates ranged from a high of 53.4 percent in South Dakota to a low of 30.8 percent in Florida. Only four states vaccinated more than half of those 18 and older, and 34 states had a vaccination rate under 40 percent for this age group.

When seniors are excluded (ages 65 and older), the rate drops to only 35.7 percent of 18 to 64 year-olds receiving vaccinations against the seasonal flu in 2012. For this population, vaccination rates ranged from a high of 48.5 percent in Massachusetts to a low of 22.6


percent in Florida, and only 18 states had vaccination rates of 40 percent or higher.[128] Traditionally, there has been a much stronger focus on encouraging seniors to get vaccinated, and children and seniors often have more interaction with the healthcare system where they may be encouraged to get vaccinated or have more convenient access to get vaccinated, so there is a bigger gap in the number of people ages 18 to 64 who are not getting vaccinated. Children and seniors often have more severe influenza disease.

Each year, an average of 62 million — or 20 percent of — Americans get the flu. Between 3,000 and 49,000 Americans die each year from the flu and 226,000 are hospitalized from the flu.[129, 130]

Between 2004 and 2012, 830 children between 6 months and 18 years old died from flu complications, and 43 percent of these children were completely healthy otherwise.[131]

In addition to its health effects, flu has a serious impact in terms of healthcare and worker absenteeism costs. Seasonal flu can often result in a half day to five days of work missed, which affects both the individual and his or her employer. Annually, the flu leads to approximately $10.4 billion in direct costs for hospitalizations and outpatient visits, and $76.7 million in indirect costs.[132]

More than four in ten private sector workers in the United States do not have paid sick leave from their employers, which means they risk not getting paid or possibly losing their jobs if they stay home from work because they get sick or must care for sick family members.[133, 134] This puts coworkers and clients at risk by coming to work sick, known as

**Experts note that generally vaccination rates need to be above 70 percent for "herd immunity" effects — which limit the spread and protect those without immunity — to become apparent.**

"presenteeism." A significant percentage of service workers, such as waiters or cashiers, who come in direct contact with a range of customers or consumers, do not have paid sick leave.

The historically low demand for seasonal vaccinations has translated into making flu vaccine development a low priority — without a steady demand, incentives to manufacture and research new influenza vaccines goes down.

Under the ACA, all vaccines recommended by ACIP, including flu shots, are covered for in-network providers in group and individual health plans and for the Medicaid expansion population with no co-payments or cost sharing, but states are still able to determine coverage for their traditional Medicaid population. As of 2010, 38 states required Medicaid coverage of flu shots with no-copay for beneficiaries under the age of 65, while 12 states and Washington, D.C. required a co-pay.[136]

In 2013, there were several innovations in flu vaccines. For the first time, a quadrivalent vaccine was available to protect against four strains, in addition to the traditional trivalent vaccines.[137] American adults also had access to flu vaccines produced with the virus grown in cells rather than eggs, which allowed for larger volumes and a faster manufacturing time, and FDA approved the first vaccine made using recombinant DNA technology.[138] NIH scientists also reported progress in vaccinology that could lead to a universal flu vaccine by discovering that viral protein nanoparticles induced an immune response against a wide range of flu strains in animal tests.[139]

In addition to the seasonal flu, historically there have been three-to-four pandemic flu outbreaks each century. Pandemics occur when a new influenza virus emerges against which people have little-to-no immunity and spreads internationally with sustained human-to-human transmission. While experts predict influenza pandemics will occur in the future, they cannot predict when the next pandemic will occur, what strain of the virus will be involved, and how severe the outbreak will be.[140] Once a novel influenza strain mutates and becomes easily transmissible among humans, it can spread in a sustained manner from person-to-person and cause a worldwide pandemic in a relatively short time. While the pandemic may last several years as it circles the globe, outbreaks in any single location often come in a series of "waves" that will last 6 to 8 weeks each.

**By preventing hospitalizations, influenza immunizations can save $80 per year, per person vaccinated.[135]**

## The U.S. experienced three flu pandemics in the 20th century and one in the 21st century:

- A severe pandemic in 1918 resulted in 30 percent of the population becoming ill and 2.5 percent (625,000 Americans) of those who became ill died.[141] In modern times, this would translate into approximately 90 million Americans becoming ill and roughly 2.25 million deaths. Based on a series of modeling study estimates, during a severe pandemic, the U.S. economy could lose an estimated $683 billion — a 5.5 percent decline in annual Gross Domestic Product (GDP).[142]
- Milder pandemic outbreaks in 1957 and 1968 killed over 34,000 in the U.S. and over 700,000 across the globe.[143]
- The 2009 H1N1 Influenza (A) virus, while considered relatively mild, infected around 20 percent of Americans (approximately 60 million individuals), and resulted in approximately 274,000 hospitalizations and 12,000 deaths.[144] Proportionally, more people were hospitalized from 2009 H1N1 than are typically hospitalized from the seasonal flu. And about 90 percent of the Americans who died from 2009 H1N1 were under the age of 65, and at least 340 children died.[145] However, according to CDC the actual number of deaths in children could be as high as between 910 and 1,880.[146] A new study published in 2013 estimates that worldwide mortality from the H1N1 pandemic could be 10 times higher than the original WHO estimates, with most deaths occurring in people under 65.[147]

Establishing a cultural norm of annual flu vaccinations can help ensure the country has a strong mechanism in place to be better able to vaccinate all Americans quickly during a new pandemic or unexpected disease outbreak.

In addition, during the H1N1 pandemic, there was increased attention to the role that antivirals can play in effective treatment of the flu. A 2013 study in *Pediatrics* found that timely treatment with neuraminidase inhibitor (NAI) drugs may improve the survival of children who become very ill from the flu. The use of antivirals has decreased since the pandemic, in part because there may be less recognition that the drugs can be used to effectively treat the seasonal flu as well.[148]

## RECOMMENDATIONS:
## Increasing Flu Vaccination Rates and Improving Flu Policies

TFAH identified some additional actions that could be taken to fill persistent gaps in flu preparedness and policy, including:

- **Increasing public education about the importance of getting vaccinated:** The public health community should make educating the public — especially high-risk groups, front-line workers and clinicians — about the seriousness of the flu, the need to be vaccinated and the safety of the vaccine a priority each flu season. There should also be increased education about the different types of flu vaccine and which is recommended for different groups.

- **Expanding support for immunization programs:** Community vaccination programs by health departments, often in cooperation with healthcare providers, pharmacies, schools and colleges, employers, retail stores, community organizations, faith-based organizations and other partners, can make shots more accessible for millions of children and adults. Partnerships are particularly important for connecting to vulnerable and hard-to-reach groups. The Community Preventive Services Task Force recommends on-site, reduced cost and actively promoted influenza vaccinations, when implemented alone or as part of a multicomponent intervention, based on sufficient evidence of their effectiveness in increasing influenza vaccination coverage among workers in worksites.[149] During a severe flu pandemic, the Task Force recommends pre-emptive, coordinated school dismissal based on sufficient evidence of the effectiveness in reducing or limiting the spread of infection or illness within communities.[150]

- **Supporting flu shots for all Americans without co-pays:** The ACA requires that individuals with new group and individual plans for in-network or Medicaid expansion receive the flu shot without co-payments, but currently 12 states and Washington, D.C. do not require their Medicaid plans to cover flu shots without co-payments requirements for beneficiaries under the age of 65. Flu shots should be covered without co-pays by all providers, including public health departments, pharmacies and others, even if they are not classified as in-network providers.

- **Improving and modernizing surveillance and diagnostics:** There needs to be an increased investment to improve diagnostics, IIS and other information technologies to ensure accurate surveillance and proper management of illnesses that are not actually influenza. There should also be better integration of electronic health records and public health surveillance systems to improve surveillance of flu outbreaks and improve two-way communication between clinicians and public health experts. Point-of-care diagnostics could more quickly identify who

actually has the flu and helplines, where nurses can help triage and provide care to patients over the phone, and other pre-hospital systems should also be expanded to reduce the number of healthy people seeking medical care.

- **Requiring all healthcare personnel to receive the annual seasonal flu vaccine every year:** Healthcare workers are at higher-risk than the general population for exposure to the flu and also for spreading the flu to their patients.[151] By getting vaccinated, they can reduce the spread of the disease and set an example to the rest of the public about the importance of being vaccinated. Employees who cannot be vaccinated due to medical contraindications or because of vaccine supply shortages should be required to wear masks or be re-assigned away from direct patient care.[152] There should also be comprehensive educational efforts that inform healthcare workers about the benefits and risks of influenza immunization to both patients and healthcare workers and other efforts that support implementation of a comprehensive infection control program. Vaccination of healthcare workers should be a condition of participation in Medicare. The Community Preventive Services Task Force recommends on-site, free and actively promoted influenza vaccinations based on sufficient evidence of their effectiveness in decreasing cases of influenza among healthcare workers and patients when implemented alone or as part of a multicomponent intervention.[153]

- **Requiring minimum sick leave benefits:** Allow workers in businesses with 15 or more employees to earn up to seven job-protected paid sick days each year to be used to recover from their own illnesses, access preventive care or provide care to a sick family member. Currently, around 38 percent of private workers do not have any sick leave coverage (around 40 million Americans). Sick leave is especially important to prevent the spread of communicable diseases in the workplace.

- **Funding and incentivizing vaccine research:** The government and private industry should continue investments in expanded domestic flu vaccine manufacturing capacity — including with government guarantees to industry to assure an adequate supply during bad flu seasons. Investments must also continue to support research for a more effective and universal flu vaccine to replace the annual vaccine.

- **Maintaining emergency flu and pandemic supplies in the Strategic National Stockpile (SNS):** In the case of supply shortages, an extreme outbreak or new pandemic, emergency medical equipment, vaccines, antivirals and other medicines should be routinely maintained as part of the SNS.


### *Pandemic Flu Preparedness: Lessons from the Frontlines*

In 2009, TFAH issued a report *Pandemic Flu Preparedness: Lessons from the Frontlines* identifying key lessons from the response to the 2009 H1N1 response, which concluded that:[154]

- Emergency funds are essential — but not sufficient — to backfill the long-standing public health infrastructure issues;
- Pandemic and emergency response plans must be adaptable and science-driven;
- Establishing trust with the public through clear and honest communication is imperative — and the highest-risk groups often have the lowest levels of trust;
- Recommendations for sick leave, school closings and limiting community gatherings have major ramifications that must be taken into account;
- Coordination across communities, states, and countries is extremely complicated, but must be a high priority; and
- Competing emergency declarations and laws must be better coordinated to avoid confusion and provide liability and health protection to medical personnel who volunteer to help during emergencies.

The 2009 H1N1 pandemic flu outbreak also showed the importance of maintaining the research and development of up-to-date countermeasures, including vaccines and antiviral medications, and to keep enough pharmaceuticals and medical equipment stockpiled for emergencies. Having the ability to respond quickly is essential during an outbreak or emergency, but requires an ongoing investment in pharmaceutical research and development and stockpiling of medicines and equipment.

As soon as the H1N1 virus was identified, scientists raced to develop a vaccine to protect against the H1N1 flu strain, yet they were operating with an outdated vaccine research capacity and technology. Despite these challenges, vaccine manufacturers were able to produce limited quantities of vaccine by mid-fall, which public health officials directed to the highest-risk populations. However, it took until later in the year before enough vaccine was available for the entire U.S. population. This delay in the supply further discouraged people from getting vaccinated.

In addition to vaccine development, within one week of the outbreak, the SNS delivered more than 11 million courses of antiviral drugs, 12.5 million facemasks, and 25 million N-95 respirators to 62 predetermined areas in states and localities around the country.[155] These materials included 25 percent of the states' fixed pandemic influenza allocations and was the first large scale distribution of its kind. In the fall, an additional 535,000 courses of antiviral drugs and 59.7 million N-95 respirators were also deployed from the SNS in response to the pandemic emergency.

The relatively rapid development of a vaccine despite limited production capabilities and the quick distribution of antivirals and other equipment were only possible due to prior investments in research and development and effective planning, stockpiling and practice in drills and tabletop exercises by state and local health departments and their key community partners.

# Emerging — and Reemerging — Infectious Diseases

An essential role of infectious disease experts is to identify new, emerging threats — or the reemergence of threats that were thought to be under control. The sooner new diseases can be detected and identified, the faster strategies can be implemented to prevent their spread and determine the best course of treatment.

Emerging diseases are not just a threat to health, they also have an impact on how Americans live their daily lives — depending on the severity and scope of a threat, issues can include things like decisions about sending children to schools, limiting travel, restricting public events and even quarantines.

According to the National Intelligence Council, "newly emerging and reemerging infectious diseases will pose a rising global health threat and will complicate U.S. and global security over the next 20 years. These diseases will endanger U.S. citizens at home and abroad, threaten U.S. armed forces deployed overseas, and exacerbate social and political instability in key countries and regions in which the U.S. has significant interests."[156] Outbreaks also have major implications for economics and trade.

CDC, the National Institute of Allergy and Infectious Diseases (NIAID), WHO and state and local health agencies are tasked with the responsibilities of working to prevent and contain new threats as quickly as possible.

New diseases can emerge in a number of ways. For instance, they can spread from animals or insects to humans, come from contaminated food or water, or new strains of existing diseases can evolve that are resistant to antimicrobial treatments. In addition, infectious disease experts must also monitor for the reemergence of diseases that may be new to a region or were previously mostly under control in particular regions.

## Animal-Borne Diseases (Zoonoses)

An estimated 75 percent of new infectious diseases that have emerged in recent decades were spread to humans from animals, birds or insects.[157] As of 2000, more than 200 diseases occurring in humans have been found to originate in animals.[158] Some recent emerging diseases that are zoonotic (diseases that originated in animals) or vector-borne (diseases transmitted by insects like mosquitoes or ticks) include the H1N1 pandemic flu, West Nile virus, monkeypox, Ebola, SARS and HIV/AIDS.

Humans who come into contact with infected animals (disease vectors) are at risk for contracting illnesses and then spreading them to other humans. Experts attribute the rise in new zoonotic diseases to a range of factors such as increased worldwide travel, global importing and exporting of food, growth in human and animal populations, and the impact of climate change, such as shifts in where people live, deforestation and changes in migration patterns of animals and birds.[159, 160]

CDC, NIAID, FDA, WHO and state and local health agencies work to develop special strategies to prevent the spread of diseases from animals to humans — as well as to reduce the spread of a disease once it reaches humans. For instance, the One Health Initiative was launched in 2010 to foster greater collaboration among physicians, veterinarians, public health officials, and other scientific-health and environmentally-related disciplines, including the American Medical Association, American Veterinary Medical Association, American Academy of Pediatrics, American Nurses Association, American Association of Public Health Physicians, the American Society of Tropical Medicine and Hygiene, CDC, USDA, and the U.S. National Environmental Health Association (NEHA).[161]

### 2013 NOVEL AVIAN INFLUENZA A OUTBREAK — H7N9

The first outbreak of a new avian influenza A (H7N9) virus in humans was reported in China by the WHO on April 1, 2013.[162] Through mid-October 2013, WHO has reported a total of 136 laboratory-confirmed human cases including 45 deaths. As of October 2013, three patients were still hospitalized and 88 had been discharged.[163] After following close contacts of confirmed H7N9 patients, very limited person-to-person spread of the virus was found. Instead many of the people infected with H7N9 reported contact with poultry. No cases of H7N9 outside of China have been reported.[164]

Although H7N9 is not currently spreading from person-to-person, the pandemic potential of this virus is a concern to scientists. Influenza viruses are constantly evolving and experts are watching for the possibility that this virus could eventually spread through sustained person-to-person contact, triggering a global pandemic of H7N9. CDC and the WHO are both closely monitoring the situation.[165, 166] HHS also invested in development of different H7N9 seed strains for vaccine production and provided grants to WHO to support production of H7N9 pre-pandemic vaccine candidates and subsequent clinical trials.[167, 168]

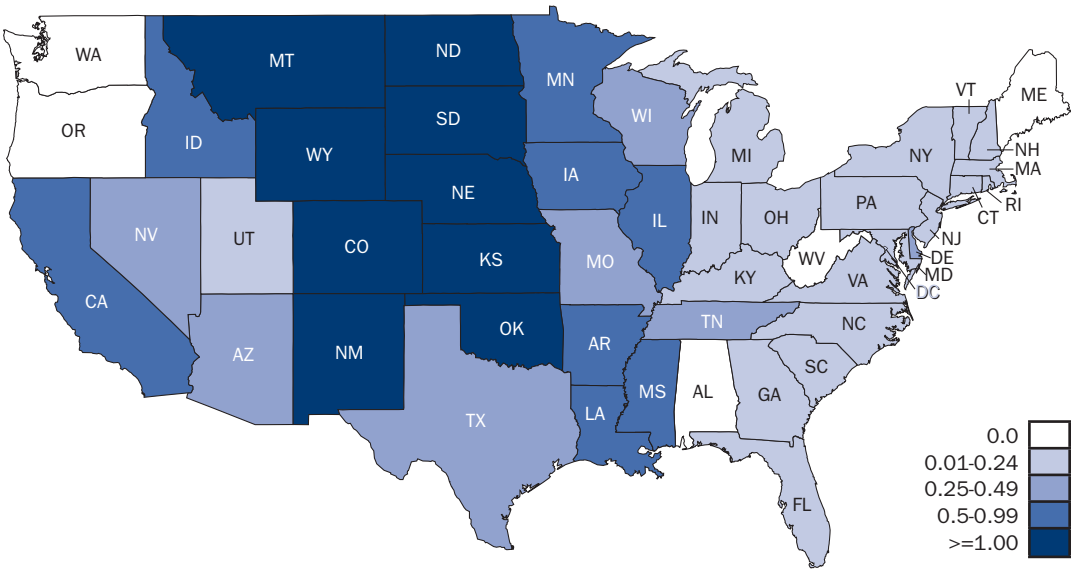
### 2012: A NEW MIDDLE EAST RESPIRATORY SYNDROME CORONAVIRUS

MERS was first reported in humans in September 2012. In July 2013, the WHO International Health Regulations Emergency Committee determined that MERS should be considered a serious concern, but not yet a "public health emergency of international concern."[172]

As of October 18, 2013, a total of 139 cases from eight countries have been reported to WHO and almost half have been fatal. All cases have been directly or indirectly linked to four countries: Saudi Arabia, Qatar, Jordan and the United Arab Emirates. No cases have been reported in the United States, although 82 persons from 29 states have been tested for MERS infection.[173]

Individuals with chronic conditions appear to be more susceptible to MERS. The largest study to date of those infected included 47 patients and found that all but two patients had one or more chronic medical conditions, including diabetes, hypertension, heart disease and kidney disease. And, 72 percent had more than one chronic condition.[174]

**CDC: West Nile Virus Neuroinvasive Disease Incidence by State per 100,000 population – United States, 2013 (as of December 3, 2013)[175]**




## WEST NILE VIRUS OUTBREAK UPSWING 2012 TO 2013

In 2012, the country experienced its second-largest and deadliest outbreak of WNV. Every state but Alaska and Hawaii reported infections in people, birds or mosquitoes. There were a total of 5,674 human cases of the disease, with 286 deaths. Half of the cases were classified as neuroinvasive (e.g. meningitis or encephalitis).[169] The majority of cases—80 percent—were reported from 13 states: Texas, California, Louisiana, Illinois, Mississippi, Michigan, South Dakota, Oklahoma, Nebraska, Colorado, Arizona, Ohio and New York. Texas reported almost a third of all cases.[170]

There were also a significant number of cases in 2013; as of November, 48 states and Washington, D.C. have reported WNV infections in humans, birds or mosquitoes. There have been a total of 2,271 cases of WNV disease in humans, including 100 deaths.[171] Older adults are at higher risk for developing WNV neuroinvasive disease.

WNV is a potentially serious illness that is spread by infected mosquitoes that contract the virus from feeding on infected birds. WNV prevention strategies focus on preventing mosquito bites by eliminating standing water, using a quality insect repellent and appropriate clothing and other behavior changes.

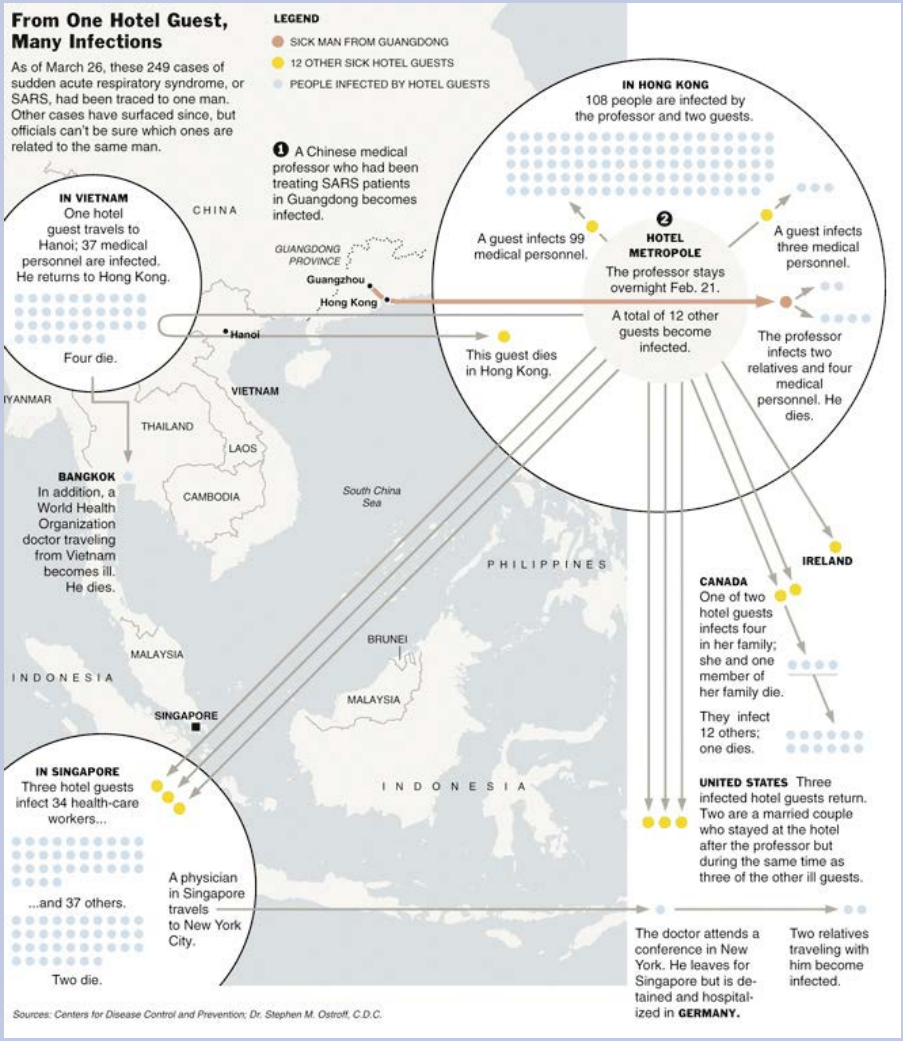
The majority of individuals (80 percent) who contract WNV develop no symptoms. Up to 20 percent of infected individuals develop minor symptoms that last from a few days to several weeks. Possible symptoms include fever, headache, body aches, nausea, vomiting, swollen lymph glands and rashes on the trunk of the body.

A small portion of infected people (one in 150) will develop serious symptoms that can last several weeks and may result in permanent neurological effects. Possible symptoms include high fever, headache, neck stiffness, disorientation, coma, tremors, convulsions, muscle weakness, vision loss, numbness and paralysis. There is no specific treatment or human vaccine for WNV, though those with severe symptoms can receive supportive care in a hospital setting.

## 2003: SARS — THE FIRST SEVERE NEWLY EMERGENT DISEASE OF THE 21ST CENTURY

In 2003, a new deadly disease, SARS, infected more than 8,000 people, leaving 774 dead.[176] It was a new form of a coronavirus and represented the first severe, newly emergent disease of the 21st century. The disease emerged in China, but within six weeks spread worldwide due to international travel and infected individuals from 29 nations around the world. SARS was contained and controlled because public health officials in the most affected communities quickly mounted an intense rapid response.

SARS also demonstrated the economic consequences that an emerging infectious disease can have. It caused widespread social disruption as schools, hospitals and some borders were closed and thousands of people were placed on quarantine. International travel to affected areas fell by 50 percent to 70 percent, hotel occupancy dropped by more than 60 percent and local businesses were sharply impacted. Overall, the economic losses, due to deaths, quarantines and lost tourism dollars, are estimated to have been $30 billion to $50 billion.[177] The World Bank found that the East Asian region's GDP fell by 2 percent in the second quarter of 2003 and Toronto, which experienced one of the more severe outbreaks outside of Southeast Asia with more than 27,000 individuals put into work/home quarantine, had a 13.4 percent drop in tourism that year and an overall estimated economic loss of nearly $1 billion.[178]



## MALARIA: A CONCERN FOR U.S. TRAVELERS

Malaria is rampant in developing countries, particularly in sub-Saharan Africa and South Asia, but malaria transmission has been considered eliminated in the United States for decades. However, imported cases and sporadic episodes of local transmission continue to occur and the malaria vector mosquitoes capable of transmitting the disease are present in the United States (*Anopheles quadrimaculatus* and *An. Freeborni*). In 2011, 1,925 imported malaria cases were reported in the United States, which is the highest since 1971, and represents a 14 percent increase since 2010.[179] In 2011, five people in the U.S. died from malaria or associated complications.[180] All but five of the malaria cases reported in the U.S. were acquired overseas with more than two-thirds of the cases imported from Africa.[181] The growing number of imported malaria cases in the United States reflects changing patterns of travel and migration to and from malaria-endemic countries.

In 2010, the most recent year for which there is reliable data, there were 219 million malaria cases worldwide and 660,000 deaths.[182] Although malaria has been virtually eliminated in developed nations with temperate climates, it is still prevalent in tropical and subtropical countries in Africa, Asia, the Middle East, South America, and Central America. Recent efforts to expand malaria control in endemic countries have substantially reduced the burden of malaria worldwide since 2000.[146] Evolving strains of drug-resistant parasites and insecticide-resistant mosquitoes continue to make this emerging infectious disease a global health threat.

Malaria is caused by a single-celled parasite from the genus *Plasmodium* and is typically transmitted to humans by mosquitoes. Malaria can also be transmitted through blood transfusions, organ transplants, or contaminated needles or syringes. "Congenital" malaria refers to the transmission from a mother to her

fetus before or during childbirth.[183] A malaria infection is generally characterized by fever and chills, along with headache, malaise, fatigue, muscular pains, occasional nausea, vomiting, and diarrhea.[184] Doctors can treat malaria effectively with antimalarial drugs. However, there is increasing worry about drug-resistant parasites that have rendered some of these medicines ineffective and increasing resistance of the mosquitoes that carry malaria to insecticides also pose a global threat.

### Malaria Facts[185]

- Approximately half of the world's population is at risk of malaria.
- A child dies of malaria every 60 seconds.
- In 2010, malaria caused an estimated 660,000 deaths.
- There were about 219 million cases of malaria in 2010, mostly among infants, young children and pregnant women; most of them live in Africa.
- Malaria accounts for at least $12 billion in economic losses each year in Africa, and a reduction in annual economic growth estimated at 1.3 percent.
- Malaria is preventable and curable.
- Due to increased malaria prevention efforts, Malaria mortality rates have fallen by more than 25 percent globally since 2000, and by 33 percent in the WHO African Region.

The Lantos-Hyde United States Global Malaria Strategy (USG) has contributed to the drop in malaria rates. USG investments in 20 countries through the President's Malaria Initiative (PMI) have resulted in significant improvements in population coverage of proven effective interventions. It has helped reduce mortality rates in children under the age of 5 by 16 to 50 percent in these countries over the past 5 to 7 years.[186]

## CHAGAS DISEASE

Chagas disease is caused by the parasite *Trypanosoma cruzi*, which is transmitted to animals and people by insect vectors found exclusively in the Americas. As many as eight million people in Mexico, Central America and South America have Chagas disease, the majority of whom do not know they are infected. If untreated, infection is lifelong and can be symptom free or life threatening.

In Chagas disease-endemic areas, the main way people become infected is through vectorborne transmission. Infected bugs pass *T. cruzi* parasites in their feces and the person can become infected if *T. cruzi* parasites in the bug feces enter the body through mucous membranes or breaks in the skin. Chagas disease can also be found in the United States and other regions but is not endemic. Generally, in the United States people can become infected through mother to baby transmission; blood transfusion; organ transplantation; and accidental laboratory exposure. But, rare vectorborne cases of Chagas disease have been noted in the southern United States.

## CDC's Epidemic Intelligence Service

Since 1951, over 3,500 Epidemic Intelligence Service (EIS) officers have responded to requests for assistance within the United States and throughout the world. EIS officers serve as CDC's "disease detectives," professionals who are trained to conduct epidemiologic investigations, research and public health surveillance.

The EIS program is a 2-year post-graduate training program comprised of 75 to 78 new officers each year. EIS attracts candidates from diverse backgrounds—physicians, nurses, veterinarians, and PhD-trained scientists.

EIS officers currently are assigned to 32 states and the District of Columbia, as well as at CDC headquarters. Regardless of their assignment location, EIS officers help many states and countries through Epi-Aids — where state, local, federal, and global partners request short-term epidemic assistance from CDC for an urgent public health problem. In FY 2013, CDC mobilized EIS officers 82 times to provide epidemiologic expertise and support to 40 states, the District of Columbia, and the Navajo Nation — as well as to 18 countries and three U.S. territories.

EIS officers interact closely with epidemiologists in affected states—many of whom are former EIS officers themselves—illustrating the network and extended reach of the program.

Here are a few notable examples of epidemiologic investigations conducted recently by EIS officers:

- EIS officers and other staff responded to a multistate cluster of rare Salmonella Braenderup infections that were linked to live poultry ordered from mail-order hatcheries.
- When an organ transplant recipient tested positive for rabies virus, CDC responded by mobilizing a large, multi-jurisdictional investigation to look for and stop other possible occurrences of infection.
- The EIS officer assigned to the California Department of Public Health investigated a fatal outbreak of Hantavirus infections among visitors to Yosemite National Park, revealing that a particular type of tent cabin was susceptible to infestation by rodents that carried the virus.
- EIS officers responded to a ten-fold increase in the incidence of pertussis in Washington State, assisting state health authorities with characterization and control of the outbreak.
- EIS officers assisted the Missouri health department with investigation of an *E. coli* O157 outbreak possibly linked to a regional grocery chain.

## CDC's Global Disease Detection Program (GDD)

The GDD is a CDC program for developing and strengthening global health security to rapidly detect, accurately identify and promptly contain emerging infectious disease and bioterrorist threats that occur internationally.[187]

GDD helps countries with limited resources develop the essential detection and control capacities. Currently, CDC operates 10 GDD Centers in Bangladesh, China, Egypt, Georgia, Guatemala, India, Kazakhstan, Kenya, South Africa and Thailand.[188]

Six core capacities were established by various GDD stakeholders to effectively identify and control emerging infectious diseases including:[189]

1. **Emerging infectious disease detection and response:** Identify and respond to emerging infections through disease surveillance, prevention and control.
2. **Training in field epidemiology and laboratory methods:** Train scientists and public health practitioners in field epidemiology and laboratory methods.
3. **Pandemic influenza preparedness and response:** Develop influenza surveillance capacity, including improving and expanding global surveillance networks, increasing virus isolation and epidemiological data collection and increasing quick identification, reporting and response to outbreaks.
4. **Zoonotic disease investigation and control:** Include veterinary expertise in detecting and responding to zoonotic diseases to help strengthen capacity.
5. **Health communication and information technology:** Improve communication with affected populations during outbreaks, and ensure public health responses are culturally, technologically and scientifically appropriate.
6. **Laboratory systems and biosafety:** Ensure appropriate facilities, equipment, policies, security precautions and occupational health programs.

GDD has been enhancing global health security for almost 10 years. In 2011 some of the accomplishments of GDD Centers include:[190]

- Supported responses to 209 disease outbreaks or other public health emergencies;
- 109 epidemiologists and laboratory scientists graduated from the Field Epidemiology Training Programs (FETP) associated with GDD Regional Centers;
- 589 FETP professionals remained in public health positions in-country or within the region where they originally graduated;
- More than 8,500 people participated in short-term public health training;
- Detected six pathogens new to their region;
- Discovered one organism new to the world; and
- Built host nation capacity for 29 new diagnostic tests.

## INDICATOR 5: CLIMATE CHANGE AND INFECTIOUS DISEASE

Key Finding: 15 states currently have completed climate change adaption plans — that include focusing on the impact on human health.

| 15 states currently have climate change adaptation plans that are completed (1 point). | 35 states and Washington D.C. do not currently have complete climate change adaptation plans (0 points). | |
|---|---|---|
| Alaska | Alabama | Missouri |
| California | Arizona** | Montana |
| Connecticut | Arkansas | Nebraska |
| Florida | Colorado** | Nevada |
| Maine | Delaware* | New Jersey* |
| Maryland | District of Columbia | New Mexico |
| Massachusetts | Georgia | North Carolina** |
| New Hampshire | Hawaii | North Dakota |
| New York | Iowa** | Ohio |
| Oregon | Idaho | Oklahoma |
| Pennsylvania | Illinois | Rhode Island* |
| Vermont | Indiana | South Carolina** |
| Virginia | Kansas | South Dakota |
| Washington | Kentucky | Tennessee |
| Wisconsin | Louisiana | Texas |
| | Michigan** | Utah** |
| | Minnesota* | West Virginia |
| | Mississippi | Wyoming |

*Source: Center for Climate and Energy Solutions*[191]

**Plans in progress*

*** Adaptation Plan Recommended in the Climate Action Plan*

This indicator examines which states have complete climate adaptation plans, which includes understanding and planning for changing risk for emerging and reemerging infectious diseases due to changing temperatures and weather patterns. This includes the need to integrate climate readiness into all policies and programs, such as vector control, air quality and food and water safety.

According to the Environmental Protection Agency (EPA), as the environment changes, Americans will be at higher risk for a range of health threats, and a 2003 IOM report, *Microbial Threats to Health: Emergence, Detection, and Response,* listed climate and weather, changing ecosystems, and land use as factors contributing to the emergence of new diseases or the reemergence or spread of diseases that were nearly eradicated or thought to be under control.[192, 193] The President issued an Executive Order in 2013 to prepare for the effects of climate change, including how increase in excessively high temperatures, heavy downpours, wildfires, severe droughts, permafrost thawing, ocean acidification and sea-level rise affect communities and public health.[194] In addition, the EPA released draft Climate Change Adaptation Implementation Plans for public review and comment in early 2013. The Implementation Plans aim to protect public health and the environment by integrating climate adaptation planning into EPA programs, policies, rules and operations.[195]

Certain vector- and zoonotic-borne diseases may increase and spread — along with food- and water-borne diseases — as changes in temperature and weather patterns allow pathogens to expand into different geographic regions. For instance:

- The presence and number of rodents, mosquitoes, ticks and other insects and animals that can carry infectious diseases rise in warmer temperatures, so as temperatures rise around the country and stay warmer for longer periods of times, the patterns of diseases ranging from WNV to Lyme and other tick-borne diseases to encephalitis are expected to shift.[196]
- Large-scale climatic change may have an effect on the timing of migration of wild birds. Wild birds are a concern for public health because they can be infected by a number of microbes that can be transmitted to humans. In addition, birds migrating across national and intercontinental borders can become long-range carriers of any bacteria, virus or parasite organism they harbor. Birds are the source of the rapid spread of WNV after it was first identified in 1999, and by 2012 the virus had been reported in human, mosquitoes, and birds in 48 states. In addition to WNV, migratory birds are reported to be the source of the 2009 global outbreak of the H1N1 avian influenza virus.[197]
- Annual influenza epidemics occur primarily during cold weather, while meningococcal meningitis is associated with dry climates, so changing weather patterns means people in different regions would be exposed to increased risk for both diseases.
- The rise in extreme weather events and natural disasters also leads to a more fertile environment for the spread of infectious diseases and germs. For instance, cryptosporidiosis outbreaks are associated with heavy rainfall, which can overwhelm sewage treatment plants or cause lakes, rivers and streams to become contaminated by runoff that contains waste from infected animals, and experts also believe that an El Niño occurrence may have contributed to increases of malaria and cholera.[198] Communities recovering from a disaster may see food or waterborne illnesses associated with power outages or flooding and infectious disease transmission in emergency shelters.
- Deforestation and the expansion of land used for agriculture and ranching has contributed to an upswing in infectious diseases, as it changes the relationships between humans and disease vectors. Changes in land use and human settlement patterns have coincided with increased malaria outbreaks in Africa, Asia and Latin America, while reforestation in the Northeast and upper Midwest regions of the United States have promoted an increase in the population of white-tailed deer, which are a host of the ticks that carry Lyme disease.[199, 200]
- Increasing temperatures can also lead to an increase the risk for foodborne disease outbreaks.
- Increases in flooding and rising sea-levels can lead to an increase in water-borne diseases.

Public health departments are uniquely positioned to help communities prepare for the adverse effects of climate change given their role in building healthy communities. Public health workers are trained to develop communication campaigns that both inform and educate the public about health threats and can use these skills to educate the public about climate change prevention and preparedness. Public health departments are also on the frontlines when there is an emergency, whether it's a natural disaster or an infectious disease outbreak. These types of emergency preparedness and response skills will be invaluable as extreme weather events become more common.

According to a review by the Center for Climate and Emergency Solutions, 15 states currently have complete climate adaptation plans, and four additional states have plans in progress. Depending on the region's specific needs, adaptation plans can focus on a variety of issues, including sea-level

rise and associated flooding, drought mitigation and water insecurity, hurricanes and other severe weather, and extreme heat events.[201] Climate change will require enhanced monitoring of potential disease vectors and outbreaks. Factors like potential changes in water quantity and quality, air quality, extreme temperatures and insect control are all important public health concerns. The number of states with complete climate change plans has not changed since 2012. All 15 states with adaptation plans include public health responses.

To help prepare for the health impact of extreme weather incidents and climate change, CDC's Climate-Ready States and Cities Initiative awarded $7.25 million in grants to 16 states and two cities to build resilience to the health impacts of climate change, with plans to award up to $19.25 million by 2016. CDC will assist awardees in developing and using models to more accurately anticipate health impacts, monitor health effects, and identify the most vulnerable areas in their region. Awardees include departments of health in Arizona, California, Florida, Illinois, Maine, Maryland, Massachusetts, Michigan, Minnesota, New Hampshire, New York City, New York State, North Carolina, Oregon, Rhode Island, San Francisco, Vermont and Wisconsin.[202]

## RECOMMENDATIONS:

### Preventing and Preparing for the Adverse Impact of Climate Change on Infectious Disease Outbreaks

To help prevent and prepare for the new and increased infectious disease threats that climate change poses, TFAH recommends:

- **Ensuring every state has a comprehensive climate change adaptation plan that includes a public health assessment and response:** State and local health agencies should engage in public education campaigns and establish relationships with vulnerable populations as part of any plan. The Federal Emergency Management Agency (FEMA) should require climate change adaptation as part of state hazard mitigation plans.
- **Improving coordination across public health and environmental agencies:** Public health agencies at all levels must work in coordination with environmental and other agencies to undertake initiatives to reduce known health threats from food, water and air, and educate the public about ways to avoid potential risks.
- **Expanding the National Environmental Health Tracking Network:** The CDC's environmental public health tracking program should be expanded and fully funded to cover every state. Currently, the program only supports efforts in 23 states and New York City. CDC should be provided with the mandate and resources to expand the network so it can become a centralized, nationwide health tracking center, and each state should receive the necessary funding to fully conduct health tracking activities. A fully funded tracking network should demonstrate interoperability with the larger HIT system to facilitate two-way communication with clinicians and state and local public health officials.
- **Building resilience to climate-related health effects at the state and local level:** Funding should be significantly increased to support CDC's Climate Ready States and Cities Initiative to build capacity at the state and local level to understand the impact of climate change and apply this to long-range health planning.

| 35 states and D.C. require facilities in the state to report HAI data through the National Healthcare Safety Network (NHSN) or other systems (1 point). | | 15 states do not require facilities in the state to report HAI data through the National Healthcare Safety Network (NHSN) or other systems (0 points). | |
|---|---|---|---|
| Alabama | New Hampshire | Alaska | Mississippi |
| Arkansas | New Jersey | Arizona | Montana |
| California | New Mexico | Idaho | Nebraska |
| Colorado | New York | Iowa | North Dakota |
| Connecticut | North Carolina | Kansas | South Dakota |
| Delaware | Ohio | Kentucky | Wisconsin |
| D.C. | Oklahoma | Louisiana | Wyoming |
| Florida | Oregon | Michigan | |
| Georgia | Pennsylvania | | |
| Hawaii | Rhode Island | | |
| Illinois | South Carolina | | |
| Indiana | Tennessee | | |
| Maine | Texas | | |
| Maryland | Utah | | |
| Massachusetts | Vermont | | |
| Minnesota | Virginia | | |
| Missouri | Washington | | |
| Nevada | West Virginia | | |

*Source: CDC*

## INDICATOR 6: MANDATORY REPORTING OF HEALTHCARE ASSOCIATED INFECTIONS (HAIS)

Key Finding: 35 states and Washington, D.C. mandate that healthcare facilities in their state report healthcare-associated infections to CDC's National Healthcare Safety Network NHSN or another system.

This indicator examines how many states legally require reporting of healthcare-associated infections — either to CDC's NHSN, the largest healthcare-associated infection reporting system in the United States, serving more than 12,000 healthcare facilities of all types, or through other established systems.[203]

Approximately one out of every 20 hospitalized patients will contract an HAI.[204] Healthcare-associated infections not only happen in hospitals but can also occur in outpatient surgery centers, nursing home and other long-term care facilities, rehabilitation centers, community clinics or physicians' offices.

A person's risk for a HAI, which includes a range of antibiotic-resistant infections, increases if they are having invasive surgery, if they have a catheter in a vein or their bladder, or if they are on a ventilator or are on a prolonged course of antibiotics as part of their care.[205, 206] In 2002, 98,987 deaths were estimated to be associated with HAIs in hospitals, including 35,967 from pneumonia, 30,665 from bloodstream infections, 13,088 from urinary tract infections, 8,205 from surgical site infections and 11,062 from infections of other sites.[207]

HAIs cost the country $28 billion to $33 billion in preventable healthcare expenditures each year.[208] According to CDC, if 20 percent of these infections were prevented, healthcare facilities could save nearly $7 billion, and, by reducing infections by 70 percent, it could result in $23 billion in savings.[209]

Prevention and education efforts have been helping to decrease the rates of HAIs. CDC, CMS, states and medical providers have launched a series of provider education and prevention

initiatives.[210, 211] In addition, in 2008, Medicare provided incentive to reduce infections by adopting a "no pay" rule to no longer cover infections acquired during a hospital stay, requiring the hospitals themselves to cover any costs incurred by these infections.[212] According to a 2012 survey, 80 percent of infection-control professionals believe the rules have resulted in a greater focus on reducing HAIs. The ACA also requires in-patient hospitals to report certain infections to NHSN in order to receive their full payment updates, and the information will be available on the CMS' Hospital Compare website.[213]

Between 2008 and 2012, there were 41 percent fewer central line-associated bloodstream infections, 7 percent fewer catheter-associated urinary tract infections and 17 percent fewer surgical site infections in in-patient healthcare settings.[214]

Many states are seeing decreases in HAIs. For instance, both Kansas and Tennessee have recently released reports detailing progress in reducing the rate of HAIs in their states. The Kansas Department of Health and Environment published data suggesting that Kansas facilities had 67 percent fewer bloodstream infections from central-line devices and 26 percent fewer urinary tract infections from urinary catheter devices as compared to national reference data.[215] Tennessee achieved a five-year prevention target set by the U.S. Department of Health and Human Services Action Plan in only three years.[216] Previously, Tennessee's rate of HAIs was significantly greater than the national average, but in three years they now fall below the national reference rate of HAIs. Also, a recent study found a significant decrease in MRSA infections. An estimated 30,800 fewer MRSA infections occurred in the United States from 2005 to 2011.[217] And, more specifically hospital acquired MRSA decreased by over 50 percent during that time. These results show the efforts states and hospitals have been making in recent years to prevent infections.

While all 50 states use NHSN or have other systems in place, according to an ongoing review by CDC, as of November 2013, only 35 states and Washington, D.C. are required by law to report HAIs to the NHSN or other systems.[218] Mandatory reporting is important to ensure that cases are being accurately counted and tracked — in particular to effectively track outbreaks and to develop effective interventions and control strategies. Without mandatory reporting, there is an ongoing concern that some facilities may underreport infections and deaths.

A report issued by ASTHO and CDC emphasized the importance of requiring standardized and publicly available reporting of infection rate information as a cornerstone of a state-wide prevention programs for HAI.[219]

### 2012 to 2013 Fungal Meningitis Outbreak[220]

As of September 2013, CDC has reported 750 cases in 20 states of fungal meningitis caused by contaminated steroid injections. Sixty-four deaths have been reported.[221] Approximately 14,000 patients may have received spinal or joint injections with medication from three implicated lots of methylprednisolone; so far, almost all have been contacted for follow-up. The FDA recalled the three lots on September 26, 2012.

This form of meningitis is not contagious and is slow to develop—symptoms can manifest one to four weeks following injection. Fungal meningitis patients may experience a spectrum of symptoms ranging from headache, fever and neck stiffness to coma, seizures and death. Those who received joint injections are not thought to be at risk for fungal meningitis, but could develop joint infections.

The outbreak raised questions about the need to increase regulatory oversight of compounding pharmacies and the need for clarification of federal and state authority and resources to conduct oversight and inspections. It also tested the ability of health departments and private sector partners to track contaminated medications and the clinics and patients who received them. In November 2013, the Drug Quality and Security Law was passed that will give U.S. health regulators increased oversight of bulk pharmaceutical compounding and strengthens their ability to track drugs through the distribution pipeline.[222]

### PUBLIC HEALTH DEPARTMENT RESPONSE TO U.S. FUNGAL MENINGITIS OUTBREAK

In September 2012, a clinician in Tennessee found a case of fungal meningitis in a patient following an epidural steroid injection. This was the first sign of the multi-state outbreak of fungal meningitis. CDC's "disease detectives" from the EIS were part of the early nationwide response to the outbreak. More than 80 EIS officers were marshaled for the response, providing critical assistance with identifying cases, tracking down and communicating with those exposed to the contaminated medication and developing treatment guidelines for an infection rarely seen in humans. In addition, public health departments around the country worked quickly and efficiently to identify the outbreak and notify patients. Below are descriptions of some of the specific actions taken by health departments during the response to the outbreak:[223]

- The Tennessee Department of Health identified the first case of fungal meningitis and quickly contacted CDC to begin the investigation into the unexplained case.
- The Virginia Department of Health laboratory was the first to identify the very rare fungal pathogen, *Exserohilum*. This discovery saved time and provided the nation with critical information to help with diagnostic and treatment recommendations.
- The Michigan Department of Community Health identified the first case of a joint infection associated with the products.
- State and local public health departments worked with FDA to recall products and helped track down and contact over 14,000 exposed patients in 23 states with facilities that received the implicated medication and worked with FDA on product recall efforts. During the outbreak, public health departments at the local, state and federal level worked together as well as communicated across all of the departments and CDC to rapidly identify and contact all potentially exposed patients.[224] A review found that state and local public health preparedness strategies helped respond to this emerging infection and reduce future potential harm.[225]

## MRSA

MRSA infection is caused by Staphylococcus aureus bacterium. Often called "staph," this organism is a common cause of serious skin, soft tissue and bloodstream infections. The advent of antibiotics revolutionized the treatment of staph infections, greatly reducing morbidity and mortality. MRSA is a strain of staph that is resistant to antibiotics commonly used to treat it. MRSA can cause potentially life-threatening infections in bones, joints, surgical wounds, the bloodstream, heart valves and lungs.[226]

In the past, most invasive MRSA infections occurred in hospitals or other healthcare settings, such as nursing homes and dialysis centers. This is known as healthcare-associated MRSA, or HA-MRSA. Older adults and people with weakened immune systems are at most risk of HA-MRSA.[227] Although MRSA is still a major health threat, a recent study showed that life-threatening HA-MRSA infections are declining. Invasive HA-MRSA infections declined 54 percent between 2005 and 2011, with 30,800 fewer severe MRSA infections.[228] Data from the NHSN also shows that rates of MRSA bloodstream infections occurring in hospitalized patients fell almost 50 percent from 1997 to 2007. And CDC found that medical professionals have reduced bloodstream infections in hospital intensive care unit patients by 58 percent since 2001.[229]

This decrease in HA-MRSA infections is encouraging, but MRSA remains an important public health problem and more remains to be done to further decrease risks of developing these infections. More recently, community-associated MRSA, or CA-MRSA, has become increasingly responsible for serious skin and soft tissue infections and for a serious form of pneumonia among previously healthy persons.[230] CA-MRSA rates continue to rise at an alarming rate, now accounting for more than half of community-acquired staph infections in many communities.[231]

Both HA- and CA-MRSA infections are painful, difficult to treat, and cost the U.S. healthcare system billions of dollars annually. While both types of MRSA still respond to a few medications, there are growing concerns that medication may be losing effectiveness. Some U.S. hospitals report seeing strains of MRSA that are less easily killed by *vancomycin*, and 13 cases of complete resistance were reported in this country between 2000 and 2006.[232]

### RECOMMENDATIONS: Reducing Healthcare-Associated Infections

Recent efforts to improve infection control practices have started showing promising results in reducing HAIs. TFAH recommends that public health and healthcare officials should make limiting HAIs a top priority, which includes:

- **Requiring all states and facilities to report HAIs to the NHSN or other recognized system, and fully funding the NHSN and Prevention Epicenters at CDC:** Fighting infections requires complete and accurate reporting. All states and facilities should be required to provide information about HAIs in addition to information about outbreaks — without this information prevention strategies are limited and the emergence of new outbreaks or patterns may go un-detected. Resources must also be provided to states to validate the data reported by facilities and to improve the science and research gap in HAI prevention.[233]
- **Aligning incentives to promote prevention:** Initiatives like the Medicare "no pay" rules and prevention-oriented healthcare payment strategies outlined in a call to action in the American Journal of Infection Control can provide incentives for healthcare providers to improve practices to reduce infections and infection-related costs."[234]
- **Fully and Swiftly Implementing the National Action Plan to Prevent Healthcare-Associated Infections: A Roadmap to Elimination:**[235] Some key strategies in the Action Plan include:
  - Reducing inappropriate and unnecessary use of devices, like catheters and ventilators;
  - Adhering to the best hygiene practices;
  - Prescribing antibiotics only when really necessary;
  - Improving education, communication and best-practice protocols as the regular standard-of-care throughout entire healthcare facilities, to practitioners and to families and patients; and
  - Improving reporting and regulatory oversight of HAIs and financial incentives for reducing the number of infections.

## Superbugs: Antibiotic Resistance

Antimicrobial resistance presents one of the greatest threats to human health around the world.

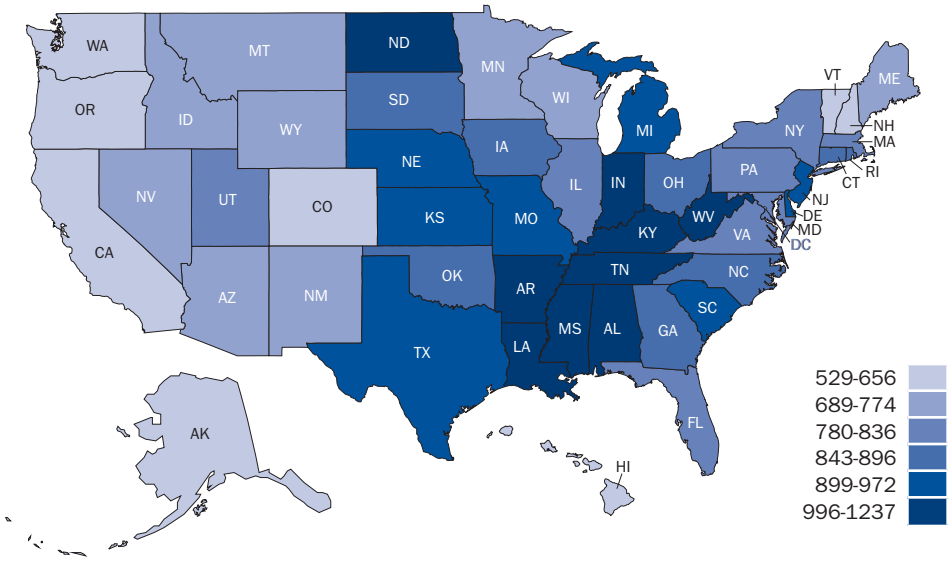
Each year more than 2 million Americans develop antibiotic-resistant infections — and at least 23,000 of these people die as a result.[236] These are considered to be very conservative estimates, since current surveillance and data collection capabilities cannot capture the full impact. Experts warn that antibiotic-resistance is expected to continue to grow and become increasingly difficult to manage.

Antibiotic resistance leads to more than eight million additional days Americans spend in the hospital a year, costs the country an estimated extra $20 billion in direct healthcare costs and at least $35 billion in lost productivity annually.[237, 238]

Antibiotics have been used to successfully treat countless numbers of bacterial infections since the 1940s. Over time, however, some infections — also called Superbugs — have adapted so that antibiotics can no longer effectively treat them.

While antibacterial medications are the effective course of treatment for many bacterial infections and can be lifesaving, according to CDC, in many cases antibiotics are actually being used unnecessarily, often being prescribed for viruses or other ailments. CDC estimates up to half of antibiotic use in humans and much of antibiotic use in animals is unnecessary.[239] According to a study in the *New England Journal of Medicine*, the number of antibiotics prescribed per year could treat four out of every five Americans.[240] The highest rates of antibiotic prescribing are in Southeastern states, and lowest in the West. Overuse increases the likelihood that drugs will be less effective when needed against

**Antibiotic Prescriptions per 1000 Persons of All Ages According to State, 2010[241]**




bacterial infections. CDC's *Get Smart: Know When Antibiotics Work* and other efforts are helping physicians, other prescribers and patients better understand when antibiotic prescriptions are appropriate and effective.[242]

There are now forms of diseases ranging from things as common-place as strep throat or ear infections to foodborne illnesses like *Salmonella* to infections that can be acquired while a person is hospitalized or receiving healthcare, such as staph infections like MRSA, which are either untreatable with antibiotics or antibiotics are less effective to fight against them.

CDC issued an *Antibiotic Resistance Threats in the U.S. 2013* report, where they prioritized a list of 18 "nightmare bacteria," which are resistant or increasingly resistant to antibiotics or have become more common because of widespread use of antibiotics.[243]

As resistance rates continue to increase and more and more people are sickened and die due to resistant infections, we are seeing fewer and fewer new antibiotics approved, particularly to treat the most serious and life-threatening infections.[244] Many pharmaceutical companies have abandoned antibiotic research and development due to regulatory and economic barriers (i.e. antibiotics are less profitable than drugs to treat longer term conditions). In 1990, there were almost 20 pharmaceutical companies with large antibiotic research and development (R&D) programs. Today, there are only three or four large companies with strong and active programs and only a small number of companies have more limited programs.

CDC, FDA, USDA and other public health agencies have identified a number of strategies to reduce antibiotic resistance. A federal Interagency Task Force on Antimicrobial Resistance was created in 1999 and in 2001, they released A Public Health Action Plan to Combat Antimicrobial Resistance and updated the plan in 2012.[245] CDC, FDA and USDA also have been tracking antibiotic resistance in foodborne bacteria since 1996 through the National Antimicrobial Resistance Monitoring System (NARMS) and CDC tracks infectious diseases, HAIs and foodborne illnesses through a range of surveillance systems.[246]

CDC has identified some key strategies for preventing and reducing antibiotic resistance, including:[247]

- **Preventing the Spread of Resistance:** Avoiding infections in the first place reduces the amount of antibiotics that have to be used and reduces the likelihood that resistance will develop during therapy. There are many ways that drug-resistant infections can be prevented: immunization, safe food preparation, hand washing, and using antibiotics as directed and only when necessary. In addition, preventing infections also prevents the spread of resistant bacteria.
- **Tracking:** CDC gathers data on antibiotic-resistant infections, causes of infections and whether there are particular reasons (risk factors) that caused some people to get a resistant infection. With that information, experts can develop specific strategies to prevent those infections and prevent the resistant bacteria from spreading.
- **Improving Antibiotic Prescribing/ Stewardship:** Perhaps the single most important action needed to greatly slow down the development and spread of antibiotic-resistant infections is to change the way antibiotics are used. Up to half of antibiotic use in humans and much of antibiotic use in animals is unnecessary and inappropriate and makes everyone less safe. Stopping even some of the inappropriate and unnecessary use of antibiotics in people and animals would help greatly in slowing down the spread of resistant bacteria. This commitment to always use antibiotics appropriately and safely—only when they are needed to treat disease, and to choose the right antibiotics and to administer them in the right way in every case—is known as antibiotic stewardship.
- **Developing New Drugs and Diagnostic Tests:** Because antibiotic resistance occurs as part of a natural process in which bacteria evolve, it can be slowed but not stopped. Therefore, we will always need new antibiotics to keep up with resistant bacteria as well as new diagnostic tests to track the development of resistance.

## Pediatric Prescribing

AAP and CDC released *Principles of Judicious Antibiotic Prescribing for Bacterial Upper Respiratory Tract Infections* during the November 2013 Get Smart About Antibiotics Week.[248] The report highlights recent AAP guidance about responsible prescribing of antibiotics, which include:[249]

- **Determine the likelihood of a bacterial infection:** Antibiotics should not be used for viral diagnoses when a concurrent bacterial infection has been reasonably excluded.
- **Weigh benefits versus harms of antibiotics:** Symptom reduction and prevention of complications and secondary cases should be weighed against the risk for side effects and resistance, as well as cost.
- **Implement accurate prescribing strategies:** Select an appropriate antibiotic at the appropriate dose for the shortest duration required.

## RECOMMENDATIONS: Reducing Antibiotic-Resistance

TFAH recommends policies that help curb antibiotic overuse and encourage new antibiotic development become high priorities, including:

- **Making countering antibiotic resistance and the development of new antibiotics a top health and national security priority:** Given the rapid growth of antibiotic-resistant diseases and the potential harm this could pose to Americans coupled with the limited research currently being done to develop new medicines, there needs to be renewed effort to raise the priority level of addressing the problem. The federal government should engage in a comprehensive strategy to combat antimicrobial resistance to help support research, improve tracking of resistant bacteria and identify a director within HHS to coordinate efforts across the agency.[250]

- **Fully implementing the 2012 *Public Health Action Plan to Combat Antimicrobial Resistance*:**[251] The plan released by the Interagency Task Force on Antimicrobial Resistance, stressed that strong Administration leadership is necessary to coordinate efforts across agencies and prioritize this pressing public health problem.

- **Implementing a comprehensive national approach to combat resistance, including:**

  - Reducing Overprescribing: CMS should make an effective antibiotic stewardship program a Condition of Participation for all CMS-enrolled facilities, and HHS should drive the development and adoption of quality measures related to appropriate prescription and use of antibiotics across all relevant providers and healthcare settings. CMS, CDC, accrediting organizations, healthcare facilities and medical organizations must also work together to reduce overprescribing and misuse of antibiotics by tracking and publicly reporting prescribing data, educating providers and patients about the harm of inappropriate prescribing, and providing clinical decision support through HIT.

  - Reducing Overuse in Agriculture: It has been 36 years since FDA began working on addressing overuse of medically-important antimicrobials on farms, but the actions to date have been highly limited.
    - The FDA should ensure full implementation and evaluation of two voluntary FDA Guidances for Industry, numbers 209 and 213, which provide guidelines for drug makers on the judicious use of antibiotics in food animals, such as eradicating use for growth promotion and ending over-the-counter use of medically-important antibiotics in animal feed.
    - The FDA should finalize, implement, and evaluate the proposed regulation amending the Veterinary Feed Directive, providing rules for veterinary oversight of antibiotic use in animal feed.
    - Eventually, the U.S. should phase out all unnecessary use of antibiotics (or, all uses of antibiotics for reasons other than treating and controlling disease) in food animals, as has been done in countries such as Denmark with minimal economic impact.
    - The FDA should also greatly enhance information collection and reporting about antibiotic use in food animals so that the public better understands the volume and class of antibiotics used, the targeted species of animals, how the drugs are administered, and for what purpose. Better data will help public health officials be able to spot problematic trends and target solutions.

  - Incentivizing Development of New Antibacterial Drugs through BARDA and Other Mechanisms: TFAH supports initiatives such as the new FDA Antibacterial Drug Development Task Force and the recommendations issued by The Brookings Institution, in partnership with the FDA, for the need to reevaluate acceptable levels of risk and benefit in new treatments; harnessing novel statistical and methodological approaches; streamlining the clinical trials process; and prioritizing unmet need.

  - Approving Limited Population Antibacterial Drug (LPAD) Pathway: FDA should have the authority to approve drugs for a limited population of patients with serious or life-threatening infections and for drugs that fill an unmet need based upon more limited data (e.g. smaller clinical trials). This mechanism would speed access to new antibacterial drugs to the patients who most need them. In addition, the limited indication would help protect those new antibacterial drugs from losing their effectiveness through overuse.

## *ANTIBIOTIC RESISTANT THREATS IN THE UNITED STATES, 2013* – CDC'S REPORT AND PRIORITIZATION OF THREATS[252]

| Superbug | Drug-Resistant Infections in U.S. Annually | How It Spreads (Most commonly: healthcare associated; STI; food/water/agriculture; outside of healthcare setting) | Types of Infections |
|---|---|---|---|
| **URGENT THREAT LIST** | | | |
| Carbapenem-resistant Enterobacteriaceae (CRE) | 9,000; 600 deaths | Often healthcare associated, via catheters, ventilators, surgical site or when patient is on a prolonged course of antibiotics as part of their care. CDC classifies as urgent because of a recent rapid rise in infection rates, CREs can spread quickly and resistance to carbapenems is particularly worrisome, as one of the most powerful, "last resort" forms of antibiotics. | Bloodstream infections from CREs can result in death rates as high as 50 percent. Can also cause urinary tract infections, pneumonia, inter-abdominal abscesses, and other forms of infection. |
| Drug-resistant Gonorrhea | 246,000 resistant to any drug (one third of cases); 3,280 reduced susceptibility to ceftriaxone (the currently used form of treatment) | Second most commonly reported infectious disease in the U.S., sexually transmitted | Can result in discharge and inflammation at the urethra, cervix, pharynx, or rectum, and can cause infertility. |
| *Clostridium difficile* | 250,000; 14,000 deaths | Infection acquired while individual is taking antibiotics for other care. Often healthcare associated | Can cause life-threatening diarrhea or colon inflammation |
| **SERIOUS THREAT LIST** | | | |
| Multidrug-resistant *Acinetobacter* | 7,300 multi-drug; 12,000 single-drug; 500 deaths | Healthcare associated – often among critically ill patients | Pneumonia or bloodstream infections |
| Drug-resistant *Campylobacter* | 310,000; 120 deaths | Contaminated food or water or exposure through antibiotic use in animals | Diarrhea, fever, abdominal cramps, complications like temporary paralysis |
| Fluconazole-resistant *Candida* (a fungus) | 3,400; 200 deaths | Often healthcare associated -- bloodstream infection related to this bacteria is fourth leading form of HAI | Number of types of yeast infections, such as bloodstream and skin infections |
| Extended spectrum ß-lactamase producing *Enterobacteriaceae* (ESBLs) | 26,000; 1,700 deaths | Often healthcare associated -- an enzyme that allows bacteria to become resistant to many forms of antibiotics | Can lead to bloodstreamand other forms of infection |
| Vancomycin-resistant *Enterococcus* (VRE) | 20,000; 1,300 deaths | Often healthcare associated – resistant to vancomycin, one of the antibiotics of 'last resort' | Bloodstream, surgical site and urinary tract infections |
| Multidrug-resistant *Pseudomonas aeruginosa* | 6,700; 440 deaths | Healthcare associated – responsible for 8 percent of all HAIs | Bloodstream, urinary and surgical site infections and pneumonia |
| Drug-resistant Non-typhoidal *Salmonella* | 100,000 | Mostly spreads through contaminated food and sometimes exposure through agriculture | Diarrhea, fever, abdominal cramps, blood infections |
| Drug-resistant *Salmonella Typhi* | 38,000 | Food and water contaminated by feces, Americans who develop typhoid fever often are exposed when traveling abroad. | Causes typhoid fever, which can lead to bowel perforation, shock and death. There is a vaccine that can prevent against this infection. |
| Drug-resistant *Shigella* | 27,000; 40 deaths | Inadequate hand washing and hygiene habits, and can be sexually transmitted | Diarrhea, fever, and abdominal pain, can lead to complications including reactive arthritis |
| Drug-resistant *Streptococcus pneumoniae* | 1.2 million; 7,000 deaths | Pneumococcal infections often in young children or the elderly | Leading cause of bacterial pneumonia and meningitis in the U.S. Can cause bloodstream, ear, and sinus infections. Rates in the U.S. have decreased with extensive use of PCV 13 vaccine. |
| Methicillin-resistant *Staphylococcus aureus* (MRSA) | 80,461 severe infections; 11,285 deaths | Staph infections, including MRSA, are a leading cause of healthcare associated infections | Can lead to a range of illnesses, from skin and wound infections to pneumonia and bloodstream infections to sepsis and death |
| Drug-resistant tuberculosis | 1,042 | Most common serious infectious disease worldwide, spreads through the air via coughs, sneezes or respiratory fluids | Often attacks the lungs but can attack other parts of the body |
| **CONCERNING THREAT LIST** | | | |
| Vancomycin-resistant *Staphylococcus aureus* (VRSA) | 13 since 2002 | Healthcare associated staph infection, often via a catheter, ventilator or surgical site | Can lead to bloodstream infections, pneumonia, heart valve infections, and bone infections |
| Erythromycin-resistant Group A *Streptococcus* | 1,300; 160 deaths | Bacteria spread to a part of the body that is normally sterile, young children, the elderly and people with underlying conditions are most vulnerable | Strep throat, toxic shock syndrome, "flesh-eating" disease, scarlet fever, rheumatic fever, and skin infections |
| Clindamycin-resistant Group B *Streptococcus* | 7,600; 440 deaths | Leading cause of bacterial infections in newborns, can cause infections in people of all ages | Bloodstream infections, pneumonia, meningitis, and skin infections. |

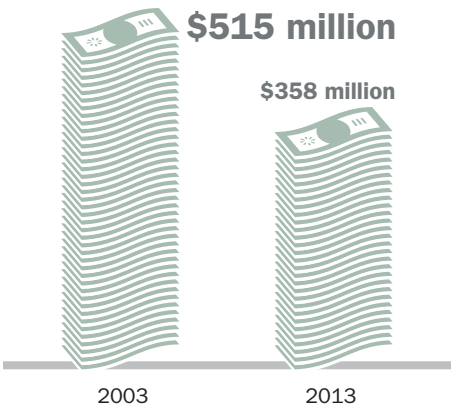


# Emergency Outbreaks: Bioterrorism and High-Risk New Diseases

Since the September 11th and the anthrax tragedies, the United States has prioritized developing strategies to be prepared for emergency outbreaks — such as new diseases that have the potential to spread quickly and widely throughout the populations or diseases that are intentionally introduced through an act of bioterrorism.

TFAH's annual *Ready or Not? Protecting the Public's Health from Diseases, Disasters and Bioterrorism* report documented considerable progress that had been made in the past decade to more effectively prepare for and respond to public health emergencies of all kinds — including major infectious disease outbreaks and bioterrorism. Since 2001, investments have led to significant accomplishments in preparedness planning and coordination; public health laboratories; vaccine manufacturing; the SNS; pharmaceutical and medical equipment distribution and administration; surveillance; communications; legal and liability protections; increasing and upgrading public health staffing trained to prevent and respond to emergencies; and limited improvements in medical surge capacity. However, the reports have also tracked persistent areas of vulnerability, including in biosurveillance, the ability to provide mass care in emergencies, maintaining a stable MCM strategy to continue research and development of vaccines and antiviral medications and helping communities become more resilient to cope with and recover from emergencies.

**Decrease in the Hospital Preparedness Program Funding — 2003 vs. 2013**




Instead of working to fill these gaps, in recent years funding has declined from the levels needed to maintain existing capabilities. Since 2001, there has been a 42 percent cut to federal funds from CDC to support state and local preparedness, including the Public Health Emergency Preparedness (PHEP) cooperative agreement.[253] In addition, federal support for health system preparedness for the nation, through the Hospital Preparedness Program (HPP), has declined from $515 million in FY 2003 to $358 million in FY 2013, without taking inflation into account. The PHEP and HPP programs address complementary areas of preparedness. In 2012, these two major preparedness grant programs were aligned to improve coordination and leverage resources. The federal cuts combined with state and local budget and staffing cuts mean that many of the capabilities that were built are starting to erode.

## National Health Security Preparedness Index (NHSPI)

On December 4, 2013, ASTHO, in partnership with CDC and 20 development partners, released the National Health Security Preparedness Index™ (NHSPI™), a new way to measure and advance the nation's readiness to protect people during a disaster — including major infectious disease outbreaks caused by nature or acts of bioterrorism.

The NHSPI™ measures the health security preparedness of the nation by looking collectively at existing state-level data from a wide variety of sources. Uses of the Index include guiding quality improvement, informing policy and resource decisions, and encouraging shared responsibility for preparedness across a community.

Utilizing data from 128 measures from more than 35 sources, the NHSPI found that that the national result was a 7.2 out of 10. The state scores ranged from 5.9 in Nevada to 8.0 in Massachusetts. The lowest results were in domains for Community Planning and Engagement (working across an entire community) and Surge Management (the ability to quickly expand care and reach large numbers of people).

Health Surveillance (detecting and investigating potential health threats), Incident and Information Management (responding to a public health emergency by dispersing resources and information), and Countermeasure Management (managing and deploying materials to prevent/treat health issues) were the domains with the highest results.

Other stakeholders contributing to the project, included: American Public Health Association; American Red Cross; Association of Public Health Laboratories; Association of Schools and Programs of Public Health; Association of State and Territorial Health Officials; Boston Consulting Group; Center for Infectious Disease Research and Policy; Centers for Disease Control and Prevention; Council of State and Territorial Epidemiologists; Department of Defense; Department of Homeland Security; Federal Emergency Management Agency; Fleishman-Hillard; International Association of Emergency Managers; McKinsey and Company; National Association of County and City Health Officials; National Association of State EMS Officials; National Emergency Management Association; National Governors Association; National Public Health Information Coalition; Office of the Assistant Secretary for Preparedness and Response; Preparedness and Emergency Response Research Centers (PERRCs) from the following institutions: Emory University, Harvard University, Johns Hopkins University, University of California — Los Angeles, University of Minnesota, University of North Carolina — Chapel Hill, University of Pittsburgh, University of Washington; RAND Corporation; Robert Wood Johnson Foundation; Trust for America's Health; University of North Carolina School of Medicine, Department of Emergency Medicine; and UPMC Center for Health Security.

## PUBLIC HEALTH EMERGENCY PREPAREDNESS (PHEP) COOPERATIVE AGREEMENT PROGRAM

The PHEP cooperative agreement program awards funds to states, territories and urban areas to build and sustain public health preparedness capabilities that enhance their ability to respond to public health emergencies. PHEP awards funds to 62 public health departments nationwide, including the 50 states; four large metropolitan areas, Chicago, Los Angeles County, New York City and Washington, D.C.; and eight U.S. territories and freely associated states: American Samoa, Guam, U.S. Virgin Islands, Northern Mariana Islands, Puerto Rico, Federated States of Micronesia, Republic of the Marshall Islands and the Republic of Palau.[254] The distribution of PHEP funds is calculated using a formula that includes a base amount for each awardee plus population-based funding.[255]

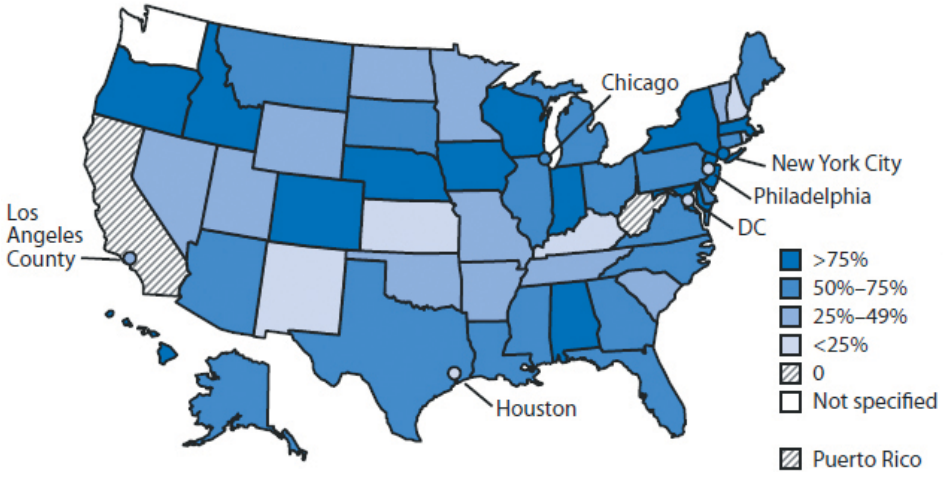
PHEP focuses on 15 key capability areas, including: community preparedness; community recovery; emergency operations coordination; emergency public information and warning; facility management; information sharing; mass care; medical countermeasure dispensing; medical material management and distribution; medical surge; non-pharmaceutical interventions; public health laboratory testing; public health surveillance and epidemiological investigations; responder safety and health; and volunteer management. PHEP also supports the Cities Readiness Initiative (CRI) to help cities and large metropolitan areas prepare to dispense medicine quickly, on a large scale.[256]

## Public Health Laboratories

Public health laboratories are essential to quickly identifying and diagnosing new outbreaks and tracking ongoing outbreaks.

Labs require highly expert staffing, extreme safety measures, specialized equipment, reagents and other biological materials to use for testing, and enough capacity to test for a large threat or multiple threats at once. They have ongoing responsibilities, such as testing water and environmental conditions, as well as responding to emergency and novel threats, such as an outbreak of Salmonella or a suspicious white powder that could be an act of bioterrorism.

**Percentage of laboratory reports received by public health agencies through electronic laboratory reporting — United States, 2013**




Since 2001, public health labs have created networks to be more efficient and effective, so that every state has a baseline of capabilities but does not have to invest the resources required to maintain every type of state-of-the-art equipment or staffing expertise. Samples can be shipped to facilities with the needed expertise as quickly and safety as possible.

The Laboratory Response Network for Biological Threat Preparedness (LRN-B) includes labs with a hierarchy of different capabilities, so labs with increased capabilities provide support for other labs, consisting of:[257]

- National laboratories - including those operated by CDC, U.S. Army Medical Research Institute for Infectious Diseases (USAMRIID), and the Naval Medical Research Center (NMRC) — are responsible for specialized strain characterizations, bioforensics, select agent activity and handling highly infectious biological agents;
- Reference laboratories, which are responsible for investigation and/or referral of specimens. They are made up of more than 100 state and local public health, military, international, veterinary, agriculture, food and water testing laboratories; and
- Sentinel laboratories, which provide routine diagnostic services, rule-out and referral steps in the identification process. While these laboratories may not be equipped to perform the same tests as LRN Reference laboratories, they can test samples.

Labs not only help detect and diagnose problems, the information they help public health officials track the emergence and spread of different outbreaks and are an essential part of monitoring disease threats and understanding how to control them.

In 2010, CDC began funding 57 state, local and territorial health departments to encourage increased electronic reporting of lab results to help make reporting faster and more complete.[258] Data collected since then shows various improvements. By the end of July 2013, 54 of the 57 jurisdictions were getting some laboratory reports through Electronic Laboratory Reporting (ELR), and 62 percent of laboratory reports were being received through ELR compared to 54 percent in 2012.[259]

| 37 state public health laboratories and D.C. report having a plan and capacity to handle a significant surge in testing over a six to eight week period in response to an outbreak that increased testing over 300 percent from July 1, 2012 to July 30, 2013 (1 point). | | 9 state public health laboratories report NOT having a plan and capacity to handle a significant surge in testing over a six to eight week period in response to an outbreak that increases testing over 300 percent from July 1, 2012 to July 30, 2013 (0 points). | |
|---|---|---|---|
| Alabama | Missouri | Alaska | **Declined to respond:** |
| Arizona | Montana | Georgia | Louisiana, Maryland, |
| Arkansas | New Hampshire | Maine | Nevada, Texas |
| California | New Mexico | Massachusetts | |
| Colorado | New York | Nebraska | |
| Connecticut | North Carolina | New Jersey | |
| Delaware | Ohio | North Dakota | |
| D.C. | Oklahoma | Utah | |
| Florida | Oregon | Vermont | |
| Hawaii | Pennsylvania | | |
| Idaho | Rhode Island | | |
| Illinois | South Carolina | | |
| Indiana | South Dakota | | |
| Iowa | Tennessee | | |
| Kansas | Virginia | | |
| Kentucky | Washington | | |
| Michigan | West Virginia | | |
| Minnesota | Wisconsin | | |
| Mississippi | Wyoming | | |

*Source: APHL 2013 Survey of State Public Health Laboratories*

## INDICATOR 7: PUBLIC HEALTH LABORATORIES — SURGE WORKFORCE

**Key Finding: 37 state public health laboratories and Washington, D.C. report having a plan and capacity to handle a significant surge in testing over a six to eight week period in response to an outbreak that increases testing over 300 percent.**

This indicator examines whether a state's public health laboratory would have enough trained staff to be able to work the hours necessary to respond to a major, widespread new disease outbreak. This type of outbreak requires labs to be able to test a large number of samples in a very short period of time, not only to identify infected individuals, but also to understand the scope and patterns of the new disease — whether caused naturally or by an act of bioterrorism.

For instance, in 2001, between October and December, public health labs around the country tested more than 120,000 samples for anthrax.[260]

During the first wave of the H1N1 pandemic in the spring of 2009, public health labs were also stretched beyond capacity. According to an article published in the journal of the Association of Public Health Laboratories (APHL), "The peak public health laboratory response was unsustainable; state and federal cutbacks have drained critical surge capacity from a system already weakened by long-term workforce shortages."[261]

In the initial phases of an outbreak of a novel influenza virus, public health labs are on the front lines conducting diagnostic testing since other labs generally lack this capacity. Once the novel virus is established in the population, diagnostic testing is no longer as important and public health labs switch to surveillance testing. The surveillance testing allows public health officials to gather enough information to track the pandemic and monitor any genetic mutations or changes in the virus.

During a pandemic flu or other infectious disease outbreak, the demand on the public health lab workforce is great, and in some cases, exceeds supply. According to a survey by APHL conducted of state public health laboratory directors in the fall of 2013, 37 states and Washington, D.C. reported having a plan and capacity to handle a significant surge in testing over a six to eight week period in response to an outbreak that increases testing over 300 percent (during July 1, 2012 to June 30, 2013).

## INDICATOR 8: PUBLIC HEALTH LABORATORIES — RAPID, SAFE TRANSPORTATION OF SAMPLES FOR TESTING

Key Finding: 46 states and Washington, D.C. have the capacity to assure the timely transportation of samples 24/7/365 days to an appropriate Public Health Laboratory Response Network (LRN) Reference Laboratory.

| 46 states and Washington, D.C. reported having the capacity in place to assure the timely transportation (pick-up and delivery) of samples 24/7/365 days to an appropriate Public Health Laboratory Response Network Reference Laboratory (between July 1, 2012 to July 30, 2013) (1 point). | | 2 states report NOT having the capacity in place to assure the timely transportation (pick-up and delivery) of samples 24/7/365 days to an appropriate Public Health Laboratory Response Network Reference Laboratory (between July 1, 2012 to July 30, 2013) (0 points). | |
|---|---|---|---|
| Alabama | Montana | Georgia | **Declined to respond:** |
| Alaska | Nebraska | Indiana | Nevada and Texas |
| Arizona | New Hampshire | | |
| Arkansas | New Jersey | | |
| California | New Mexico | | |
| Colorado | New York | | |
| Connecticut | North Carolina | | |
| Delaware | North Dakota | | |
| D.C. | Ohio | | |
| Florida | Oklahoma | | |
| Hawaii | Oregon | | |
| Idaho | Pennsylvania | | |
| Illinois | Rhode Island | | |
| Iowa | South Carolina | | |
| Kansas | South Dakota | | |
| Kentucky | Tennessee | | |
| Louisiana | Utah | | |
| Maine | Vermont | | |
| Maryland | Virginia | | |
| Massachusetts | Washington | | |
| Michigan | West Virginia | | |
| Minnesota | Wisconsin | | |
| Mississippi | Wyoming | | |
| Missouri | | | |

*Source: APHL 2013 Survey of State Public Health Laboratories*

This indicator examines whether a state's public health laboratory has the capacity to be able to deliver and receive laboratory specimens on a 24-hour, seven day a week basis. This can include a state operated courier, use of a private delivery company such as FedEx, or a contract courier service.

Each state should have the capacity to test samples of potential infectious disease threats needed during major new outbreaks — or have arrangements to get the samples to labs where they can quickly be tested. For infectious diseases or food- or water-borne outbreaks, timeliness is often of the essence to confirm needed treatments and to contain a problem. This can include getting the samples to and from a particular lab or being able to transport a specimen to a lab with the technology required to test for a particular threat as part of the nation's Laboratory Response Network.

According to APHL's survey of public health laboratory directors, from July 1, 2012 to July 30, 2013, 46 states and Washington, D.C. reported having the capacity.

| 27 state public health laboratories reported evaluating the functionality of their COOP via a real event or exercise, from July 1, 2012 to July 30, 2013 (1 point). | | 18 state public health laboratories and Washington, D.C. reported they did NOT evaluate the functionality of their COOP via a real event of exercise from July 1, 2012 to July 30, 2013 (0 points). | |
|---|---|---|---|
| Alabama | Mississippi | Arkansas | Ohio |
| Alaska | Missouri | Colorado | Oregon |
| Arizona | New Hampshire | Connecticut | Pennsylvania |
| California | New York | D.C. | Utah |
| Delaware | North Carolina | Georgia | West Virginia |
| Florida | Oklahoma | Idaho | Wisconsin |
| Hawaii | South Carolina | Iowa | Wyoming |
| Indiana | South Dakota | Maine | |
| Kansas | Tennessee | Montana | **Did not respond:** |
| Kentucky | Texas | Nebraska | Illinois, Massachusetts, |
| Louisiana | Vermont | New Mexico | Nevada, New Jersey |
| Maryland | Virginia | North Dakota | and Rhode Island |
| Michigan | Washington | | |
| Minnesota | | | |

*Source: APHL 2013 Survey of State Public Health Laboratories*

## INDICATOR 9: PUBLIC HEALTH LABORATORIES — CAPABILITIES DURING EMERGENCIES OR DRILLS

Key Finding: 27 state public health laboratories reported evaluating their functionality of their Continuity of Operations Plan (COOP) during a real event or exercise (from July 1, 2012 to July 31, 2013).

This indicator examines whether a state's public health laboratory reported that they evaluated their COOP during a real event or exercise, from July 1, 2012 to July 30, 2013.

Conducting exercises and responding to real events is important to gauge how well emergency plans will work during actual events, and to evaluate strengths and areas of vulnerabilities to improve on.

One key aspect of responding to an emergency is ensuring that public health departments and laboratories, and other aspects of government, will be able to continue to function during a time of stress, such as a mass disease outbreak or bioterrorism event. Laboratories and most agencies have continuity plans, but without seeing how they hold up during an actual incident or simulated drill, it is hard to evaluate where there may be gaps in the plan.

FEMA stresses that individual agencies should be able to continue to perform during a wide range of emergencies and disruptive events, including localized acts of nature, accidents and technological or attack-related emergencies.[262] Aspects of a COOP include: essential functions; orders of succession; delegations of authority; continuity facilities; continuity communications; vital records management; human capital; tests, training and exercises; devolution of control and direction; and reconstitution.

In the fall 2013 APHL survey of public health laboratory directors, 26 state public health laboratories reported they were able to evaluate the functionality of their COOP during a real event or exercise last year. In addition, 21 states reported that they have documented that they have a COOP consistent with National Incident Management System (NIMS) guidelines, and 27 states reported that they have a state agency- or department-wide COOP that includes the laboratory.

## RECOMMENDATIONS: Ensuring Fully-Functioning Labs

Public health labs are critical for public health and building strong infectious disease prevention and control capabilities. They are essential for diagnosing, treating and containing threats. To ensure labs are fully-functional, TFAH recommends:

- **Ensuring sufficient support for public health laboratories:** To properly function, public health labs need up-to-date equipment, testing agents, a highly-trained workforce and safety protections. Labs need appropriate resources to maintain their daily responsibilities as well as surge capacity to respond during major or new disease outbreaks. It is important to maintain the LRN-bio system to efficiently and cost-effectively be able to test and respond to threats, and maintain ongoing continuity of operations capabilities.
- **Developing and implementing plans to facilitate communication between the healthcare providers and systems and the public health system and labs:** As the health care system is reforming, it is essential to ensure that providers, including ACOs and other emerging types of models, have the ability to communicate with state and local public health laboratories.

## ONGOING PREPAREDNESS GAP: Health System Preparedness And Enhancing Surge Capacity

The ability of our healthcare system to quickly provide care for an influx of patients during an emergency is critical, but it is often identified as one of the most difficult components of a preparedness response.

During a severe health emergency, the healthcare system would be stretched beyond normal limits. Patients would quickly fill emergency rooms and doctors' offices, exceed the existing number of available hospital beds, and cause a surge in demand for critical medicines and equipment.

**The challenge of how to equip hospitals and train healthcare staff to handle the large influx of critically injured or ill patients who show up for treatment after or during a public health emergency remains the single most challenging issue for public health and medical preparedness.[263]**

In public health emergencies, such as a new disease outbreak, a bioterror attack, or catastrophic natural disaster, U.S. hospitals and healthcare facilities are on the front lines providing triage and medical treatment to individuals. In the best of times, however, most emergency rooms and intensive care units (ICUs) must confront bed shortages and staffing issues; in a mass casualty event — particularly a pandemic influenza or mass bioterror attack — the situation could quickly become out of control.

The HPP, which is part of the Office of the Assistant Secretary of Preparedness and Response (ASPR) at HHS, provides leadership and funding through grants and cooperative agreements to states, territories and eligible municipalities to improve surge capacity and enhance community and hospital preparedness for public health emergencies.[264] HPP builds capabilities in the areas of health system preparedness, health system recovery, medical surge, emergency operations coordination, fatality management, information sharing, responder safety and health and volunteer management. Through the planning process and cooperation within healthcare coalitions, facilities are learning to leverage resources, such as developing interoperable communications systems, tracking available hospital beds, and sharing assets such as mobile medical units. HPP was recently reauthorized in the Pandemic and All-Hazards Preparedness Reauthorization Act (PAHPRA, P.L. 113-5).[265]

However, there continue to be major gaps, particularly in plans for mass trauma events, which could overload the system, demand a surplus of equipment and staffing and even incapacitate part of the system itself. There has been increasing recognition that healthcare system preparedness models must extend beyond focusing on individual hospitals, since during times of emergencies a larger community, including multiple hospitals, providers and other government and community groups, need to work together to be effective. A number of independent assessments have encouraged moving toward a coalition-based model to better leverage resources, disseminate information, enhance credibility and broaden reach.[266, 267, 268] A healthcare coalition (HCC) is a collective network of healthcare organizations, and public and private sector partners that work together to prepare for, respond to and recover from a disaster. Since 2007, HPP has piloted a coalition-based model, and in 2012, launched new measures to move the full program toward a coalition approach. The new measures focus on continuity of operations, medical surge and healthcare coalition development assessment. HPP has worked with CDC to better coordinate and integrate preparedness programs to support communities and states toward the goal of having a baseline set of foundational capabilities in place that surge and emergency plans can build upon.[269]

## RECOMMENDATIONS: Enhancing Surge Capacity and Health System Preparedness

Health system preparedness capabilities have been one of the most persistent problems in public health preparedness and require increased agreement and implementation on crisis standards of care and improved integration of preparedness concerns into overarching healthcare systems and coordination across public health and healthcare providers. To help improve surge capacity concerns, TFAH recommends:

- **Continuing to modernize the Hospital Preparedness Program:** TFAH supports the move toward healthcare coalitions and updating of measures to reflect a capabilities-based approach. Within the context of shrinking resources, the Assistant Secretary for Preparedness and Response should:
  - Continue to prioritize coordination between the inpatient and outpatient health systems, including long term care facilities, and ensure that healthcare coalitions are reaching out to these partners;
  - Define a minimum set of standards that a healthcare coalition must meet to be considered effective. While HPP has avoided being overly-prescriptive with grantees, limited budgets demand that healthcare coalitions should meet a federally-defined standard for their ability to respond to a disaster;
  - Align HPP measures with other health system quality initiatives, such as CMS measures, Joint Commission standards and National Quality Forum (NQF) measures; and
  - Publicly report data from the recently revamped HPP measures so policymakers can track progress and gaps in the program.
- **Incorporating preparedness into the healthcare delivery system:**
  - CMS should work to expedite the release of emergency preparedness requirements for Medicare and Medicaid participating providers.[270] CMS and ASPR should work together to align those requirements and track progress.
  - Newly established federal and state healthcare marketplaces should begin planning for disasters. Exchange marketplace systems, using information provided by providers and insurers, should have the ability to operate and maintain key enrollment and coverage information in case of emergency. In addition, systems must be interoperable in a way that would permit sharing data across states if people are evacuated in large numbers.
  - Hospitals should incorporate community-wide disaster preparedness planning and community resilience into their community benefit work. For example, hospitals can integrate disaster plans for individuals dependent on electricity or medication into patients' discharge information.
- **Ensuring crisis standards of care planning is underway in localities and states:** In 2013, the Institute of Medicine issued *Crisis Standards of Care: A Toolkit for Indicators and Triggers*, a follow-up to its previously released framework for crisis standards planning. ASPR has also developed a Communities of Interest clearinghouse website with resources for planners. However, implementation has been limited at many local levels. Public health must take a leadership. as well as quality assurance role, to ensure health facilities and systems are engaging in meaningful crisis standards of planning. If necessary, the federal government should require such planning of PHEP and HPP grantees.

## ONGOING PREPAREDNESS GAP: Medical Countermeasures

The government is the only real customer for most medical countermeasure products, such as anthrax and smallpox vaccines. As a result of the lack of a natural marketplace, the U.S. government has invested in the research, development and stockpiling of emergency MCMs for a pandemic, bioterror attack, emerging infectious disease outbreak, or chemical, radiological or nuclear events.

Development of medical products for the nation's biodefense is a key piece of any public health emergency response. By preparing for a bioterror attack with adequate supplies of countermeasures that can be rapidly deployed and administered, the nation can effectively neutralize that threat. A successful domestic MCM enterprise will prepare the nation for new threats, expected or unexpected, by building the science, policy and production capacity in advance of an outbreak.

Congress enacted Project BioShield in 2004 to spur development and procurement of MCMs and under the Pandemic and All-Hazards Preparedness Act (PAHPA) of 2006 established and authorized the BARDA to speed up the development of MCMs by supporting advanced research, development, and testing; working with manufacturers and regulators; and helping companies devise large-scale manufacturing strategies. BARDA bridges the funding gap between early research and commercial production. The Special Reserve Fund of $5.6 billion was established to help guarantee a market for newly developed vaccines and medicines needed for biodefense that would not otherwise have a commercial market.[271, 272]

The Public Health Emergency Medical Countermeasures Enterprise (PHEMCE), created in 2006 by HHS, is made up of federal partners responsible for protecting the nation from the health effects associated with chemical, biological, radiological and nuclear (CBRN) threats, through the use of MCMs. In 2012, ASPR released a PHEMCE Strategy and PHEMCE Implementation Plan, which together provide the blueprint the PHEMCE will follow in the near, mid- and long-term to achieve its strategic goals, which include developing new MCMs, establishing clear regulatory pathways, developing operational plans for use, and addressing gaps—all while prioritizing investments in the most efficient ways possible — and plans for making sure new MCMs are available, distributed and used when needed in an incident.[273]

In August 2010, FDA launched a new Medical Countermeasures Initiative (MCMi) to improve the agency's efforts to minimize red tape, maximize innovation and maintain safety in its review and standards for the development of MCMs. At first the initiative was limited to preparing for responding to a flu pandemic, but in 2011, the project was expanded to address all vaccines and medications related to CBRN threats.[274, 275] Additional coordination with BARDA and private industry is essential to understand priorities and to find ways to improve processes to make them less burdensome on companies. Through the initiative, FDA is developing new scientific and analytic tools to speed the approval of lifesaving drugs and devices.

As of the end of fiscal year 2013, BARDA investments resulted in 80 to 90 new candidate products in the pipeline under advanced research and development and 12 products in the SNS. In 2013, under Project BioShield, BARDA exercised an option to procure additional doses of smallpox vaccine for individuals with HIV or atopic dermatitis to include all age ranges and nursing and pregnant women; maintaining preparedness levels for this MCM, took delivery of the first treatment courses of a smallpox antiviral, awarded contracts to maintain the current level of anthrax antitoxins, awarded contracts for cytokines to treat neutropenia associated with exposure to ionizing radiation and awarded a contract to procure midazolam to treat seizures associated with exposure to chemical agents. In addition, two products funded by BARDA under Project BioShield were approved by the FDA in fiscal year 2013: Raxibacumab, an anthrax antitoxin, and heptavalent botulinum antitoxin (HBAT). These are the first novel products approved/licensed under the FDA's "animal rule." Under advanced research and development BARDA has initiated new programs to support MCM development for candidate products for biodosimetry, biodiagnostics, antimicrobial resistance and biothreat pathogens, chemical, burns, blood products, sub-syndromes of acute radiation exposure (hematopoietic, gastrointestinal, lung and skin), and additional programs for anthrax and smallpox. BARDA has strategically invested the dollars available under the Special Reserve Fund, and in addition to procuring critical MCMs, has established a robust portfolio of candidate products under advanced research and development with the potential to transition to procurement in the future, addressing remaining preparedness gaps.

## STRATEGIC NATIONAL STOCKPILE

The SNS is a national repository of antibiotics, chemical antidotes and other medicines and medical supplies for use during a major disease outbreak, bioterror or chemical attack, or other public health emergency. The program focuses on responding quickly to a large-scale event in a large city or metropolitan area (where more than half of the country's population lives). The first line of support is "12-hour Push Packages," which contain over 50 tons of medicines, antidotes and medical supplies designed to provide rapid immediate help, even when the cause of an attack or event is uncertain. Push Packages are kept in secure warehouses across the country, ready for rapid deployment to a designated city or site. SNS also has further supplies, designed to arrive within 24 to 26 hours, if necessary.[276]

### SNS Contents

Quantities in the SNS change based on national planning guidance and prioritization, modeling scenarios, standard inventory management procedures and funding.

The SNS maintains a variety of critical pharmaceuticals and medical supplies such as antibiotics like ciprofloxacin and doxycycline, chemical nerve agent antidotes like atropine and pralidoxime, antiviral drugs, pain management drugs like morphine, vaccines for agents like smallpox and radiological countermeasures like Prussian blue and DTPA. In addition to pharmaceuticals, the SNS contains supportive care supplies like endotracheal tubes and IV supplies, burn and blast supplies such as sutures and bandages, ventilators, personnel protective equipment such as N-95 respirators and surgical gloves and other life-saving medical materiel.

During the H1N1 pandemic, the U.S. government distributed both antivirals and personal protective equipment from the SNS to state and local health departments. As of the most recent publicly available data in June 2010, the total quantity of antiviral drugs in the stockpile was 68 million treatment courses. CDC reports that the antiviral drugs, including pediatric formulations, have been replenished and increased.

PHEMCE is currently evaluating how to replenish supplies used during the H1N1 pandemic, including N-95 respirators and surgical masks, and will develop a strategy to address the gap that includes stockpiling goals.

The federal government also can work with partners in the public sector to strengthen the deployment of countermeasures. For instance, they worked with private pharmaceutical distribution companies and pharmacies to distribute vaccines during the H1N1 outbreak.

**Examples of Some SNS Contents:**

- Enough smallpox vaccine to protect every man, woman and child in America;
- Millions of regimens of countermeasures against anthrax;
- Therapeutic anthrax antitoxins to treat symptomatic patients;
- Millions of doses of the anthrax vaccine (AVA); and
- Hundreds of thousands of doses of countermeasures to address radiation exposure.

## RECOMMENDATIONS: Improving Research and Development of Medical Countermeasures

TFAH recommends that the United States place a higher priority on research and development of MCMs, including vaccines, medicines and technology. Policymakers must ensure that the public health system is involved in this process, from initial investment through distribution and dispensing. The nation's MCM enterprise could be advanced through the following activities:

- **Supporting the entire medical countermeasure enterprise, from initial research through dispensing:** The MCM enterprise must receive robust federal funding to ensure continuation of the pipeline, provide assurances to industry that the government will be a reliable partner in development and procurement of new products, and ensure products reach the intended recipients. As of FY 2014, the Project BioShield Special Reserve Fund (SRF) and supplemental funds from the H1N1 pandemic has expired. An anomaly in the FY2014 continuing resolution was necessary to allow BARDA to continue operations with existing HHS funds, but will only maintain the program until January 2014. The PHEMCE enterprise should receive additional, long-term funding, most notably no-year funding in the SRF for procurement, annual funding for advanced development at BARDA and the Strategic National Stockpile at CDC to enable storage and distribution of appropriate MCMs, and regulatory science in FDA's MCM initiative to promote safe pathways to approval for new products.
- **Improving leadership and accountability:** The MCM enterprise could benefit from a series of measures, including improved White House leadership and definition and coordination of roles and responsibilities, increased transparency of contracting and decision-making process at HHS, long-term funding, streamlined contracting process, and continued progress in creating clear regulatory pathways at FDA, as was recommend in a report by the Alliance for Biosecurity and MD Becker Partners.[277]
- **Developing an ongoing plan for maintaining and restocking the SNS:** Given limited budgets, PHEMCE must assess how it will prioritize restocking of expiring materiel and stockpiling new products for the SNS based on risk. The National Biodefense Science Board (NBSB) recently issued a statement recommending ways to improve and measure the nation's SNS by 2020, which included:[278]
  - Using science as a key strategy and management tool.
  - Moving to a single appropriation model to boost fiscal management.
  - Articulating an SNS vision for 2020.
  - Tailoring surge capacity.
  - Enhancing critical review processes.
  - Using cost-benefit decisions as management components.
  - Making greater use of computational modeling and simulation.
  - Recognizing SNS and BARDA as the sole purchaser and SNS as sole distributor of certain countermeasures.
  - Improving coordination among federal, state and local public health partners.
  - Applying lab science and animal models to guide SNS requirements.
- **Ensuring the development and availability of safe vaccines and medications for children:** The MCM enterprise should continue to prioritize adapting the use of medical countermeasures to ensure they are safe and effective for children. While some progress has been made to make sure there are safe options available for children, a 2013 GAO report found that 40 percent of SNS products have not been approved for pediatric use.[279] The federal government should set a goal to increase the development and procurement of pediatric medical countermeasures so that the right countermeasure, in the right dose and formulation, at the right time can be safely delivered to all children during an emergency.
- **Fostering public-private partnerships for distributing and administering vaccines and medications:** Federal, state and local health departments should partner with nongovernmental entities to develop the most efficient distribution and dispensing mechanisms for medical countermeasures. In some communities, private sector, healthcare, community-based or faith-based organizations may have better systems in place to reach target populations.

## ONGOING PREPAREDNESS GAP: Community Resilience

Ensuring communities can cope with and recover from emergencies is a significant challenge to public health preparedness, which includes dealing with major infectious disease outbreaks or disease threats that may arise in the wake of a disaster.

The most vulnerable members of a community, such as children, the elderly, people with underlying health conditions and racial and ethnic minorities, face special challenges that must be considered before disaster strikes.

The resilience of a community — including its ability to recover from disasters — is inextricably linked to the underlying health of that community and the basic, ongoing capabilities of that community's public health department or region. Without strong core capabilities, a public health department cannot be expected to meet additional demands that arise during emergencies. Dedicating and maintaining ongoing resources for these foundational public health capabilities, as measured in indicator one of this report, are tied to the ability of states and communities to be resilient in the face of unexpected and major threats.

Building community resilience is one of the two overarching goals identified by HHS in the release of the draft Biennial Implementation Plan for the National Health Security Strategy. It calls for fostering informed, empowered individuals and communities.

Establishing ongoing strong relationships between public health officials and the communities they serve and efforts to improve the overall health status of the community are both strongly tied to resilience.[280, 281] For instance, individuals who are obese or have poor kidney function can need different dose levels of medications, which can lead to worse health outcomes. Currently, two-thirds of Americans are overweight or obese.

Experts recommend that improving resilience, particularly among vulnerable populations, requires:

- Improving the overall health status of communities so they are in better condition to weather and respond to emergencies. Initiatives and programs supported by the Prevention and Public Health Fund's Community Transformation Grants can assist in these efforts;
- Providing clear, accurate, straightforward guidance to the public;
- Health officials developing ongoing relationships with members of the community, so they are trusted and understood when emergencies arise; and
- Engaging members of the community directly in emergency planning efforts.

To reach diverse communities, experts also recommend providing information through channels beyond the Internet, such as radio and racial and ethnic publications and television, and in languages other than English. In addition, idiomatic translations are important to reach specific cultural perspectives effectively, and messages should be delivered by trusted sources, such as religious and community leaders.

In 2013, HHS and DHS launched a beta version of a Community Health Resilience Initiative (CHRI). The CHRI is a public-private collaboration intended to provide stakeholders with resources and guidance to promote resilience in their communities.[282] CDC has also funded the development of a Community Resilience Index: Composite of Post-Event Wellbeing (CoPE-WELL), to develop a predictor of the ability of a community to prepare for, survive and rebuild from a disaster scenario.[283]

## RECOMMENDATIONS: Improving Community Resilience

Helping build healthier and stronger communities ensures they can cope with and recover from major outbreaks, health emergencies and other disasters more easily. TFAH recommends that improving community resilience should be a top priority for federal, state and local governments, including:

- **Supporting prevention and public health programs:** Prevention programs that help improve the health of communities, such as community resilience strategies, diabetes and obesity prevention efforts and infectious control programs, can decrease the vulnerability for infectious diseases by improving American's underlying health and can contribute to strategies to contain the spread of infections.[284] The Prevention and Public Health Fund (PPHF), the National Prevention Strategy (NPS), Community Transformation Grants (CTGs) and other programs focused on improving the health of communities, particularly targeting health inequities in lower-income communities and empowering those communities to actively engage their residents in improving the health of their neighborhoods, help all communities be better prepared to weather and recover in the aftermath of disease outbreaks and other health emergencies. The Prevention Fund was created by the ACA as the first mandatory funding stream "to provide for expanded and sustained national investment in prevention and public health programs to improve health and help restrain the rate of growth in private and public health care costs."[285] Community Preventive Services Task Force recommendations based on a review of effective prevention programs serve as the evidence base for CTGs and support the NPS.[286]
- **Including community resilience in emergency preparedness plans:** It is important for health officials to know and understand special needs and concerns in different areas of the community, particularly where there are high rates of poverty, high rates of seniors and children, high rates of chronic diseases, low community engagement, limited English proficiency and limited access to transportation. Health officials and emergency management officials must have plans and mechanisms in place to provide assistance to these neighborhoods in times of crisis, and members of these communities should be part of any emergency planning effort to ensure the needs and concerns of the public are heard and addressed. Federal partners must provide strong technical assistance to allow for the creation of models that can be adapted to meet the needs of specific communities across the United States.
- **Incorporating preparedness activities into the ongoing work of public health departments and other social services:** Supporting community health organizations and coalitions to address obesity, tobacco and other ongoing public health concerns helps forge relationships between the community and public health officials, which lays an important foundation for trust and communication during times of emergency. Having partnerships with other services, agencies and community groups, such as housing and faith-based organizations, also builds important channels for reaching and providing assistance to at-risk individuals and neighborhoods in times of crisis.
- **Prioritizing plans for protecting children:** Special efforts must be made to work with childcare centers and schools to coordinate and plan for emergencies. This should include ensuring all childcare facilities have appropriate disaster plans in place, and public health officials should work with parents, educators, schools and school systems to ensure every school has a plan in place, that plans are tested and to help teach children how to be prepared, such as having plans for how to reunify with teachers or parents.
- **Ensuring rebuilding efforts incorporate best practices for making the community even stronger:** As communities recover from a disaster, they should be rebuilt to maximize community resilience, health outcomes and social services. The IOM is beginning a relevant study, Post-Disaster Recovery of a Community's Public Health, Medical and Social Services, that should inform such an approach.

## Examples of Bioterror Threats

CDC classifies biological agents that could be used for an intentional bioattack into three categories:

- Category A, or "High-Priority Agents," is considered the most dangerous and includes: Anthrax, botulism, plague, smallpox, tularemia, and viral hemorrhagic fevers (e.g., Ebola, Marburg).
- Category B, or "Second-highest Priority Agents," includes food safety threats (e.g., *Salmonella* and *E. coli*), ricin toxin, Typhus fever, and viral encephalitis, among others.
- Category C, or "Third-highest Priority Agents" include emerging pathogens that could be engineered for mass dissemination in the future because of availability; ease of production and dissemination; and potential for high morbidity and mortality rates and major health impact. Hantavirus is an example of a Category C agent.[287]

Two threats that have been of high focus in U.S. bioterrorism preparedness strategies include:

- **Anthrax:** In September and October 2001, at least five envelopes containing Bacillus anthracis (anthrax) were mailed to Senators Patrick Leahy and Thomas Daschle and to members of the media in New York City and Boca Raton, Florida. After the bioterrorist attacks were identified, the Federal Bureau of Investigation (FBI) and the United States Postal Inspection Service (USPIS) formed a task force to investigate the crime. The investigation lasted seven years and was undertaken by FBI field offices in Miami, New York, Newark, New Haven, Baltimore and Washington, D.C. At the beginning of the investigation, the limitations on scientific analysis prevented the task force from finding the culprit because it was impossible to determine precisely from which spores the anthrax came.

At least 22 victims contracted anthrax, with five people dying from the infection. In addition, 31 people tested positive for exposure to anthrax spores. In all, 35 post offices and mailrooms were contaminated along with seven buildings on Capitol Hill in Washington, D.C. The investigation included over 600,000 investigator hours, 10,000 witness interviews, 80 searches and over 6,000 pieces of evidence. In addition, there were 5,750 federal grand jury subpoenas issued and 5,730 environmental samples collected from over 60 sites. The investigation cost $100 million. [288, 289]

Anthrax is a potentially lethal infection caused by the bacterium Bacillus anthracis. Outside of a host, this bacterium normally resides as a spore — a hardy, dormant cell that may become active (germinate) in the right conditions. Anthrax generally affects large grazing animals, but it can also infect humans who handle products of infected animals. However, deliberate exposure to aerosolized anthrax spores also is a highly effective means of transmission.[290] That is why anthrax is considered by many to be the ideal bioweapon. It is extremely stable and can be stored almost indefinitely as a dry powder. The costs of producing anthrax material are relatively low and knowledge about production is widely available and does not require high degrees of technology. According to DOD, anthrax is easy to weaponize and can be loaded, in a freeze-dried condition, in munitions or disseminated as an aerosol with crude sprayers.[291] Currently, detection of this anthrax is limited. In 1999, CDC classified anthrax as a Category A bioterrorism agent, which means it poses the highest level of threat to national security. However, unlike some other Category A agents (e.g. smallpox), anthrax does not spread from person to person, limiting the risk to those directly exposed in an attack.[292]

Historically, numerous nations have experimented with anthrax as a biological weapon, including the U.S. offensive biological weapons program that was disbanded in 1969.[293] The worst documented outbreak of inhalation anthrax in humans occurred in Russia in 1979, when anthrax spores were accidentally released from a military biological weapons facility near the town of Sverdlovsk, killing at least 66 people.

Much of the planning for the Cities Readiness Initiative has centered on planning for the ability to respond to a major anthrax attack in urban areas.

### Potential Economic Costs of an Anthrax Attack

- According to an article in the *Washington Post*, the clean-up from the 2001 anthrax attacks exceeded $1 billion.[294] A reported $42 million was spent to decontaminate the Hart Senate Office Building and other Capitol Hill offices, and it cost in excess of $200 million to decontaminate the postal facilities at Brentwood in Washington, D.C. and in Hamilton Township, New Jersey.[295] This does not include the cost of the public health response and laboratory testing of specimens around the country.
- According to a report in the *New York Times*, under a hypothetical scenario developed by DHS involving an anthrax attack, if terrorists were to spray aerosolized anthrax from a van in three cities initially, followed by two more cities shortly afterward, casualties could well exceed 13,000, and result in a loss of billions of dollars.[296] Other estimates are that anthrax could result in more than 13,000 deaths in a single city.
- According to a study by Towers Perrin Consulting, one anthrax attack in New York City could lead to $90 billion in workers' compensation losses, which would be three times greater than the entire $30 billion workers' compensation industry.[297]
- Risk Management Solutions (RMS), a leading risk consulting firm, believes an attack on downtown New York City could result in 173,000 casualties. In this scenario, anthrax is weaponized and dispersed in aerosol form, resulting in inhalation of anthrax by approximately one million people. RMS estimates economic losses of $91 billion from workers compensation alone.[298]

- **Smallpox:** Although WHO declared that smallpox was eradicated in 1980, this contagious and deadly infectious disease caused by the Variola major virus, remains high on the list of possible bio-terror threats.

The last naturally occurring case of smallpox was reported in 1977. Currently, there is no evidence of naturally occurring smallpox transmission anywhere in the world. Although a worldwide immunization program eradicated smallpox disease decades ago, small quantities of smallpox virus officially still exist in research laboratories in Atlanta, Georgia, and in Novosibirsk, Russia. There is a fear there may be other unknown sources of smallpox virus that could fall into the hands of terrorists. In January 2003, the Bush Administration declared smallpox the "number one bio-threat facing the country" and made planning for an attack a top priority.[299] The Administration launched a national smallpox vaccination initiative with the goal of immunizing 500,000 healthcare workers in 30 days and 10 million emergency response personnel within a year. Immunization rates fell well-below that target level with approximately 40,000 people actually vaccinated. The plan faced obstacles, including unexpected side effects, worker compensation issues, and liability concerns that precluded its full implementation.[300, 301]

ACIP and the Healthcare Infection Control Practices Advisory Committee (HICPAC) have developed recommendations for using smallpox vaccine in the pre-event vaccination program in the United States, including that:[302]

- Individuals designated by public health authorities to conduct investigation and follow-up of initial smallpox cases that might necessitate direct patient contact should receive the smallpox vaccine.
- Every state and territory should establish and maintain one smallpox response team.
- Each acute-care hospital should identify health-care workers who can be vaccinated and trained to provide direct medical care and management for the first smallpox patients requiring hospital admission. But, if possible, the smallpox vaccination program should include previously vaccinated health-care personnel to decrease the potential for adverse events.
- Persons administering smallpox vaccine in this pre-event vaccination program should be vaccinated.

# Food Safety

Annually, 48 million Americans suffer from foodborne illnesses. These illnesses send 128,000 people to the hospital and kill approximately 3,000.[303] Virtually all of these illnesses could be prevented if the right measures are taken to improve the U.S. food safety system.

Every year, approximately one million Americans who are stricken with foodborne illnesses will suffer from long-term chronic complications.[304] Foodborne illnesses take a high health and financial toll. For instance, *Salmonella* infections, which are responsible for an estimated $365 million in direct medical costs annually, have not decreased over the past 15 years and have increased by 10 percent recently.[305]

Foodborne diseases caused by major pathogens alone are estimated to cost up to $44 billion annually in medical costs and lost productivity.[306, 307]

Major outbreaks can also contribute to significant economic losses in the agriculture and food retail industries, which account for approximately 13 percent of the U.S. GDP and are the largest industries and employers in the United States.[308] Americans spend more than $1 trillion on food annually.

Through FoodNet, CDC tracks infections caused by the bacteria *Campylobacter, E. coli* O157, *Listeria, Salmonella, Shigella, Vibrio,* and *Yersinia*, and the parasites *Cryptosporidium* and *Cyclospora.*[309]

FOOD SAFETY

PROGRESS REPORT FOR 2012

| Disease Agents | Percentage change in 2012 compared with 2006–2008 | 2012 rate per 100,000 Population | 2020 target rate per 100,000 Population | CDC estimates that... |
|---|---|---|---|---|
| *Campylobacter* | 14% increase | 14.30 | 8.5 | For every *Campylobacter* case reported, there are 30 cases not diagnosed |
| *Escherichia coli* O157 | No change | 1.12 | 0.6 | For every *E. coli* O157 case reported, there are 26 cases not diagnosed |
| *Listeria* | No change | 0.25 | 0.2 | For every *Listeria* case reported, there are 2 cases not diagnosed |
| *Salmonella* | No change | 16.42 | 11.4 | For every *Salmonella* case reported, there are 29 cases not diagnosed |
| *Vibrio* | 43% increase | 0.41 | 0.2 | For every *Vibrio parahaemolyticus* case reported, there are 142 cases not diagnosed |
| *Yersinia* | No change | 0.33 | 0.3 | For every *Yersinia* case reported, there are 123 cases not diagnosed |

U.S. Department of Health and Human Services, Centers for Disease Control and Prevention

For more information, see http://www.cdc.gov/foodnet/

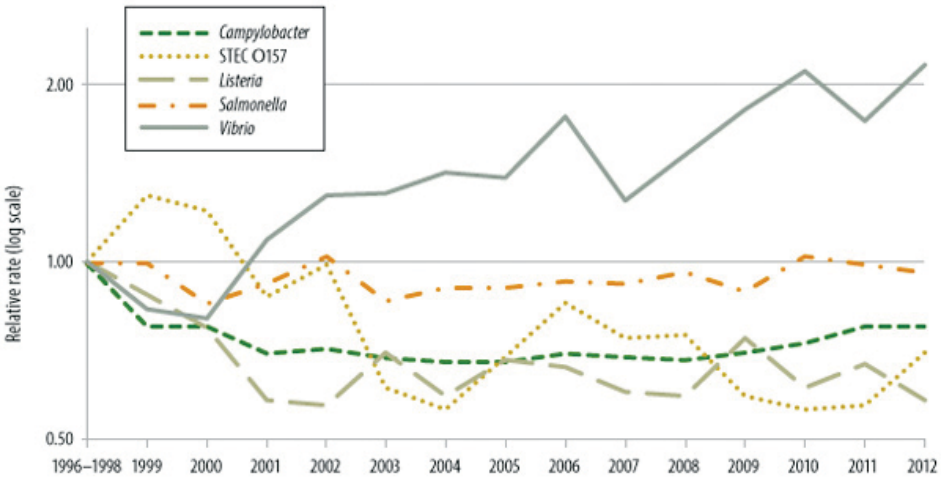
Preliminary FoodNet 2012 Data

In 2011 and 2012, Salmonella was the most common bacterial infection tracked by FoodNet, followed closely by *Campylobacter*, and *Campylobacter* infections have been on the rise in the last five years.[310] *Campylobacter* infections usually occur due to consumption of undercooked poultry, raw milk, produce and untreated water, as well as contact with young animals.[311] *Vibrio* infections are rare (0.41 cases reported per 100,000 population), but have increased by almost 50 percent since they were measured from 2006 to 2008.[312] They are often attributable to eating raw oysters, and specifically during warmer months when water contains more *Vibrio* organisms.[313] In a recent study, CDC reported on the types of food commodities that cause the most illnesses and deaths and found that produce causes the most illness (46 percent), but meat and poultry cause the most deaths (29 percent).[314]

According to another study by the Center for Science in the Public Interest (CSPI), 10 foods regulated by the FDA account for almost 40 percent of all foodborne outbreaks since 1990. The list includes 1) leafy greens; 2) eggs; 3) tuna; 4) oysters; 5) potatoes; 6) cheese; 7) ice cream; 8) tomatoes; 9) sprouts; and 10) berries.[315]

Norovirus is the leading cause of illness from contaminated food in the United States. During 2009-2010, norovirus was responsible for the largest number of outbreaks and outbreak-associated illnesses, similar to trends identified during the preceding decade.[316, 317] Foodborne norovirus outbreaks result most commonly from handling of ready-to-eat foods by infected individuals, but can also occur due to use of fecally-contaminated water during production.[318]

**Relative rates of laboratory-confirmed infections with *Campylobacter*, STEC* O157, *Listeria*, *Salmonella*, and *Vibrio* compared with 1996–1998 rates, by year — Foodborne Diseases Active Surveillance Network, United States, 1996–2012†**




* Shiga toxin-producing *Escherichia coli*.

† The position of each line indicates the relative change in the incidence of that pathogen compared with 1996–1998. The actual incidences of these infections cannot be determined from this graph. Data for 2012 are preliminary.

## 2013 Major Foodborne Illness Outbreak: Cyclosporiasis

*Cyclospora cayetanensis* is a parasite that causes an intestinal infection called cyclosporiasis. In 2013, CDC, FDA and state and local health departments investigated multi-state outbreaks of cyclosporiasis that included dozens of individual restaurant- or grocery store-associated clusters linked to fresh cilantro and a bagged salad mix, both imported from Mexico. A total of 631 cyclosporiasis cases from 25 states and New York City were identified as part of these outbreaks, from Arkansas, California, Connecticut, Florida, Georgia, Illinois, Iowa, Kansas, Louisiana, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, South Dakota, Tennessee, Texas, Virginia, Wisconsin and Wyoming.[319] Most of the illnesses occurred from June through July. Almost 10 percent of cases reported being hospitalized, but no deaths were reported.

## RECOMMENDATIONS: Fixing Food Safety

To improve food safety in the United States, TFAH recommends:

- **Fully funding and implementing the Food Safety Modernization Act:** Although the Food Safety Modernization Act passed in 2011, the White House has yet to finalize several key rules to implement the law, including preventive controls for human food, produce safety and a foreign supplier verification program.[320] Several of these rules are well past the statutory deadline for implementation. Congress and the Administration should also provide enough funding to FDA, CDC and relevant state agencies to be able to implement and enforce the law.
- **Improving inspection capacity:** There are insufficient resources to support enough inspectors for foods regulated by FDA, and there is not enough authority for FDA to have oversight over state and third party inspections.
- **Moving toward a unified government food safety agency:** The government currently does not have a coordinated, cross-governmental approach to food safety. Right now, food safety activities are siloed across a range of agencies, and many priorities and practices are outdated. As a first step, food safety functions should continue to be unified within the FDA, and a plan with a set timeline should be developed for how to restructure food safety functions across the federal government into a single, unified food safety agency to carry out a prevention-focused, integrated food safety strategy. This same type of coordinated, cross-governmental approach to food safety is also needed at the state level.
- **Improving surveillance of foodborne illnesses:** Currently, foodborne illnesses are radically underreported in the United States and the quality of reporting varies dramatically by state. New standards and requirements should be put in place to incentivize states to improve reporting and penalize states for underreporting. Surveillance for foodborne illness outbreaks should be fully integrated with other HIT systems, which will help improve tracking and identification of the scope of problems as well as sources of outbreaks. FDA and CDC should also have a plan for requiring clinics to send cultures from rapid response tests showing problems to public health labs to allow for subtype pathogen testing.
- **Preventing the tainting of food by environmental contaminants:** Measures should be implemented to prevent the tainting of food by environmental contaminants, such as untreated sewage or manure that enter waters and pollute crops downstream.

# HIV/AIDS, Viral Hepatitis and Tuberculosis Prevention

Even though they are largely preventable, HIV/AIDS, viral hepatitis and TB remain serious public health threats in the United States.[321] Misperceptions plague each of the diseases, which have taken away from the urgency and resources devoted to their prevention and control.

Millions of Americans are living with HIV/AIDS, hepatitis B and hepatitis C, but do not know they are infected. This not only puts them at risk by not receiving needed treatment, it puts them at risk for spreading the disease.

- **HIV/AIDS:** Over the years, successful treatment regimens for HIV/AIDS has led to complacency and feeling that the disease is largely under control, when the reality is that more than 1.1 million Americans are living with the disease, and of those, roughly one in five do not know they are infected.[322] The complacency has also contributed to an alarming rise in new infections among young gay men. In 2011, there were almost 50,000 diagnoses of new HIV infections.[323] Sixty-two percent of new infections were in men who have sex with men (MSM), even though they represent only around 2 percent of the total U.S. population.[324]
  - The risk is even more acute for gay men of color. Blacks represent nearly half (46 percent) of Americans living with HIV and 44 percent of new infections, but only constitute 14 percent of the total population.[325] In 2010, Black MSM accounted for almost as many new HIV infections as white MSM, despite their differences in population size. Young gay Black men (ages 13 to 24) were at the highest risk, accounting for the greatest number of new HIV infections (4,800 in 2010).[326]
  - Behavioral risks alone do not account for the disproportionately high new HIV infections among Black gay men. A review of 53 studies found that key risk factors were comparable or lower compared to white MSM. Other factors, such as the legacy of higher infection rates among Blacks in the earlier years of the epidemic, less frequent use of available treatment and higher rates of individuals who do not know they are infected (e.g. have not been screened for HIV), exacerbate the trends.[327]

- **Hepatitis B and C:** Around five million Americans have HBV or HCV, but between 65 percent and 75 percent do not know they have them.[328] As they age, they are at risk for developing serious liver diseases or cancer unless they receive treatment. Two-thirds of those with HCV are Baby Boomers and one in 12 Asian Americans has HBV.

- **Tuberculosis:** During the 1970's, TB cases had greatly declined (from more than 84,000 cases to just over 22,000). This led to a sense of complacency that allowed the deterioration of TB control programs."[329] However, the country experienced a resurgence of the disease in the mid-1980s and early-1990s with emergence of drug-resistant TB, HIV/AIDS and changing immigration patterns with more people arriving from countries with a high TB burden. Improvements in treatment, case finding, laboratory capacity, and infrastructure allowed the US to regain control from the resurgence, and cases again declined.

- **Overlapping Risks and Conditions:** According to CDC, HIV/AIDS, viral hepatitis, STIs and TB have some overlapping at-risk populations, including racial and ethnic minorities. Populations at-risk for HIV, viral hepatitis and STIs include MSM and injection drug users — and most STIs have similar prevention strategies. Persons at high-risk for TB include people born outside the United States, racial and ethnic minorities, persons experiencing homelessness, incarceration, substance and alcohol abuse and people who have weakened immune systems from HIV/AIDS, diabetes and other conditions. These diseases can also co-exist, contribute to the susceptibility of other diseases and worsen symptoms of diseases. For instance, of Americans living with HIV, 25 percent are also co-infected with hepatitis C and 10 percent are co-infected with hepatitis B, and HIV is one of the biggest risk factors for progression of TB, while TB accelerates HIV progression.[330, 331]

There is strong evidence that if the best practices for prevention were widely implemented, there could be sharp reductions in each of these diseases. However, the misperceptions that these problems are not as severe as they are — and a reluctance to invest in prevention strategies — leaves millions of Americans at continued and unnecessary risk. For instance, prevention through safe sex and condom use, syringe exchange programs and routine screening can help identify those in need of treatment and help prevent the additional spread of the diseases and ensure those who need treatment receive appropriate care and services.[332, 333] In addition, providing treatment to those who have HIV is one of the most effective ways to limit the continued spread of the disease to others.

| 33 states and D.C. cover routine HIV screening under their Medicaid programs (1 point). | | 16 states do not cover routine HIV screening under their Medicaid programs (0 points). One state declined to respond. | |
|---|---|---|---|
| Alaska | New Hampshire | Alabama | Michigan |
| California | New Mexico | Arizona | Mississippi |
| Colorado | New York | Arkansas | Nebraska |
| Connecticut | North Carolina | Florida | South Carolina |
| Delaware | North Dakota | Georgia | South Dakota |
| D.C. | Ohio | Indiana | Utah |
| Hawaii | Oklahoma | Iowa | Virginia |
| Idaho | Oregon | Maine | |
| Illinois | Pennsylvania | Maryland | Declined to respond: |
| Kansas | Rhode Island | | New Jersey |
| Kentucky | Tennessee | | |
| Louisiana | Texas | | |
| Massachusetts | Vermont | | |
| Minnesota | Washington | | |
| Missouri | West Virginia | | |
| Montana | Wisconsin | | |
| Nevada | Wyoming | | |

*Source: Kaiser Commission on Medicaid*

## INDICATOR 10: SCREENING FOR HIV/AIDS

**Key Finding: 33 states and Washington, D.C. cover routine HIV screening under their Medicaid programs.**

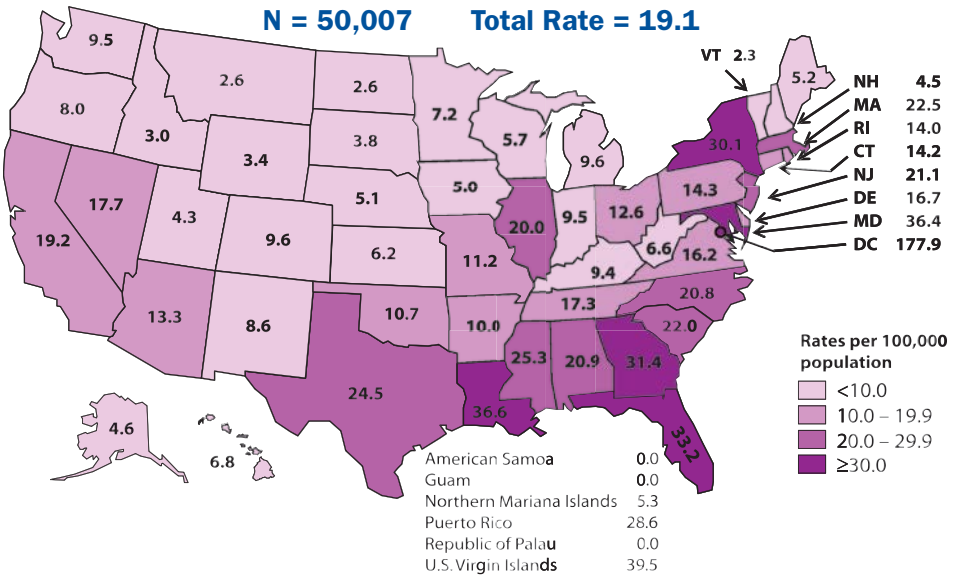
This indicator examines whether a state's Medicaid program covers routine HIV screening, which is recommended by CDC for all patients between the ages of 13 and 64.

According to a survey conducted by the Kaiser Family Foundation's Commission on Medicaid and the Uninsured, as of January 1, 2013, 33 states and Washington, D.C. reported coverage of routine HIV screening under their Medicaid programs, while 16 states reported coverage of testing only when it is considered "medically necessary."[334] (One state — New Jersey did not respond to the survey). States in the South were least likely to cover routine screening (50 percent, or 8 in 16), while over half of states in the Midwest did (58 percent, or 7 of 11). Western states were most likely to provide coverage (85 percent, or 12 of 13), followed by the Northeast (78 percent, or 6 of 9).

Screening is considered particularly important so individuals who may not know they are infected can receive treatment as soon as possible and take action to prevent spreading the infection to others. While CDC estimates that 18 percent of those who were HIV positive as of 2009 were unaware of their infection, the proportions were substantially higher among younger Americans. Lack of awareness among people ages 13 to 24 (59.5 percent) and 25 to 34 (28.1 percent) was particularly high.[336] An estimated 49 percent of new HIV infections are from the 20 percent of people living with HIV who are unaware of their infection.[337]

In 2006, CDC released screening guidelines recommending routine HIV screening in all healthcare settings for 13 to 64 year olds, unless a patient opts out. This is in contrast

## Rates of Diagnoses of HIV Infection among Adults and Adolescents, 2011—United States and 6 Dependent Areas




*Note.* Data include persons with a diagnosis of HIV infection regardless of stage of disease at diagnosis. All displayed data have been statistically adjusted to account for reporting delays, but not for incomplete reporting.

to "medically necessary" or targeted testing for those considered at higher risk. In addition, screening of pregnant women helps decrease the vertical transmission of infection. In 2013, the U.S. Preventive Services Task Force (USPSTF) gave routine screening of all Americans ages 15 to 64 an "A" rating, which means under the ACA, new group and individual plans, Medicare and Medicaid Expansion programs are required to provide the service without co-payment or cost-sharing.[338] This requirement, however, is not extended to the base Medicaid programs in states, so decisions about covering routine HIV screenings is left up to the states.[339]

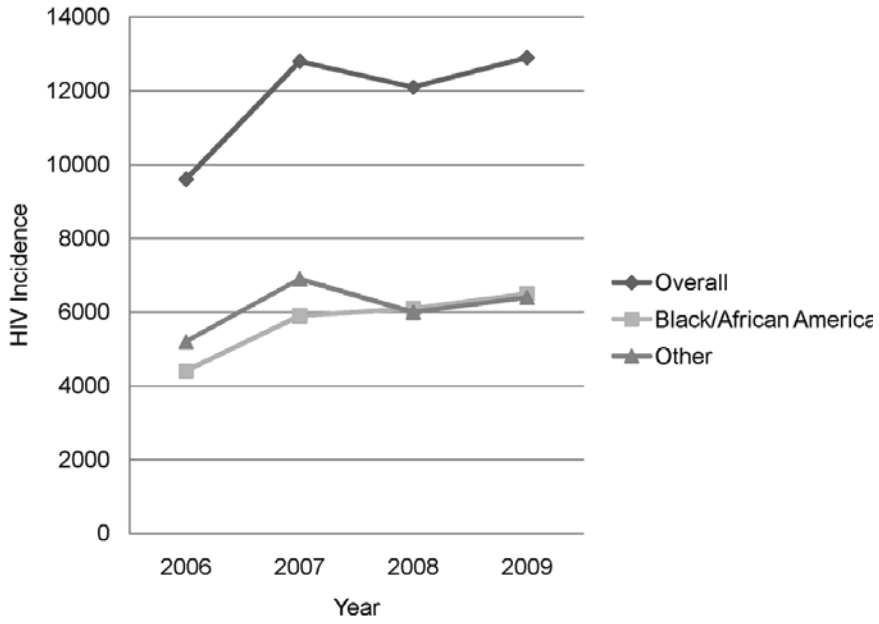
Experts believe that providing screening services for Medicaid beneficiaries is particularly important since these Americans include many of the lowest-income and most vulnerable in terms of quality of health and risk for HIV infection. According to a 2007 study, 20 percent of individuals diagnosed with HIV were already on Medicaid.[340]

HIV testing is the first step in the HIV care continuum. In order to assure best health outcomes, people living with HIV need to be engaged in care and treatment, with the goal of achieving viral suppression. When the HIV virus is suppressed, individuals are healthier and, quite importantly from a public health standpoint, are also less likely to transmit HIV. Nationally, CDC estimates that only 25 percent of those living with HIV are virally suppressed.[341] Jurisdictions where high rates of viral load suppression are achieved have seen declines in infection rates, in contrast to national trends.

In addition to expanding coverage of screenings for most insured Americans, the ACA made it illegal for insurers to deny coverage due to patients with pre-existing conditions — so insurers can no longer deny coverage or drop coverage for children and adults living with HIV/AIDS, and it also eliminated lifetime caps on insurance coverage, which has been a long-standing issue for HIV/AIDS coverage and treatment. In addition, the ACA helped expand coverage for a significant number of Americans living with HIV/AIDS

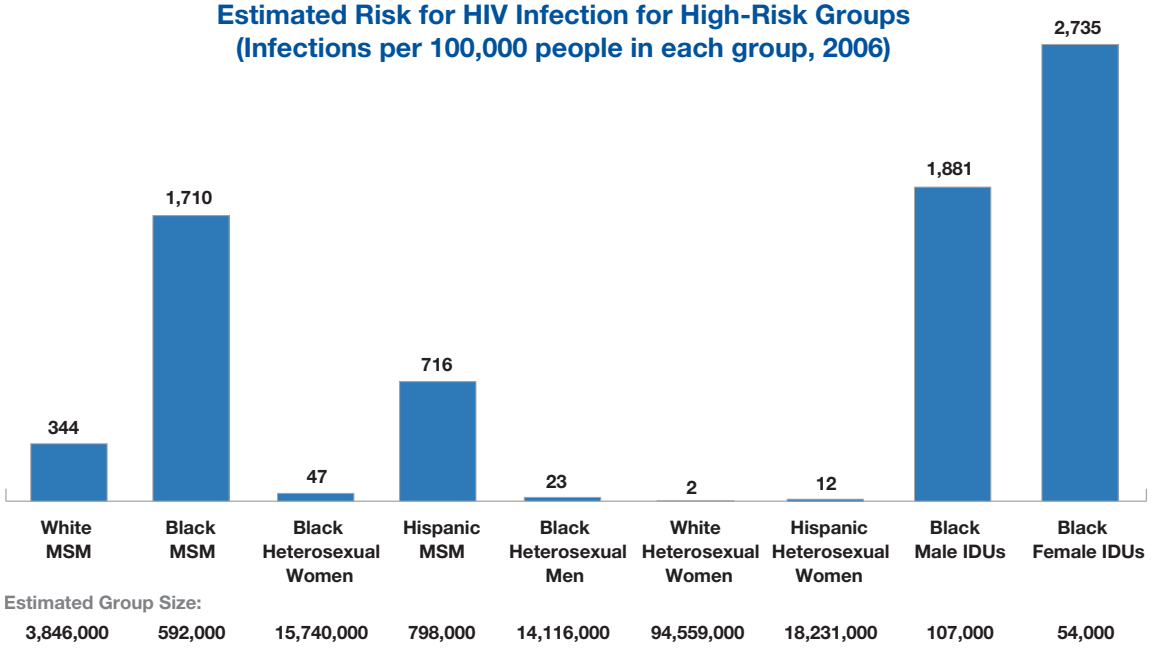
by allowing states to expand their Medicaid programs to cover all adults earning up to 133 percent of the federal poverty level in 2014. As of October 2013, 25 states and Washington, D.C. are participating in Medicaid Expansion.[342] The Health Resources and Services Administration (HRSA) which administers the Ryan White Program, a federal program that pays for healthcare and related services for uninsured and underinsured people living with HIV/AIDS, notes that many Ryan White patients will gain access to or see their current health insurance plans improve under the ACA, and is working on transition plans to ensure patients receive all available services and benefits.[343]

## HIV incidence among 13–29 year old men who have sex with men (MSM) overall and by race/ethnicity — United States, 2006–2009




Source: Prejean J, Song R, Hernandez A, Ziebell R, Green T, et al. (2011) Estimated HIV Incidence in the United States, 2006–2009. PLoS ONE 6(8): e17502. doi:10.1371/journal.pone.0017502 . http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0017502

## Estimated Risk for HIV Infection for High-Risk Groups (Infections per 100,000 people in each group, 2006)




Source: National HIV/AIDS Strategy for the United States. July 2010. Holtgrave, D., Johns Hopkins Bloomberg School of Public Health based on analysis of HIV incidence in the 50 states from MMWR, October 3, 2008, with the inclusion of HIV incidence for Puerto Rico, where all Puerto Rico cases were classified as Hispanic and taken from CDC's MMWR , June 5, 2009. Population sizes for 2006 are rounded estimates derived from analysis of the following sources: Statistical Abstract US, 2009; CDC estimate of 4% of men are MSM (MSM denotes men who have sex with men); The National Survey on Drug Use and Health Report, October 29, 2009; Brady et al., Journal of Urban Health 2008; and Thierry et al., Emerging Infectious Diseases, 2004.

## HIV/AIDS

Worldwide, an estimated 35.3 million people are living with HIV/AIDS, and over half of them are women.[344] And though the spread of the virus has slowed in some countries, it has escalated or remained steady in others. Since 1981, more than 25 million people have died due to AIDS (the most advanced stage of HIV). More than 2.3 million people were newly infected with HIV and 1.6 million died in 2012 alone.[345]

By damaging or destroying the cells of the body's immune system, HIV interferes with the ability to effectively fight off viruses, bacteria, fungi and neglected parasites that cause disease.[346] This makes individuals with HIV more susceptible to certain types of cancers and to opportunistic infections that the body would normally resist, such as pneumonia, TB and meningitis.

An individual can become infected with HIV in several ways, including unprotected sex; transfusion of infected blood; transmission through needle sharing or accidental needle sticks; re-use of syringes in a medical setting, especially where the medical infrastructure is lacking; or transmission from mother to child during pregnancy, delivery, or through breast feeding.[347] In rare cases, the virus may be transmitted through organ or tissue transplants or unsterilized dental or surgical equipment.

CDC, NIH, WHO, scientists, doctors and public health experts all over the world have been working to find ways to prevent and treat HIV/AIDS. There have been significant advancements in treatment and care, so people with access to treatment and proper medications are often able to live longer and with a better quality of life than ever before.[348] Despite research efforts, no vaccine exists to protect against HIV/AIDS, so efforts to curb the spread of the virus focus on prevention, treatment and education.

Some significant federal initiatives to combat HIV/AIDS include:

- NIH conducts ongoing research to advance treatments for HIV/AIDS and to try to develop a vaccine, microbicides, behavioral and social science prevention interventions and strategies to limit the spread of the disease through better treatment.[349]
- The Division of HIV/AIDS Prevention (DHAP) at CDC supports a range of prevention, control and surveillance programs.[350]
- In 1990, the Ryan White AIDS Resources Emergency Care Act (now the Ryan White HIV/AIDS Treatment Extension Act of 2009) was enacted as the largest federally funded program for people in the United States living with HIV/AIDS. The program has provided at least some level of care for around 500,000 Americans each year as a "payer of last resort" to fund treatment and support services when no other resources are available, including for drug therapy.[351]
- In 2003, the President's Emergency Plan for AIDS Relief (PEPFAR) was launched, committing $15 billion over five years to combat global HIV/AIDS. In 2008, PEPFAR funding was increased to $39 billion for five years, including $4 billion in funding to fight TB and $5 billion to malaria. In 2013, the one-millionth baby born HIV-free due to PEPFAR's efforts to curb mother-to-child transmissions was announced on the tenth anniversary of the program.[352] In 2012 alone, the program supported antiretroviral treatment for nearly 5.1 million

people and HIV screening and counseling for more than 49 million people in 15 target countries in Sub-Saharan Africa, Asia and the Caribbean.[353, 354]

- In 2010, a National HIV/AIDS Strategy was issued, focusing on domestic policies to reduce new HIV infections, increase access to care and improve health outcomes for people living with HIV, reduce HIV-related disparities and health inequities and achieve a more coordinated response to the HIV epidemic.[355]
- In 2013, President Obama issued an executive order creating an HIV Care Continuum Initiative within the United States "to be overseen by the Director of the Office of National AIDS Policy. The Initiative will mobilize and coordinate Federal efforts in response to recent advances regarding how to prevent and treat HIV infection. The Initiative will support further integration of HIV prevention and care efforts; promote expansion of successful HIV testing and service delivery models; encourage innovative approaches to addressing barriers to accessing testing and treatment; and ensure that Federal resources are appropriately focused on implementing evidence-based interventions that improve outcomes along the HIV care continuum."[356]

## HHS GUIDELINES FOR THE USE OF ANTIRETROVIRAL AGENTS IN HIV-1-INFECTED ADULTS AND ADOLESCENTS

HHS released an updated version of its Guidelines for the Use of Antiretroviral Agents in HIV-1-Infected Adults and Adolescents in 2012.[357] The major change is a recommendation for treatment of all people with HIV due to increasing evidence showing the harmful impact of HIV replication as well as evidence showing the effectiveness of anti-retroviral therapy (ART) preventing secondary transmission of HIV. Other updates to the recommendations include new sections on aging with HIV and drug costs, information on ART as prevention, and recommendations for use in HIV/HCV co-infected individuals.

ART is recommended for all HIV-infected individuals. The strength of this recommendation varies on the basis of pre-treatment CD4 cell count:[358]

- CD4 count < 350 cells/mm3
- CD4 count 350 to 500 cells/mm3
- CD4 count >500 cells/mm3

And, Regardless of CD4 count, initiation of ART is strongly recommended for individuals with the following conditions:[359]

- Pregnancy
- History of an AIDS-defining illness
- HIV-associated nephropathy (HIVAN)
- HIV/HBV co-infection

In 2013, Treatment Action Group (TAG) and the Foundation for AIDS Research (amfAR) released a Filling the Gaps in the U.S. HIV Treatment Cascade: Developing a Community-Driven Research Agenda, which includes recommendations and priorities for follow-up to end the AIDS epidemic, particularly focusing on the need "to develop a community-based agenda to improve implementation of effective service-delivery approaches and identify research priorities for improved management of HIV treatment and prevention, with a particular focus on filling the gaps in the United States HIV continuum of care (or treatment cascade)."[360]

## RECOMMENDATIONS: HIV/AIDS Prevention and Control

TFAH recommends that all state Medicaid programs should cover routine screening of HIV, regardless of risk (consistent with CDC and USPSTF guidelines). Knowing HIV status is important to help connect individuals with treatment and to help limit the spread of the disease. TFAH also recommends routine screening for other STIs as recommended by the U.S. Preventive Services Task Force.

In addition in 2012, TFAH and amfAR, The Foundation for AIDS Research, undertook a formal process to reconsider recent scientific and political developments to chart a new path forward for HIV prevention in the United States.[361] The committee included more than 50 leading national experts and was supported by the M·A·C AIDS Foundation. Given the particularly high risk and growing rates of infection among MSM, the group was challenged to redefine HIV prevention priorities among gay men by identifying interventions that were evidence-based, could be implemented in the near term and that took full advantage of recent legislative and scientific advances. Some key recommendations included:

- **Implementing traditional risk reduction efforts:** This includes 1) reducing HIV risk behaviors, particularly through condom use, and 2) learning HIV status since research shows that those who are aware of their infections engage in less risky behavior.[362] However, these interventions are essential, but are also "inherently limited."
- **Focusing on the overall wellness of gay men:** Programs must focus on improving the health and well-being of gay men generally, and specific interventions must help HIV-positive gay men learn their status, connect to appropriate healthcare services, stay in care and maintain treatment adherence and prevent transmission to others. Young gay men must be a priority. Particular focus is needed on behavioral health issues faced by gay men that affect HIV risk taking and adherence to treatment if HIV infected. These have been described as syndemics—co-occurring challenges that gay men (and others face), including high rates of mental health problems, substance abuse, stigma and other negative experiences.
- **Supporting "treatment as prevention" strategies:** Recent studies have shown that HIV-positive individuals with full viral suppression are far less likely to transmit HIV infection, while modeling studies have demonstrated the potential for "treatment as prevention" or "test and treat" initiatives in combination with other approaches to dramatically slow the HIV epidemic.[363] These strategies can only be successful if individuals know their HIV status and receive full treatment.

In addition, TFAH recommends:

- **Exploring the use of "pre-exposure prophylaxis" (PrEP) for high-risk individuals:** There is growing evidence that regular use of anti-retroviral drugs by those who are not infected with HIV can prevent transmission from an infected partner. Assuring adherence to a PrEP regimen and continued following of other risk reduction guidelines requires careful implementation of this approach.[364]
- **Reassessing sexual risk reduction guidelines in light of treatment as prevention and pre-exposure prophylaxis:** CDC should release revised guidelines to assist individuals in assessing their risk in the context of these new treatment and chemoprophylaxis approaches to match the most recent evidence-based epidemiological data.[365]
- **Coordinating prevention strategies and treatment when appropriate for HIV/AIDS, hepatitis and TB:** Since the at-risk populations often overlap for the conditions, it is important to coordinate strategies, surveillance and treatment programs for the conditions, which also helps more efficiently use available resources.
- **Removing the ban of use of federal funds for needle exchange programs as part of the next appropriations cycle — and support syringe public safety campaigns and syringe exchange programs:** There has been a recurring "rider" on the Labor, Health and Human Services, Education and Related Agencies appropriations bill since 1988. Omitting the ban in the next appropriations cycle would effectively repeal the ban. There should also be increased state, local and private support for syringe exchange programs and campaigns to inform the public about the effectiveness of syringe exchange programs for limiting the spread of HIV/AIDS, HBV and HCV, including for protecting first-responders and healthcare workers. Needle exchange programs have been shown to be one of the most effective, scientifically based methods for reducing these diseases and have been endorsed by leading scientific organizations, including the IOM; WHO; AAP; the American Medical Association (AMA); the American Nurses Association (ANA); and the APHA.[366, 367] Alternative approaches to needle exchange, such as disinfection and decontamination and outlawing the sale of needles, have been shown to be much less effective.[368] Many needle exchange programs often also work to target the underlying problems of drug use by providing and/or referring individuals to substance abuse treatment or other health and social services. Hundreds of scientific studies have been conducted that have found needle exchange programs can help to reduce HIV transmission and do not promote illegal drug use. There is also evidence that needle exchange programs do not increase unsafe disposal of unused syringes among participants in those programs.[369]

## Viral Hepatitis

Hepatitis — particularly hepatitis B and C — are silent epidemics in America. Nearly two percent of the U.S. population may have some form of the disease — and approximately five million of these individuals will develop a chronic from of the disease, but many of them will not even know they have a hepatitis infection for years or decades, often until it has caused significant, irreversible damage to their livers.[370]

Baby Boomers (born between 1945 and 1965) account for more than two-thirds of the 2.7 to 3.9 million Americans with HCV, but most of them do not know they have the disease, which they may have been infected with through infected blood contact when they were younger but may have not yet reached an age where it has progressed to recognizable symptoms.

Testing for HBV and HCV can help identify those who are infected but are not aware of it.

In 2013, the USPSTF recommended routine one-time HCV screening of individuals born between 1945 and 1965 for the first time, which means the test is now available to these individuals who are enrolled in new group or individual health insurance, Medicare or Medicaid Expansion programs with no cost-sharing.[371]

In the next decade, unless more individuals are identified at an earlier stage, the IOM estimates that 150,000 Americans could die from liver cancer or end-stage liver disease associated with HBV and HCV, and an independent Milliman report found total medical costs for HCV patients could more than double over the next 20 years — from $30 billion to $80 billion per year.[372, 373] Medicare would likely bear most of these costs, since individuals often live with the infection for years before they age into liver diseases and other symptoms.

Hepatitis is an inflammation of the liver. Symptoms of acute viral hepatitis can include fever, fatigue, loss of appetite, nausea, vomiting, abdominal pain, joint pain and jaundice. Individuals with acute or chronic hepatitis do not always show symptoms.

- **Hepatitis A:**[374] There were an estimated 2,700 cases of hepatitis A in the United States in 2011.[375] Hepatitis A is a highly contagious liver infection typically contracted from contaminated food or water or though contact with a contaminated individual who has not properly washed their hands after using the bathroom or changing diapers. Symptoms can range from very mild to very severe. A hepatitis A vaccination was introduced in 1995 and is recommended for all children, individuals traveling to certain countries, and other at-risk individuals.

### HEPATITIS A OUTBREAK—2013

As of September 20, 2013, 162 people have been confirmed ill from hepatitis A after eating 'Townsend Farms Organic Antioxidant Blend' in 10 states: Arizona, California, Colorado, Hawaii, New Hampshire, New Jersey, New Mexico, Nevada, Utah, and Wisconsin.[376] Seventy-one individuals have been hospitalized, and no deaths have been reported. The investigation is ongoing and CDC continues to track cases in all states and test specimens in order to determine if any other cases are related to this outbreak. In an effort to prevent more illness, at least three different products were recalled because of potential Hepatitis A contamination in June 2013.[377]

Hepatitis A is an acute liver disease lasting from a few weeks to several months, but does not lead to chronic infection. Hepatitis A is transmitted through ingestion of fecal matter, from person-to-person contact, including sexual contact, or ingestion of contaminated food or drinks. Hepatitis A can be prevented through vaccination, and due to the vaccine, rates of the disease are the lowest they have been in 40 years.

**150,000 Americans could die from liver cancer or end-stage liver disease associated with HBV and HCV in the next 10 years.**

- **Hepatitis B:**[378, 379] CDC estimates there are between 800,000 and 1.4 million individuals chronically infected with HBV in the United States and 65 percent of these individuals do not know they are infected. In 2007, there were at least 43,000 new infections, but CDC considers this to be an underestimate. Asian-Americans and Pacific Islanders account for 50 percent of chronic HBV cases.

It is typically spread through sexual activity, from a mother to a baby during childbirth, or direct contact with infected blood, such as during household sharing of razors or contact with cuts or wounds, through needle sharing, or exposure in a healthcare setting resulting from poor infection control practices. Currently an estimated 800 to 1,000 newborns are infected with HBV in the United States each year, and they are at the highest risk for developing chronic HBV and of having greatly increased risk of serious liver disease as they get older — around 90 percent of newborns who are infected with HBV during childbirth will develop a chronic infection unless they receive proper preventive care measures. If recommended screening, treatment and prevention practices were followed, it could eliminate maternal-child transmissions. For healthy young adults, about 5 percent of HBV infections develop into chronic HBV. It can lead to cirrhosis (scaring of the liver), liver cancer and other liver problems. Some patients end up needing liver transplants.

Since 1982, an HBV vaccine has been available. More than 90 percent of American children have been vaccinated for HBV — and the HBV vaccine has helped cut infection rates by around 80 percent, but approximately 10 percent of infants are still not vaccinated and many adults were not vaccinated because they came of age before it was available in 1982. Those Americans who came of age before the vaccine was widely available, along with Americans born to mothers who have the disease or are immigrants from other countries where the vaccine is not widely used are at risk for HBV. Seven medications have been approved for treating HBV. They often do not result in a full cure, but can significantly reduce liver damage particularly if treatment is started early. However, successful therapy of patients with advanced disease can prevent liver cancer, reduce the need for liver transplants and save lives.

- **Hepatitis C:**[380, 381] Between 2.7 and 3.9 million Americans are infected with HCV, but 75 percent of these individuals do not know they are infected. There were an estimated 17,000 new infections in 2007, but CDC considers this to be an underestimate. Seventy percent to 80 percent of people who contract an HCV infection develop chronic HCV. In addition to the disproportionate risk faced by Baby Boomers, Blacks account for 22 percent of HCV cases. Death rates have also been higher among Blacks than other ethnic groups. In 2011, Blacks died from HCV 91.6 percent more often than whites.[382]

It is typically spread through blood-to-blood contact, such as the reuse of contaminated drug injection equipment (needles, cookers, etc.) or through exposure in a healthcare setting resulting from poor infection control practices, or occasionally through sexual contact. Individuals who received blood transfusions or procedures before 1992, when blood started to be screened, may be at risk.

Medical complications can include cirrhosis (scarring of the liver), liver cancer and other liver problems. Some patients need liver transplants. HCV is the most common cause of adult liver transplants in the United States and worldwide. There is no vaccine for HCV. The treatment involves a combination of antiviral medications. Approximately 60 to 80 percent of patients respond to treatments initially (depending on genotype). Blacks only have a 28 percent success rate. New treatments have been recently introduced and more are expected in the next few years that are significantly less complicated and showing promising results, with success rates consistently over 80 percent with shorter, more easily tolerated treatment regimens, and these new treatment options also hold increased promise for closing the treatment response gap between Blacks and other groups.[383]

**2.7 to 3.9 million Americans are infected with HCV**

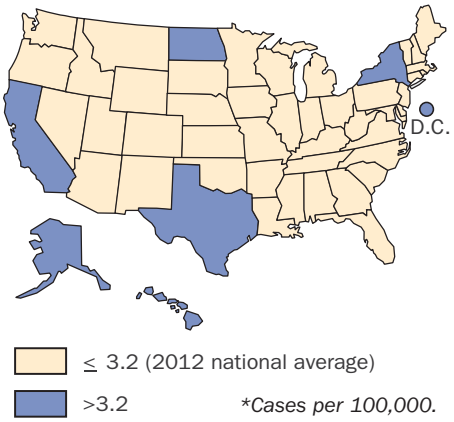
**75% don't know they are infected**

## RECOMMENDATIONS: Preventing and Controlling Viral Hepatitis

Health reform combined with new scientific advances provide the chance to dramatically improve hepatitis prevention, help identify people who do not know they are infected for earlier treatment and treat people in the most effective ways possible. TFAH recommends a comprehensive strategy be carried out to better prevent, control and treat hepatitis, including:

- **Promoting universal HBV vaccination:** HBV vaccinations have helped reduce rates of infection by around 80 percent, but around 10 percent of infants still do not get vaccinated, and adults who came of age before the vaccine was available in 1992 or were born abroad where the vaccine is not widely used should also be vaccinated.
- **Promoting hepatitis A vaccination for at-risk populations:** Americans traveling abroad to certain countries where hepatitis A is more prevalent, gay men, drug users and other at-risk populations should be routinely vaccinated against hepatitis A.
- **Improving surveillance:** The scope of the infections have long been underreported, which has hampered the ability to reduce the spread of the diseases, target treatment and generate support for needed research. A comprehensive surveillance system should be developed with the build out of electronic health records.
- **Making HBV and HCV screening routine:** HBV and HCV screening for at-risk groups, including Baby Boomers, as recommended by the USPSTF and HBV vaccination should be the standard of care in the reformed health system. Doctors and other healthcare providers should be educated about the at-risk populations, including the USPSTF recommendation to screen all Baby Boomers for HCV and the need to screen all pregnant women, Asian-Americans and other at-risk populations for HBV — and appropriate health measures should be taken to prevent perinatal transmission from infected mothers to their newborns. All newborns should receive their initial birth-dose of HBV vaccine within twelve hours of birth. Despite the screening guidelines and insurance coverage for screening at-risk groups, many of these individuals are still not actually being screened. A 2013 study of 1,578 patients born between 1945 and 1965 found that only 2 percent (31) of these Baby Boomers were screened for HCV.[384]
- **Ensuring everyone who is diagnosed receives appropriate care:** Every person diagnosed with HBV or HCV should have access to and receive a standardized level of care and receive support services.
- **Bolstering prevention campaigns and public awareness:** Strong public education campaigns and improved surveillance must be put in place to help prevent new infections.
- **Reducing disparities:** The National Medical Association studied the disproportionate impact of HCV among Blacks and supported a number of strategies to reduce the disparities including a Black-specific campaign to created awareness about the risks associated with HCV infections among Blacks and providing adequate education and training to providers of all races and ethnicities about racial disparities in HCV epidemiology, clinical course and treatment outcomes and barriers to care and treatment.[385]
- **Eliminating healthcare-associated HBV and HCV infections:** Infection control practices must be strengthened to reduce healthcare associated hepatitis infections.
- **Investing in biomedical, behavioral and health services research and development:** The investment in hepatitis-related biomedical and behavioral research must be significantly increased including support for understanding the differential response to treatment among certain populations, improving screening and diagnostic tools, and for new and better vaccines. Research support should be more proportionate to the public health threat associated with hepatitis.

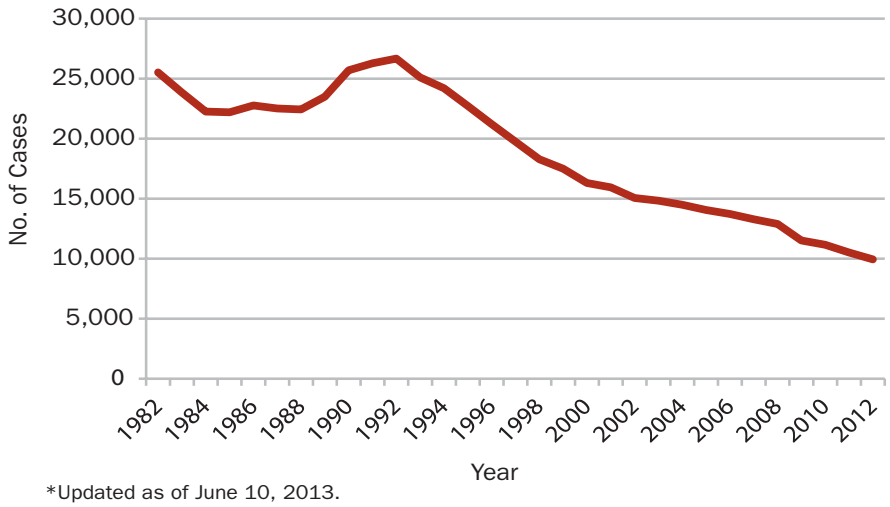
## TB Case Rates,* United States, 2012[386]




## Tuberculosis (TB)

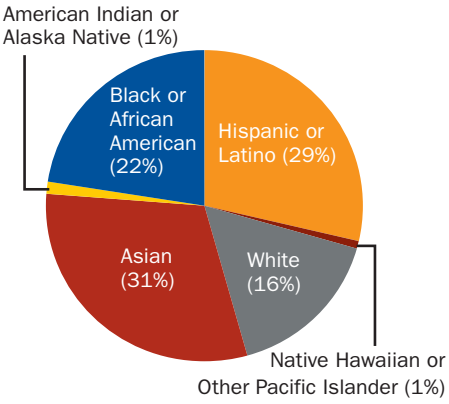
In the early 1980s, TB was thought to be well on its way toward elimination in the United States. In the mid-1980s, the country experienced a resurgence of the disease. Lax support for TB control programs, immigration from countries where TB is more common, the emergence of drug-resistant TB and cases among people with HIV/AIDS contributed to the resurgence.[389]

## Reported TB Cases United States, 1982–2012*[387]




*Updated as of June 10, 2013.

## Reported TB Cases by Race/Ethnicity,* United States, 2012[388]




*All races are non-Hispanic. Persons reporting two or more races accounted for less than 1% of all cases.

Increased resources and a concerted public health campaign helped lead to declines in TB from 1993 to 2012, but TB remains a threat. There were 9,945 TB cases reported in the United States in 2012 (3.2 cases per 100,000 people), with 63 percent of cases occurring in foreign-born patients.[390] Rates were highest among Asian Americans (18.9 cases per 100,000 people). Foreign-born persons and racial/ethnic minorities are disproportionately affected — new or reactivated infections among foreign-born persons in the U.S. were 12 times greater than among U.S.-born persons. The declining number of TB cases masks the increasing complexity of the cases being reported. There are high numbers of cases with co-morbid conditions (HIV/AIDS and other immune-compromising conditions), increases in multi-drug or extensively-drug resistant cases requiring longer, more toxic and more expensive treatment regimens and cases with significant socio-economic challenges.

TB is one of the leading causes of death and disability around the world. An estimated 8.8 million people globally develop active tuberculosis each year.[391] Approximately 1.4 million people die from TB each year, with 95 percent of those deaths occurring in developing countries. Around 1.1 million of the TB cases are among patients living with HIV/AIDS. The infection is common — about one-third of the human population is infected with TB, with one new infection occurring each second, but most cases of TB infection are not contagious. One in 10 people infected with TB bacteria develops TB cases.

Most strains of TB disease can be treated with drug therapy — usually treated with a regimen of drugs taken for six months to two years depending on the type of infection — but it is imperative that people finish the medicine, and take the drugs exactly as prescribed. If they stop taking the drugs too soon or do not take the drugs correctly, they can become ill again and the infection may become drug resistant.

ACIP and HRSA recommend routine TB testing for children at high risk for TB, but there currently is not a recommendation for routine screening for at-risk adults by ACIP, HRSA or USPSTF.[392]

People who are at-risk for TB include those who are uninsured, and people who are homeless, foreign-born, incarcerated or co-infected with other conditions. Prior to the ACA, states had the option of adding diagnosed TB patients to Medicaid.[393] The covered TB related services include: prescribed drugs, physician's services, lab and x-ray services, clinic and Federally Qualified Health Center services, case management services, and other services such as- services that were designed to encourage completion of outpatient regimens, including directly observed therapy (DOT) where healthcare professionals watch to make sure a patient is taking all of their treatment medication. DOT is the standard of care for TB. It is recommended by the AAP for all children with TB disease and for latent tuberculosis infection when feasible. Nine states have elected to provide this Medicaid waiver/expansion. There is receipt of matching federal dollars for treating these TB patients. However, even with the ACA in effect, there will be many individuals who are still uninsured or fall outside of the system of receiving routine medical care or attention, so there is a continued role for public health agencies to provide access to care and treatment, in addition to conducting surveillance, contact investigations, and outreach and education. In addition, the lengthy regimens and specialized care required to cure TB require a repository of expertise that is usually found in public health departments.

Legal issues can arise around TB treatment, such as the potential need to isolate patients to prevent the spread of the disease. CDC issued *Tuberculosis Control Laws and Policies: A Handbook for Public Health and Legal Practitioners* to help identify both the state's and individual's rights.[394] For instance, in some jurisdictions, patients with TB cannot be forced to undergo treatment, but they can be isolated or detained if they refuse treatment.[395] Some states have laws requiring DOT, where healthcare professionals ensure that the patient completes therapy by providing patient support, monitoring side effects and response to medication, sometimes providing incentives and enablers (food, transportation tokens, and housing).

Recent shortages of medications and antigen used in skin tests for diagnosing TB, budget cuts, and hiring freezes have impacted the capacity of state and local TB programs. For example, weakened programs may have difficulty conducting large, complex investigations to locate contacts to TB cases, test for and treat TB infection, and in some cases, provide treatment through DOT.

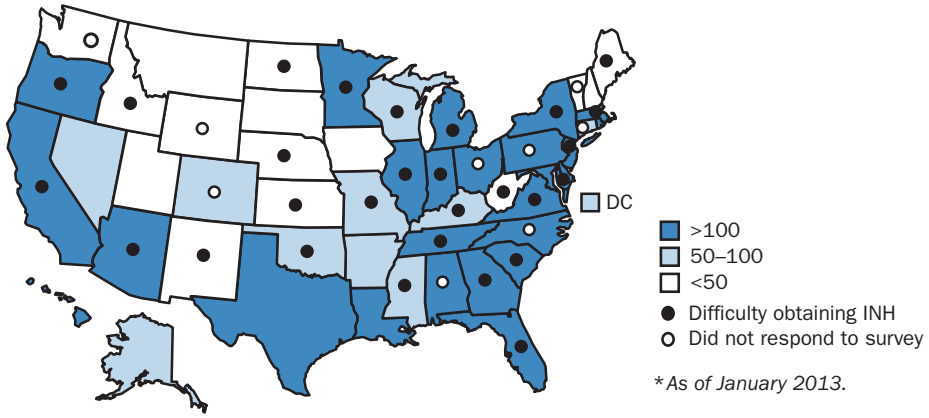
### • Shortage of Medications

In November 2012, the United States began to experience a severe decrease in the supply of isoniazid (INH), one of the four core drugs used to treat TB disease and the primary drug used to treat TB infection. The results of a nationwide survey showed that the INH shortage was interfering with patient care and could contribute to TB transmission in the United States. Results of the survey found that of the responding health departments:[396]

- 79 percent reported difficulties with procuring INH within the last month;
- 15 percent reported that they no longer had INH;
- 41 percent reported that they would no longer have a supply within one month of the survey;
- 69 percent were changing INH suppliers;
- 72 percent were prioritizing patients for treatment of latent TB infection;
- 68 percent were delaying latent TB infection treatment; and
- 88 percent were changing to alternative latent TB infection treatment regimens.

In April 2013, there was a nationwide shortage of Tubersol and Aplisol, the only FDA approved solutions for use in tuberculin skin testing (TST).[397] While it was anticipated that the shortages would last a few months, many states continued to report difficulties obtaining both Tubersol and Aplisol through November 2013.

**States reporting difficulty obtaining isoniazid (INH) during 2012–2013* and state tuberculosis case counts in 2011 — National Tuberculosis Controllers Association survey, United States[398]**




**As of January 2013.*

- **Rising costs**

- A new regimen of medication (rifapentine and INH) lasting only three months rather than the nine month treatment course is now available, which means an increase in costs. The new regimen has a higher completion rate among patients. Health departments, CDC, and drug companies are seeking the best way to assure access to the regimen.
- High costs also make it extremely difficult for TB programs to pay for the treatment of drug-resistant TB. TB programs in the U.S. identified cost as a leading challenge to obtaining medications for multidrug-resistant TB (MDR-TB) and extensively drug-resistant TB (XDR-TB). The average total cost of treating an individual with XDR-TB in the U.S. was $430,000.[399] And, in 2011 the price of capreomycin, a drug used for at least six months in the treatment of multidrug-resistant TB, doubled.[400]

- **Cuts to budget and staff**

- City and state TB programs are facing funding shortfalls from the local, state and federal levels. New York City's TB program, for example, will have its federal funding slashed by $2 million in 2013, on top of a $300,000 rescission from 2012.[401]
- A recent survey of TB control programs conducted by the National TB Controllers Association (NTCA) revealed that, as a result of reduced funding, 60 percent of the TB programs have eliminated staff and 25 percent have restricted some of the activities considered the core of TB public health efforts (provision of DOT for high-risk TB infection cases and pulmonary TB patients, contact investigations and capacity for outbreak response).

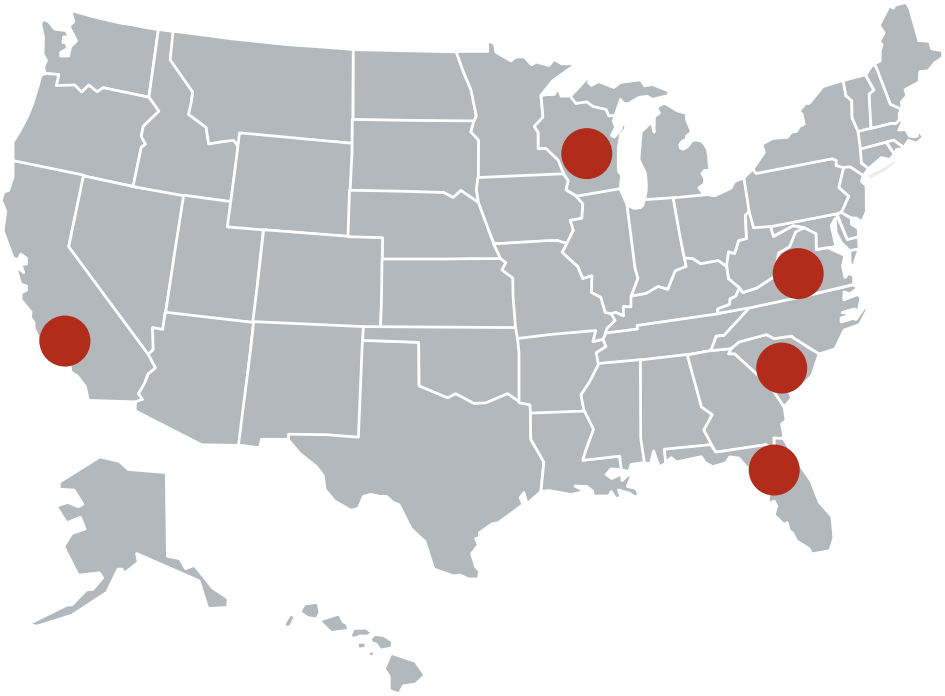
In addition, there are now drug-resistant forms of TB. TB can be resistant to a single drug or multiple-drugs. MDR-TB is caused by an organism that is resistant to at least isoniazid and rifampin, the two most potent TB drugs. These drugs are used to treat all persons with TB disease. XDR-TB is a rare type of MDR-TB that is resistant to isoniazid and rifampin, plus any fluoroquinolone and at least one of three injectable second-line drugs (i.e., amikacin, kanamycin, or capreomycin).

Because XDR-TB is resistant to the most potent TB drugs, patients are left with treatment options that are much less effective. XDR-TB is of special concern for people with HIV infection or other conditions that can weaken the immune system. These people are more likely to develop TB disease once they are infected, and also have a higher risk of death once they develop TB.

While cases of MDR-TB and XDR-TB are relatively infrequent in the United States, they are considered a serious public health threat. Between 1993 and 2011, 63 cases of XDR-TB have been reported.[402] While drug-resistant TB is generally treatable, it requires extensive chemotherapy (up to two years of treatment) with second-line anti-TB drugs that are more costly than first-line drugs, and which produce adverse drug reactions that are more severe, though manageable.[403] According to a recent CDC study, treatment for MDR-TB costs an average of $131,000, compared with $17,000 to treat drug-susceptible TB.[404]

A 2012 study of TB patients found drug-resistant TB was more common than previously thought — of 1,278 patients in Estonia, Latvia, Peru, Philippines, Russia, South Africa, South Korea and Thailand, nearly 44 percent of patients were resistant to at least one second-line drug and 6.7 percent had XDR-TB. Prior treatment with second-line drugs was the strongest risk factor for subsequent resistance—increasing the risk of XDR-TB by more than four times.[405]

**Recent TB U.S. Outbreaks**



## TB and Recent U.S. Outbreaks

TB is an airborne disease caused by infection with Mycobacterium tuberculosis. TB typically affects the lungs; however it also may affect any other organ of the body, such as the brain, the kidneys, or the spine.[406] There is a difference between TB infection and active TB disease, which makes people sick and can be spread to others.

Symptoms of active disease include cough, loss of weight and appetite, fever, chills, and night sweats as well as symptoms from the specific organ or system that is affected; for example, coughing up blood or sputum in pulmonary TB or bone pain if the bacteria have invaded the bones. TB germs spread when a person infected with active TB disease in the lungs or throat coughs or sneezes. As a result of this airborne transmission, TB can affect anyone, anywhere. However, people with active TB disease are most likely to spread it to people they spend time with every day, especially when they are interacting in a confined space with poor, or no, ventilation.

People with weakened or compromised immune systems — individuals with HIV disease, individuals with other immune-compromised conditions (diabetes, arthritis), those receiving chemotherapy, pregnant women, young children, including infants (under 12 months old)– are at a much greater risk for developing active TB disease. When these people breathe in TB bacteria, the bacteria settle in the lungs and start growing because the individual's immune system cannot fight the bacteria. In these people, TB disease may develop within days or weeks after the infection. It is usually treated with a regimen of drugs taken for six months to two years depending on the type of infection. It is imperative that people who have TB disease finish the medicine, and take the drugs exactly as prescribed. If they stop taking the drugs too soon or do not take the drugs correctly, they can become ill again and the infection may become more drug resistant.

Although rates of TB have been decreasing in recent years in the United States, there have been a number of TB outbreaks in 2012 and 2013.

- **Sheboygan, Wisconsin:** On April 11, 2013 a case of MDR-TB was diagnosed. The patient's family included children who attended the local high school and middle school. The Sheboygan County Department of Health and Human Services screened approximately 130 individuals and found nine cases of active TB.[407]
- **Greenwood County, South Carolina:** In March 2013, a physician in Greenwood County, South Carolina, reported a TB case to the Department of Health and Environmental Control. Because the patient worked at an elementary school, the public health investigation resulted in the screening of 1,364 individuals, 94 of whom tested positive for TB. Of these, 13 progressed to active TB and were placed on a standard TB treatment regimen. No cases of drug resistant TB were reported.[408]
- **Fairfax County, Virginia:** In June 2013, officials at the Fairfax County Health Department found three cases of TB at a Virginia high school. The first case was diagnosed in December, 2012, and two subsequent cases were diagnosed in June. Over 400 families were contacted by the health department for screening.[409]
- **Los Angeles, California:** Health workers identified almost 5,000 people who were probably exposed to a TB outbreak on downtown Los Angeles' skid row area. Eleven have died from 2007 through 2013, and 60 of the 78 cases were among homeless people who live on and around skid row.[410]
- **Jacksonville, Florida:** In April 2012, CDC issued a report to Florida health officials warning that Jacksonville was in the midst of the largest TB outbreak it had investigated in the U.S. in the last 20 years.[411] Nine days earlier, Governor Rick Scott had signed a bill to close A.G. Holley State Hospital—the state's only TB hospital.[412] The Duval County Health Department, Florida Department of Health and CDC conducted an investigation from February to March 2012, which identified 99 cases and 13 deaths since 2004 that were attributable to one TB strain. Of these 99 cases, 78 had a history of homelessness, incarceration, or substance abuse.[413] Researchers identified one homeless shelter, a jail and an outpatient mental health facility as the main points of TB transmission. Since the CDC investigation, state health officials have screened over 3,000 individuals who could have been exposed and have found 311 people who tested positive for TB infection and one with active TB.[414]

## RECOMMENDATIONS: Toward Eliminating TB in America

The resurgence of the disease is particularly troubling since TB is treatable, curable and preventable. TB, once largely controlled in the United States, disproportionally affects Americans living in poverty and those with HIV/AIDS who are at higher risk for the disease. Now there are antibiotic-resistant forms of the disease. TFAH consulted with a set of TB control experts to identify key recommendations for curbing a future resurgence of TB in the United States, which include:

- **Fully funding TB control programs:** The resurgence of TB in the mid-1980s shows the need for continued vigilance. TB control efforts require strong surveillance for individuals and clusters of the disease, infection control programs in communities with outbreaks and ensuring infected patients receive full and complete treatment, which is important not only for their care but for helping to limit the transmission of the disease. States should ensure routine screenings in correctional facilities and also require TB screening for international college students. Additionally, plans, procedures and sufficient fiscal resources should be in place to ensure the timely and coordinated management by the Immigration and Customs Enforcement, CDC, and state local health officials in order ensure proper care when TB-infected individuals transition from being a federal responsibility when they seek and are granted asylum.

- **Ensuring quality control in TB treatment:** Treating TB is an intensive and long process. It requires patients to take a full course of their medicine precisely as prescribed through DOT, and often requires providing wrap-around services for lower-income patients, particularly since they often need to be isolated for periods of time to stop the spread of the disease and are not able to sustain employment. Private healthcare providers and insurers should enter into contracts and arrangements with TB public health programs to refer patients to experts in TB care, since improper care can exacerbate the development of additional drug-resistant cases or forms of the disease or lead to the patient becoming ill again. Public health departments should be able to bill a patient's insurance company for direct service treatment costs.

- **Addressing the TB drug costs and shortages and biologics shortages:** The shortage of INH and biologics used to diagnose TB infection and the growing cost of TB treatment drugs is harming not only the care for individuals but also control efforts in states. Ensuring sufficient quantities and payment for drugs is essential to effective TB control. Finding new treatments for TB should be a priority. Ensuring adequate supplies of TB biologics (Tubersol and Aplisol) are essential for effectively monitoring TB outbreaks and diagnosing new infection. TB drugs and biologics should be added as essential resources to the Strategic National Stockpile.

- **Encouraging all states to participate in the TB Medicaid waiver/expansion:** All states have the option of being able to add all TB patients to their Medicaid program and receive federal matching support. As of 2013, there were nine states reported to be participating.[415]

- **Supporting routine screening of target high-risk groups:** CDC should work with the USPSTF to assess the value of routine screening of TB for target at-risk groups. If supported by the USPSTF, screening would be a mandated benefit offered to Americans with new group and individual plans and those covered by Medicaid expansion with no-copayments.[416]

- **Providing adequate federal, state and local support for TB prevention and control:** Some states have reduced or eliminated state contributions to the TB control program, relying exclusively on the federal monies provided by CDC. TB control is largely local and federal funding alone is not sufficient to control, and prevent, TB.

# CONCLUSION:

## Q&A with Tom Inglesby, MD, Chief Executive Officer and Director of the UPMC Center for Health Security.

**What are the infectious disease threats that, in your opinion, pose the greatest risk?**

There are a range of infectious disease threats that pose extraordinary risks. In no particular order, these would include:

- **Middle East Respiratory Syndrome (MERS)** is a virus that has killed nearly 40 percent of those known to be infected and is in 12 countries. However, we still don't have a good handle on how it spreads, and there is no treatment for it or vaccine against it. With the extensive travel between the Middle East and the United States, it is not unlikely we will see a case in the U.S. at some point.
- **A novel influenza virus.** The great concern would be the outbreak of a new influenza virus that maintains the ability to spread widely - like seasonal flu — but comes with a far higher mortality rate. The world hasn't seen this combination in a new flu strain in a long time. Our most recent new flu pandemic of 2009, H1N1, posed many challenges, but the overall case fatality remained relatively low. The most important new flu strain to appear this past year is H7N9, which has emerged in China. We have been fortunate that, up to this point, it hasn't developed a capacity to spread widely. Like MERS, H7N9 does not spread widely, but has had a high case fatality rate.
- **An accident involving a lethal engineered virus** that was altered to enhance lethality and/or the ability to spread rapidly. Recently, we have seen some scientists working on trying to confer transmissibility into lethal viruses, such as the H5N1 influenza strain. If there were an inadvertent lab accident or escape involving such a strain, this could have the potential to start an extraordinary and lethal epidemic.
- In terms of major global killers, **tuberculosis (TB)** is the most widely prevalent infectious disease in the world and there are increasing numbers of **drug resistant strains**. The level of drug resistance is growing and coping with this needs to be a real priority. **HIV**, too, is a national threat and a global scourge that continues to take a terrible toll with **antiviral resistance** also a serious problem.

- The rise of **antibiotic resistance**. Antibiotic resistance is finally getting recognized as the potentially grave problem that it is. However, many people are still unclear how widely and dangerous the consequences of antibiotic resistance could become. For example, if pathogens continue to develop multi-drug resistance to the most important antibiotics we use in hospitals, there could be a time where elective surgery (which requires effective antibiotics) might not be possible because the types of antibiotics that would allow for these minor surgeries would be ineffective. We need to step up our national and international efforts against antibiotic resistance.

- **Deliberate biological threats** are always on my list because of the feasibility and great consequences of even a small biological weapons event. In the event of a biological attack, we could have high levels of illness and fatality, communication troubles (in terms of getting information to the public) and a whole series of response challenges which could be very difficult for the public health and medical system to manage.

- Lastly, the rise of **mosquito borne illness** in the United States and the larger trend that is driving it: **change in climate**, which is allowing mosquitoes back into places where they haven't been for some time. Most notably and recently, we have seen a spike of West Nile Virus and sporadic, but increasing, cases of Dengue Fever. Dengue had been, for all intents and purposes, eliminated from United States, but is now back in the southern part of the country. We need to reinvigorate our strategy for mosquito control and the infectious diseases that come with mosquitoes.

**Where is the nation the weakest in preparing/responding to these threats? What are the country's greatest strengths?**

From a public health standpoint, an infectious disease outbreak must be responded to at the individual clinical level (the treatment of those who need medical care) and at the population level to contain or manage an outbreak and prevent more people from getting seriously ill.

On the public health side of that ledger, there are many components of public health response that we need to strengthen. For example, for some time, our vaccination programs were among the strongest in the world. But, in recent years, we are struggling with falling vaccination rates. Public health is a central part of solving this problem. Further, for a number of the infectious disease outbreak threats, we don't have a vaccine or therapy, nor do we have a diagnostic test that can tell whether the infectious disease is present in a person.

We have great losses in the public health workforce — more than 40,000 people in the last five years. Further, while the digital revolution is animating clinical care, it has not proceeded in the same way in the public health world. We don't have the connections between public health and medicine, which are

needed to identify and respond quickly to an emerging threat.

In terms of strengths, we do continue to have one of the best healthcare and public health systems in the world — we can build on these strengths to make good progress. We have a surge of new young people wanting to come into the field. People are motivated and eager to get engaged in the fight against infectious diseases.

There is some increased awareness in the country about infectious diseases and the dangers they pose. We went through a stage where some people declared infectious diseases over and dead, but people are realizing that's just wrong.

Globally, American scientists and health officials are working more closely with other governments around the world to try and get a handle on new outbreaks, provide assistance where it might be needed, and, treat and contain potential outbreak before it reaches the United States. Having these working relationships will be vital when new outbreaks emerge around the world in the time ahead.

### How can health reform improve public health response to infectious disease outbreaks?

One of the major goals of health reform has been to get more people covered by some form of insurance. When that occurs and people increasingly access preventive services, we can broaden vaccine coverage in places where it is needed. And, as more people having insurance should help remove a barrier to preventive care, it will also make public health funds available for other public health priorities, as they will no longer have to use scarce resources to cover vaccination programs.

When it comes to responding to an outbreak, health reform will reduce the barriers for potentially infected people getting medical care. When people develop a communicable infectious disease that can lead to an outbreak, one of the most important things they can do is get care. If someone has a highly contagious disease, it is important for them to be isolated at home or in the hospital, so the sooner a proper diagnosis is made, the sooner someone can be isolated and receive good care.

Lastly, reform will also change how healthcare institutions are compensated for their work. For example, hospitals are not going to be paid if a patient contracts a hospital acquired infection. By rewarding good patient outcomes instead of paying for services, there is an incentive for institutions to reduce hospital acquired infections and antibiotic resistance in their hospitals.

### How do science and technology need to operate differently to meet the current and future threats?

To prepare for and respond to infectious disease outbreaks, we need medicines, vaccines and diagnostics. Unfortunately, vaccines and medicines pose a challenge because there is no consumer market for them, meaning there is no market incentive for

companies to make a MERS vaccine, for example. A drug that treats hypertension has a clear and defined market. In the case of some of the most concerning infectious disease threats, government is the only customer.

Therefore, to make a vaccine or a therapeutic for many of these infectious disease threats, government needs to get involved, stay involved and provide consistent funding and support. The country needs better collaboration between government and the private sector on this. The Food and Drug Administration, Centers for Disease Control and Prevention and BARDA have been making headway on these issues in recent years. The challenge will be sustaining engagement with the private sector and operating in ways that overcome many of the roadblocks that have existed in this public-private partnership.

On new diagnostic technology, when it comes to figuring out ways to utilize advanced molecular techniques to discover infectious disease outbreaks, we have to be careful not to lose the great value we have in laboratory culture — which has been the gold standard. If you talk to people involved in public health, laboratory practice and outbreak response, one of their great worries is that we will move away from culture to rapid molecular techniques and lose all the information that we have gotten from laboratory culture. So as we develop new diagnostic approaches, we have to take that into account.

**What can Americans do to better protect themselves and what can they ask officials to do to better protect communities?**

There are a few commonsense things all families and individuals can do, starting with: getting vaccinated. People should follow the vaccination recommendations of the CDC and other public health organizations. Vaccination programs are born out of substantial research, resources and judgment — they are intended to save lives. It is public health's responsibility to educate Americans about the benefits and risks (which are minimal) of vaccines.

In addition, we all need to get better educated on antibiotic use and the trends around antibiotic use. For example, patients often put pressure on doctors for antibiotics even when antibiotics aren't needed and won't help. Unnecessary antibiotic usage is one of the main drivers of antibiotic resistance. The more people understand about antibiotics and the dangers of antibiotic resistance the better.

Americans can also go further and let their elected officials know that they support preserving antibiotics for illnesses that actually require them and not for animal use to promote growth. People should also tell legislators they want a strong public health and medical system that will help keep people safe from infectious diseases. These are the kinds of programs that tend to get eaten away as times get tough. These programs need to be continually supported if they are to be effective.

# State Public Health Budget Methodology

TFAH conducted an analysis of state spending on public health for the last budget cycle, fiscal year 2012-2013. For those states that only report their budgets in biennium cycles, the 2013-2015 period (or the 2012-2014 and 2012-2013 for Virginia and Wyoming respectively) was used, and the percent change was calculated from the last biennium, 2011-2013 (or 2010-2012 and 2011-2012 for Virginia and Wyoming respectively).

This analysis was conducted from August to October of 2013 using publicly available budget documents through state government web sites. Based on what was made publicly available, budget documents used included either executive budget document that listed actual expenditures, estimated expenditures, or final appropriations; appropriations bills enacted by the state's legislature; or documents from legislative analysis offices.

"Public health" is defined to broadly include all health spending with the exception of Medicaid, CHIP, or comparable health coverage programs for low-income residents. Federal funds, mental health funds, addiction or substance abuse-related funds, WIC funds, services related to developmental disabilities or severely disabled persons, and state-sponsored pharmaceutical programs also were not included in order to make the state-by-state comparison more accurate since many states receive federal money for these particular programs. In a few cases, state budget documents did not allow these programs, or other similar human services, to be disaggregated; these exceptions are noted. For most states, all state funding, regardless of general revenue or other state funds (e.g. dedicated revenue, fee revenue, etc.), was used. In some cases, only general revenue funds were used in order to separate out federal funds; these exceptions are also noted.

Because each state allocates and reports its budget in a unique way, comparisons across states are difficult. This methodology may include programs that, in some cases, the state may consider a public health function, but the methodology used was selected to maximize the ability to be consistent across states. As a result, there may be programs or items states may wish to be considered "public health" that may not be included in order to maintain the comparative value of the data.

Finally, to improve the comparability of the budget data between FY 2011-2012 and FY 2012-2013 (or between biennium), TFAH adjusted the FY 2012-2013 numbers for inflation (using a 0.9817 conversion factor based on the U.S. Dept. of Labor Bureau of Labor Statistics; Consumer Price Index Inflation Calculator at http://www.bls.gov/cpi/).

After compiling the results from this online review of state budget documents, TFAH coordinated with the Association of State and Territorial Health Officials (ASTHO) to confirm the findings with each state health official. ASTHO sent out emails on October 24, 2013 and state health officials were asked to confirm or correct the data with TFAH staff by November 8, 2013. ASTHO followed up via email with those state health officials who did not respond by the November 8, 2013 deadline. In the end, six states did not respond by December 3, 2013 when the report went to print. These states were assumed to be in accordance with the findings.

State Public Health Budget Methodology
*Appendix A*

APPENDIX B

# State Facts and Figures Summary *Appendix B*

| STATE FACTS AND FIGURES SUMMARY | | | | | |
|---|---|---|---|---|---|
| | Childhood Vaccination Rate 4:3:1:3:3:1:4 Series (2012) | Whooping Cough Vaccination Rate (4+DTaP) (2012) | HPV teen girls 3 doses (2012) | Flu Vaccination Rate 6 months + (2012-2013) | |
| Alabama | 71.0% (+/- 6.9) | 84.8% (+/- 5.9) | 31.1% (+/- 9.9) | 45.7% (+/- 2.3) | |
| Alaska | 59.1% (+/- 7.8) | 79.4% (+/- 5.8) | 31.4% (+/- 8.8) | 39.7% (+/- 2.5) | |
| Arizona | 69.1% (+/- 8.3) | 82.7% (+/- 5.8) | 36.9% (+/- 9.3) | 38.3% (+/- 2.3) | |
| Arkansas | 66.3% (+/- 7.5) | 79.8% (+/- 6.4) | 18.3% (+/- 7.2) | 47.0% (+/- 2.3) | |
| California | 65.3% (+/- 7.4) | 81.6% (+/- 6.6) | 35.8% (+/- 8.4) | 44.2% (+/- 1.8) | |
| Colorado | 65.6% (+/- 7.8) | 82.8% (+/- 6.7) | 38.0% (+/- 11.2) | 48.3% (+/- 1.5) | |
| Connecticut | 74.5% (+/- 6.3) | 91.3% (+/- 3.8) | 43.6% (+/- 10.5) | 46.5% (+/- 2.0) | |
| Delaware | 69.4% (+/- 7.1) | 90.9% (+/- 4.3) | 50.4% (+/- 10.2) | 51.3% (+/- 2.4) | |
| D.C. | 68.0% (+/- 7.7) | 90.7% (+/- 4.0) | 38.5% (+/- 9.7) | 47.4% (+/- 3.1) | |
| Florida | 70.3% (+/- 7.8) | 83.3% (+/- 6.5) | 25.3% (+/- 8.8) | 34.1% (+/- 2.0) | |
| Georgia | 75.0% (+/- 7.0) | 86.7% (+/- 5.2) | 29.0% (+/- 9.0) | 41.1% (+/- 2.0) | |
| Hawaii | 71.8% (+/- 6.8) | 87.9% (+/- 4.6) | 43.4% (+/- 9.7) | 54.3% (+/- 2.6) | |
| Idaho | 61.4% (+/- 8.0) | 76.6% (+/- 6.7) | 27.8% (+/- 8.2) | 37.8% (+/- 2.1) | |
| Illinois | 71.2% (+/- 5.2) | 85.3% (+/- 3.6) | 21.1% (+/- 6.3) | 43.1% (+/- 2.7) | |
| Indiana | 63.7% (+/- 7.7) | 76.8% (+/- 6.5) | 35.2% (+/- 9.1) | 42.2% (+/- 1.5) | |
| Iowa | 71.3% (+/- 6.4) | 88.2% (+/- 4.4) | 35.6% (+/- 9.3) | 50.4% (+/- 1.9) | |
| Kansas | 71.7% (+/- 6.9) | 79.0% (+/- 6.0) | 25.1% (+/- 9.3) | 40.7% (+/- 1.3) | |
| Kentucky | 75.1% (+/- 7.1) | 83.0% (+/- 5.4) | 34.9% (+/- 9.9) | 46.6% (+/- 1.9) | |
| Louisiana | 67.7% (+/- 8.3) | 77.8% (+/- 6.6) | 40.5% (+/- 9.0) | 47.1% (+/- 2.3) | |
| Maine | 69.5% (+/- 6.6) | 87.9% (+/- 5.1) | 41.8% (+/- 9.6) | 50.0% (+/- 1.8) | |
| Maryland | 71.5% (+/- 6.6) | 83.2% (+/- 6.2) | 30.9% (+/- 9.4) | 53.1% (+/- 2.1) | |
| Massachusetts | 70.8% (+/- 7.1) | 88.2% (+/- 4.5) | 43.0% (+/- 9.1) | 57.5% (+/- 1.6) | |
| Michigan | 71.8% (+/- 7.4) | 81.5% (+/- 6.7) | 32.2% (+/- 9.3) | 40.8% (+/- 1.5) | |
| Minnesota | 68.5% (+/- 7.7) | 84.2% (+/- 5.6) | 33.1% (+/- 9.9) | 52.5% (+/- 1.6) | |
| Mississippi | 76.0% (+/- 6.8) | 83.6% (+/- 6.4) | 12.1% (+/- 5.9) | 40.8% (+/- 2.1) | |
| Missouri | 62.5% (+/- 7.7) | 81.9% (+/- 7.0) | 34.5% (+/- 9.7) | 46.4% (+/- 2.2) | |
| Montana | 60.8% (+/- 7.4) | 86.6% (+/- 4.4) | 41.6% (+/- 10.1) | 41.7% (+/- 1.8) | |
| Nebraska | 72.5% (+/- 7.0) | 84.5% (+/- 5.2) | 37.3% (+/- 10.0) | 50.3% (+/- 1.7) | |
| Nevada | 63.4% (+/- 8.0) | 81.0% (+/- 5.5) | 37.2% (+/- 10.2) | 39.6% (+/- 3.7) | |
| New Hampshire | 75.8% (+/- 6.1) | 88.7% (+/- 4.7) | 34.5% (+/- 9.7) | 48.9% (+/- 2.2) | |
| New Jersey | 71.2% (+/- 6.4) | 84.7% (+/- 5.1) | 31.6% (+/- 8.5) | 45.3% (+/- 1.6) | |
| New Mexico | 68.0% (+/- 8.2) | 87.0% (+/- 4.9) | 30.3% (+/- 8.7) | 48.1% (+/- 2.1) | |
| New York | 61.5% (+/- 5.2) | 83.8% (+/- 3.5) | 39.7% (+/- 7.2) | 46.6% (+/- 1.8) | |
| North Carolina | 70.7% (+/- 8.0) | 85.9% (+/- 5.4) | 35.5% (+/- 9.5) | 50.1% (+/- 1.9) | |
| North Dakota | 74.3% (+/- 7.1) | 85.1% (+/- 6.2) | 40.9% (+/- 9.6) | 48.9% (+/- 1.9) | |
| Ohio | 67.6% (+/- 8.4) | 83.3% (+/- 6.0) | 31.9% (+/- 10.5) | 44.8% (+/- 1.7) | |
| Oklahoma | 60.7% (+/- 7.6) | 79.1% (+/- 6.0) | 38.4% (+/- 9.4) | 46.1% (+/- 2.2) | |
| Oregon | 68.4% (+/- 6.8) | 81.2% (+/- 5.8) | 38.6% (+/- 9.3) | 40.1% (+/- 1.9) | |
| Pennsylvania | 70.4% (+/- 5.2) | 80.1% (+/- 5.3) | 44.6% (+/- 8.2) | 46.2% (+/- 1.9) | |
| Rhode Island | 70.2% (+/- 6.5) | 89.0% (+/- 4.9) | 57.7% (+/- 10.0) | 56.7% (+/- 2.8) | |
| South Carolina | 69.7% (+/- 7.1) | 80.9% (+/- 6.0) | 26.6% (+/- 9.5) | 44.8% (+/- 1.9) | |
| South Dakota | 64.8% (+/- 7.2) | 79.2% (+/- 5.5) | 31.8% (+/- 9.3) | 56.7% (+/- 3.4) | |
| Tennessee | 74.6% (+/- 6.7) | 82.0% (+/- 6.0) | 28.6% (+/- 9.4) | 50.8% (+/- 2.4) | |
| Texas | 67.5% (+/- 4.1) | 77.4% (+/- 3.6) | 30.3% (+/- 5.3) | 43.7% (+/- 2.0) | |
| Utah | 71.2% (+/- 7.7) | 80.5% (+/- 6.6) | 24.1% (+/- 8.4) | 42.9% (+/- 2.1) | |
| Vermont | 66.5% (+/- 7.0) | 86.0% (+/- 5.0) | 46.2% (+/- 9.6) | 49.6% (+/- 2.0) | |
| Virginia | 72.8% (+/- 6.8) | 82.7% (+/- 6.6) | 27.9% (+/- 9.2) | 49.4% (+/- 2.1) | |
| Washington | 61.7% (+/- 8.4) | 84.0% (+/- 5.5) | 43.5% (+/- 9.8) | 47.5% (+/- 1.8) | |
| West Virginia | 61.9% (+/- 7.0) | 79.1% (+/- 6.8) | 36.1% (+/- 10.2) | 48.8% (+/- 1.9) | |
| Wisconsin | 73.3% (+/- 6.9) | 87.8% (+/- 5.3) | 37.5% (+/- 10.5) | 40.6% (+/- 2.5) | |
| Wyoming | 60.9% (+/- 7.9) | 79.4% (+/- 6.0) | 30.3% (+/- 8.7) | 39.2% (+/- 2.4) | |

| | Flu Vaccination Rate 18+ (2012-2013) | West Nile Virus Cases (2012) | Standardized Infection Ratio* for Centeral Line-associated Bloodstream Infections (2011) | Antibiotic Prescriptions per 1,000 (2010) | HIV Rate per 100,000 (2011) | Hepatitis A Rate per 100,000 (2011) | Hepatitis B Rate per 100,000 (2011) | Hepatitis C Rate per 100,000 (2011) | TB Rate per 100,000 (2012) |
|---|---|---|---|---|---|---|---|---|---|
| Alabama | 43.8% (+/- 2.5) | 62 | 0.694 | 1,079.6 | 17.6 | 0.2 | 2.5 | 0.5 | 2.8 |
| Alaska | 37.4% (+/- 2.9) | 0 | 0.716 | 510.7 | 3.7 | 0.6 | 0.4 | N/A | 9.0 |
| Arizona | 34.9% (+/- 2.7) | 133 | 0.575 | 732.5 | 10.9 | 1.2 | 0.2 | N/A | 3.2 |
| Arkansas | 42.3% (+/- 2.5) | 64 | 0.481 | 1,020.8 | 8.3 | 0.1 | 1.9 | 0.0 | 2.4 |
| California | 40.2% (+/- 2.0) | 479 | 0.565 | 554.6 | 15.8 | 0.5 | 0.4 | 0.1 | 5.8 |
| Colorado | 45.2% (+/- 1.6) | 131 | 0.587 | 611.0 | 8.0 | 0.4 | 0.4 | 0.5 | 1.2 |
| Connecticut | 41.2% (+/- 2.4) | 21 | 0.627 | 821.9 | 12.0 | 0.5 | 0.5 | 1.3 | 2.1 |
| Delaware | 46.8% (+/- 2.5) | 9 | 0.534 | 921.1 | 14.0 | 0.2 | N/A | N/A | 3.1 |
| D.C. | 42.4% (+/- 3.5) | 10 | 0.693 | 976.4 | 155.6 | N/A | N/A | N/A | 5.9 |
| Florida | 30.8% (+/- 2.2) | 73 | 0.540 | 706.1 | 28.4 | 0.5 | 1.1 | 0.3 | 3.5 |
| Georgia | 37.4% (+/- 2.2) | 99 | 0.816 | 853.0 | 25.7 | 0.3 | 1.4 | 0.5 | 3.6 |
| Hawaii | 50.0% (+/- 2.7) | 0 | 0.258 | 543.7 | 5.7 | 0.6 | 0.4 | N/A | 8.4 |
| Idaho | 35.5% (+/- 2.4) | 17 | 0.428 | 677.9 | 2.4 | 0.4 | 0.1 | 0.8 | 0.9 |
| Illinois | 40.2% (+/- 3.3) | 290 | 0.593 | 836.1 | 16.6 | 0.6 | 0.7 | 0.0 | 2.7 |
| Indiana | 38.8% (+/- 1.6) | 77 | 0.580 | 956.5 | 7.9 | 0.4 | 1.1 | 1.3 | 1.6 |
| Iowa | 49.7% (+/- 2.2) | 31 | 0.555 | 851.9 | 4.3 | 0.3 | 0.5 | 0.0 | 1.5 |
| Kansas | 39.0% (+/- 1.2) | 56 | 0.434 | 961.0 | 5.2 | 0.1 | 0.5 | 0.3 | 1.5 |
| Kentucky | 43.0% (+/- 2.0) | 23 | 0.718 | 1,196.9 | 7.9 | 0.2 | 3.5 | 3.2 | 1.8 |
| Louisiana | 44.1% (+/- 2.7) | 335 | 0.727 | 1,122.8 | 30.2 | 0.1 | 1.4 | 0.2 | 3.2 |
| Maine | 46.9% (+/- 2.0) | 1 | 0.989 | 654.5 | 4.5 | 0.5 | 0.6 | 0.9 | 1.3 |
| Maryland | 48.9% (+/- 2.2) | 47 | 0.670 | 758.1 | 30.6 | 0.4 | 1.1 | 0.6 | 3.8 |
| Massachusetts | 52.8% (+/- 1.8) | 33 | 0.562 | 797.7 | 19.2 | 0.6 | 1.0 | 0.3 | 3.2 |
| Michigan | 37.9% (+/- 1.6) | 202 | 0.362 | 907.0 | 8.1 | 0.7 | 0.9 | 0.3 | 1.5 |
| Minnesota | 50.3% (+/- 1.6) | 70 | 0.403 | 679.6 | 6.0 | 0.5 | 0.4 | 0.3 | 3.0 |
| Mississippi | 39.2% (+/- 2.4) | 247 | 0.606 | 1,137.0 | 20.7 | 0.2 | 1.9 | N/A | 2.7 |
| Missouri | 44.8% (+/- 2.5) | 20 | 0.468 | 932.1 | 9.4 | 0.2 | 1.0 | 0.1 | 1.5 |
| Montana | 40.6% (+/- 2.0) | 6 | 0.408 | 636.9 | 2.2 | 0.3 | 0.0 | 0.9 | 0.5 |
| Nebraska | 47.2% (+/- 1.8) | 193 | 0.610 | 935.9 | 4.3 | 0.3 | 0.7 | 0.1 | 1.2 |
| Nevada | 36.0% (+/- 4.7) | 9 | 0.577 | 637.4 | 14.6 | 0.2 | 1.1 | 0.4 | 3.0 |
| New Hampshire | 46.1% (+/- 2.5) | 1 | 0.640 | 619.2 | 4.2 | 0.0 | 0.2 | N/A | 0.7 |
| New Jersey | 39.1% (+/- 1.8) | 48 | 0.728 | 875.7 | 17.8 | 0.9 | 0.8 | 0.6 | 3.4 |
| New Mexico | 42.1% (+/- 2.4) | 47 | 0.523 | 689.7 | 7.1 | 0.3 | 0.5 | 0.7 | 1.9 |
| New York | 42.7% (+/- 2.2) | 107 | 0.837 | 840.9 | 25.5 | 0.6 | 0.7 | 0.3 | 4.4 |
| North Carolina | 47.8% (+/- 2.2) | 7 | 0.571 | 818.7 | 17.3 | 0.3 | 1.1 | 0.6 | 2.2 |
| North Dakota | 45.3% (+/- 2.0) | 89 | 0.373 | 950.5 | 2.2 | 0.0 | 0.0 | 0.0 | 3.7 |
| Ohio | 42.0% (+/- 1.8) | 121 | 0.472 | 874.1 | 10.6 | 0.3 | 0.8 | 0.1 | 1.3 |
| Oklahoma | 44.9% (+/- 2.4) | 191 | 0.514 | 854.3 | 8.8 | 0.3 | 2.6 | 1.4 | 2.3 |
| Oregon | 38.0% (+/- 2.2) | 11 | 0.384 | 556.9 | 6.7 | 0.3 | 0.8 | 0.5 | 1.6 |
| Pennsylvania | 41.2% (+/- 2.0) | 60 | 0.485 | 787.2 | 12.1 | 0.5 | 0.7 | 0.3 | 1.8 |
| Rhode Island | 50.2% (+/- 3.3) | 4 | 0.710 | 879.7 | 12.1 | 0.8 | N/A | N/A | 2.2 |
| South Carolina | 42.7% (+/- 2.2) | 29 | 0.706 | 880.5 | 18.4 | 0.2 | 0.8 | 0.0 | 2.6 |
| South Dakota | 53.4% (+/- 3.9) | 203 | 0.443 | 834.5 | 3.2 | 0.2 | 0.2 | N/A | 2.3 |
| Tennessee | 49.2% (+/- 2.7) | 33 | 0.699 | 1,159.4 | 14.5 | 0.4 | 3.0 | 1.3 | 2.5 |
| Texas | 39.2% (+/- 2.4) | 1,868 | 0.559 | 867.4 | 19.7 | 0.5 | 0.8 | 0.1 | 4.7 |
| Utah | 39.9% (+/- 2.4) | 5 | 0.673 | 791.0 | 3.3 | 0.3 | 0.4 | 0.4 | 1.3 |
| Vermont | 46.7% (+/- 2.2) | 3 | 0.246 | 626.5 | 1.9 | 1.0 | 0.0 | 1.0 | 0.6 |
| Virginia | 46.0% (+/- 2.2) | 30 | 0.700 | 768.6 | 13.6 | 0.4 | 1.0 | 0.3 | 2.9 |
| Washington | 44.4% (+/- 1.8) | 4 | 0.477 | 571.2 | 8.0 | 0.5 | 0.5 | 0.6 | 2.7 |
| West Virginia | 47.2% (+/- 2.2) | 10 | 0.460 | 1,177.7 | 5.7 | 0.4 | 6.1 | 2.5 | 0.4 |
| Wisconsin | 36.5% (+/- 2.9) | 57 | 0.574 | 715.8 | 4.8 | 0.1 | 0.3 | 0.3 | 1.2 |
| Wyoming | 37.2% (+/- 2.5) | 7 | 0.289 | 744.3 | 2.8 | 0.4 | 0.0 | 0.4 | 0.5 |

*The standardized infection ratio (SIR) is a summary measure and adjusts for the fact that each healthcare facility treats different types of patients. The SIR compares the actual number of HAIs in a facility or state with the standard population, adjusting for several risk factors that have been found to be most associated with differences in infection rates. An SIR significantly greater than 1.0 indicates that more HAIs were observed than predicted; conversely, an SIR of significantly less than 1.0 indicates that fewer HAIs were observed than predicted.

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