


2017

A Stinging Effect: The Legal Implications Biting into the Effects of the Zika Virus

Keanu Bader Mr
University of Central Florida

 Part of the [Administrative Law Commons](#), and the [Environmental Law Commons](#)
Find similar works at: <https://stars.library.ucf.edu/honorsthesis>
University of Central Florida Libraries <http://library.ucf.edu>

This Open Access is brought to you for free and open access by the UCF Theses and Dissertations at STARS. It has been accepted for inclusion in Honors Undergraduate Theses by an authorized administrator of STARS. For more information, please contact STARS@ucf.edu.

Recommended Citation

Bader, Keanu Mr, "A Stinging Effect: The Legal Implications Biting into the Effects of the Zika Virus" (2017). *Honors Undergraduate Theses*. 182.
<https://stars.library.ucf.edu/honorsthesis/182>

A STINGING EFFECT:
THE LEGAL IMPLICATIONS BITING INTO THE EFFECTS OF THE ZIKA
VIRUS

by

KEANU BADER

A thesis submitted in partial fulfillment of the requirements
for the Honors in the Major Program in Legal Studies
in the College of Health and Public Affairs
and in the Burnett Honors College
at the University of Central Florida
Orlando, Florida

Spring Term, 2017

Thesis Chair: Dr. Kathy Cook

ABSTRACT

People are afraid of contagious diseases. The thought that disease can spread throughout an entire population tends to make people wary of their interactions with their surrounding environment. Hearing about, or even seeing pictures of mosquitoes can make people squeamish or even stimulate an itch. Throughout the ages, the reaction to contagious diseases has been to quarantine and isolate. From the bubonic plague to the 1918 “Spanish” flu, the protocol was to quarantine those infected and isolate the rest. It may be this practice that inspired such precautions be taken by the public. Often these precautions are not warrantless and come to be second nature: Don’t get too close to sick people who appear to sneeze or cough often; cover your mouth when sneezing or coughing; wash your hands frequently.

In recent years, the world has encountered new outbreaks from not so new diseases: 2002 SARS. 2009 “Swine” Flu. 2014 both Measles and Ebola. 2016 Zika.

To the public, it seems that the next disease may strike at any moment. It is often the government’s duty to intervene and alleviate the damages. This thesis examines the legal aspects of the Zika virus and how past regulations have affected the spread of contagious diseases. In addition, it will examine past outbreaks of different diseases: how the country reacted, what policies were enacted, and how they relate to the current case of the Zika Virus.

TABLE OF CONTENTS

Introduction	1
History and Overview of the Zika Virus	7
Transmission and Clinical Implications	10
Animals	14
Current State of The Zika Virus	15
How Climate Change Has Prompted the Spread of Mosquitoes	17
Existing Laws on Controlling Disease	20
Controlling Outbreaks	21
The Spanish Flu of 1918	25
Local Law	28
United States Emergency Powers	29
Contagious Carriers – Aviation	32
International Authorities	35
Applicable Case Law	39
Environmental Case Law	39

Constitutional Case Law	42
Religious and Cultural Implications and the Treatment of Corpses	44
Political Implications	48
Prevention Methods	51
Mosquito Control and Surveillance	51
Vaccines	53
Genetically Modified Organisms	56
Powered by Congress – The University of Central Florida	58
Proposed Laws	59
Notice for Proposed Rulemaking and New CDC Powers	59
Conclusion	62
Recommendations and Proposals	62
Areas of Future Research.....	66
Bibliography	69

TABLE OF FIGURES

FIGURE 1	9
FIGURE 2	17

INTRODUCTION

This thesis presents an analysis of the legal implications that the Zika virus brings into play. Within this analysis are four central recommendations which act as the drivers for change in quarantine law authorities. The first recommendation is a change of ideology: the need to be proactive rather than reactive. If a problem is imminent and a solution is both available and viable, why let the problem escalate? The second and third recommendations call for legal reforms on both the national and international levels. A major driver in change for national authority is through United States federal government funding. This thesis will examine the resources available to the federal and state governments and recommend which is the most effective means to combat the Zika virus. Conversely, there is a lack of international authority since many policing powers available to the United States authorities are not available to international authorities. This thesis will inspect the powers that international authorities do have and whether they have been effective in past outbreaks. The fourth and final recommendation is to keep the general public informed. The public's reaction to an outbreak is often important as a calm and informed public in addition to proper regulations can greatly mitigate the effects of an outbreak.

Prior to addressing any issues, it is important to first define terms that will be used throughout this thesis:

- **Disease** - “A condition of the living animal or plant body or of one of its parts that impairs normal functioning and is typically manifested by distinguishing signs and symptoms”¹
- **Communicable Disease** - “A communicable disease is one that is spread from one person to another through a variety of ways that include: contact with blood and bodily fluids; breathing in an airborne virus; or by being bitten by an insect.”²
- **Virus** - “A microorganism that is smaller than a bacterium that cannot grow or reproduce apart from a living cell.”³
- **Vector** - “Vectors are living organisms that can transmit infectious diseases between humans or from animals to humans. Many of these vectors are bloodsucking insects...”⁴ An example would be the mosquito, the best known vector.⁵

¹ (n.d.). Disease | Disease Definition by Merriam-Webster. Retrieved April 6, 2017, from <https://www.merriam-webster.com/dictionary/disease>

² "Communicable Disease - ACPHD." <http://www.acphd.org/communicable-disease.aspx>. Accessed 26 Mar. 2017.

³ (n.d.). Medical Definition of Virus - MedicineNet. Retrieved March 23, 2017, from <http://www.medicinenet.com/script/main/art.asp?articlekey=5997>

⁴ (n.d.). WHO | Vector-borne diseases. Retrieved April 3, 2017, from <http://www.who.int/mediacentre/factsheets/fs387/en/>

⁵ Id.

- **Outbreak** - “A disease outbreak is the occurrence of cases of disease in excess of what would normally be expected in a defined community, geographical area or season. An outbreak may occur in a restricted geographical area, or may extend over several countries.”⁶ An outbreak can last from a couple days to many years.
- **Pandemic** - “Worldwide spread of a new disease.”⁷ Note the key word here being “worldwide”. In essence, every pandemic is an outbreak, not every outbreak is a pandemic.
- **Preemption** - Friction between state and federal law, when federal law displaces state law under the Supremacy Clause of the United States Constitution.⁸
- **Federal Administrations** - Through years of technological innovations, “Congress deemed it appropriate to delegate the details of administering laws to protect the public or enhance fairness to executive departments or independent regulatory agencies.”⁹ An example of such agency is the Environmental Protection Agency.

⁶ (n.d.). WHO | Disease outbreaks. Retrieved March 23, 2017, from http://www.who.int/topics/disease_outbreaks/en/

⁷ (2010, February 24). WHO | What is a pandemic?. Retrieved March 23, 2017, from http://www.who.int/csr/disease/swineflu/frequently_asked_questions/pandemic/en/

⁸ (n.d.). Preemption | Wex Legal Dictionary / Encyclopedia | LII / Legal Retrieved March 25, 2017, from <https://www.law.cornell.edu/wex/preemption>

⁹ (2016, December 12). Federal Administrative Law: A Brief Overview. Retrieved March 25, 2017, from <http://www.llsdc.org/federal-administrative-law-a-brief-overview>

- **Policing Powers** - It is under the 10th amendment of the United States Constitution that the states are delegated rights not given to the federal government. This gives the states the power to “establish and enforce laws protecting the welfare, safety, and health of the public.”¹⁰
- **Quarantine Law** - In this thesis “Quarantine law” will be a blanket term for all laws and regulations pertaining to the control of Communicable diseases. This often includes quarantining, isolating, reporting, standards of medical examination, and the movement of people.
- **Interstate Commerce** - Commercial transactions occurring between more than one state.
- **Corpse** - A dead body.
- **Justiciability** - “The types of matters that the federal courts can adjudicate. If a case is ‘nonjusticiable’ a federal court cannot hear it.”¹¹
- **Standing** - A doctrine of justiciability, “Capacity of a party to bring suit in court.”¹²
Factors included in this are whether a party sustained or will sustain direct injury

¹⁰ (n.d.). police powers | Wex Legal Dictionary / Encyclopedia | LII / Legal Retrieved April 19, 2017, from https://www.law.cornell.edu/wex/police_powers

¹¹ (n.d.). Justiciability | Wex Legal Dictionary / Encyclopedia | LII / Legal Retrieved March 25, 2017, from <https://www.law.cornell.edu/wex/justiciability>

¹² (n.d.). Standing | Wex Legal Dictionary / Encyclopedia | LII / Legal Retrieved March 25, 2017, from <https://www.law.cornell.edu/wex/standing>

and that the injury can be remedied by law.¹³

- **The Political Question Doctrine** - A doctrine of justiciability, “Courts should not hear cases which deal directly with issues that [the] Constitution makes the sole responsibility of the other branches of government.”¹⁴
- **Vaccines** - A vaccine “produces immunity from a disease and can be administered through needle injections, by mouth, or by aerosol.”¹⁵ In addition, a vaccination is “the injection of a killed or weakened organism that produces immunity in the body against that organism.”¹⁶ This results in immunization or “the process by which a person or animal becomes protected from a disease.”¹⁷

Part I of the thesis provides relevant background information on Zika. The virus’ origins, clinical implications, and a brief introduction of its cousin viruses. Part II focuses on legislation and governmental powers relating to disease control. Much of this section will be dedicated to the powers of the governmental agencies, Federal statutes, and Constitutional law cases. Part III covers relevant case law. This section examines cases relevant both directly and indirectly to an analysis of the law regarding the Zika virus.

¹³ Id. See also *Lujan v. Defenders of Wildlife*, 504 U.S. 555 (1992)

¹⁴ (n.d.). Political Question Doctrine | Wex Legal Dictionary / Encyclopedia | LII Retrieved March 25, 2017, from https://www.law.cornell.edu/wex/political_question_doctrine. See also *Baker v Carr*, 369 U.S. 186 (1962)

¹⁵ (n.d.). Basics | Vaccines.gov. Retrieved March 25, 2017, from <https://www.vaccines.gov/basics/>

¹⁶ Id.

¹⁷ Id.

Part IV provides the legal aspects pertaining to the methods of preventing the virus. Part V presents the proposed laws and future endeavors to control the Zika virus. The paper concludes in Part VI by restating main points found in the thesis and offering recommendations.

This now raises the question, what is the Zika virus?

HISTORY AND OVERVIEW OF THE ZIKA VIRUS

In 1947, a virus was discovered during studies of the yellow fever in a Ugandan jungle. This virus was named after its location of discovery, the “Ziika forest”. Until recently, Zika has been largely dormant, with less than 20 cases within a 40-year timespan.¹⁸ Zika began to garner attention after a 2007 outbreak in the Yap islands.¹⁹ An estimated 73% of the population was infected within a four-month period.²⁰ Zika would then return to its dormant status until a second outbreak in French Polynesia when an estimated 30,000 people were infected.²¹ This led to a spread to other islands in 2013. Two years following, the virus made its way to Latin America with an estimated 500,000 - 150,000,000 people infected.²² In 2016, Zika drew the attention of the people in the United States by establishing a foothold in Miami.

The Zika virus is a flavivirus- simply put, a cousin of the yellow fever that is primarily transferred by the *Aedes aegypti* mosquito and the *Aedes albopictus*. These mosquitoes are of African origins, yet they have spread towards more tropical regions.²³

¹⁸ "Zika fever and congenital Zika syndrome: An unexpected emerging" 29 Feb. 2016, [http://www.journalofinfection.com/article/S0163-4453\(16\)00061-X/abstract](http://www.journalofinfection.com/article/S0163-4453(16)00061-X/abstract). Accessed 18 Feb. 2017.

¹⁹ Id.

²⁰ Id.

²¹ Id.

²² Id.

²³ Id.

It was in the French Polynesia where the largest Zika outbreak occurred.²⁴ During this outbreak, there were a number of Guillain-Barre syndrome cases that occurred during the Zika virus.²⁵

It is apparent that the Zika virus is well traveled, so the question may be, whether a mosquito can survive a plane ride. The answer is yes. Mosquitoes can be one of many unwanted passengers of a plane, and can even share the cab to a passenger's destination. Monika Gehner from the World Health Organization (WHO) explains, "The Aedes mosquito is a weak flyer... But it may inadvertently be transported by humans from one place to another (e.g. in the back of a car, via planes)," and upon reaching a destination, "it may theoretically be capable of reproducing itself there and introduce Zika virus to new areas."²⁶ Now what exactly is the Aedes mosquito?

The most common mosquito which carries Zika is the Aedes, which frequently bites in the daytime, indoors and outdoors.²⁷ The Aedes mosquito also carries the dengue and chikungunya viruses, cousins to Zika. The other mosquito which spreads

²⁴ "Guillain-Barré Syndrome outbreak associated with Zika virus infection" 29 Feb. 2016, [http://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(16\)00562-6/abstract](http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(16)00562-6/abstract). Accessed 20 Feb. 2017.

²⁵ "Guillain-Barré Syndrome (42 Cases) Occurring During a Zika Virus" 8 Apr. 2016, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4998790/>. Accessed 20 Feb. 2017.

²⁶ "WHO: Zika mosquitos can travel by planes - AeroTime." 19 Feb. 2016, <https://www.aerotime.aero/en/civil/10320-who-zika-mosquitos-can-travel-by-planes>. Accessed 18 Feb. 2017.

²⁷ Schaffner, Francis, and Alexander Mathis. "Dengue and dengue vectors in the WHO European region: past, present, and scenarios for the future." *The Lancet Infectious Diseases* 14.12 (2014): 1271-1280.

the Zika virus is the *Aedes Albopictus*. Due to their feeding habits, the CDC has declared the *Aedes albopictus* the lesser threat of the two mosquitos.²⁸ These mosquitoes are often referred to as the “Asian tiger mosquito.”²⁹ The two mosquitoes lay eggs in standing water, but often choose smaller areas such as dog bowls, flower pots, and buckets.³⁰ There are several other mosquitoes which have the potential to carry Zika, but the *Aedes aegypti* is the primary vector.³¹

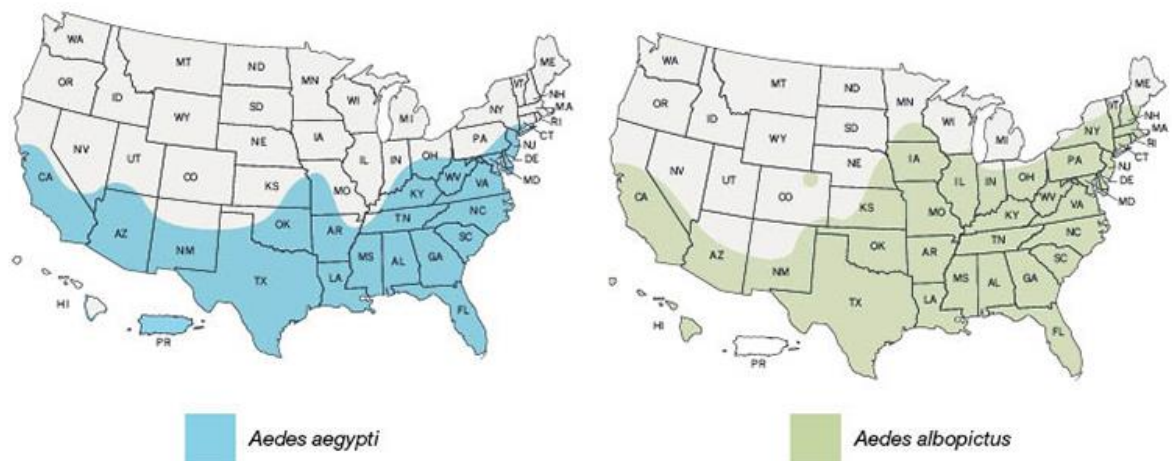


Figure 1 Estimated range of *Aedes aegypti* and *Aedes albopictus* in the US - CDC." 19 Jan. 2017, <http://www.cdc.gov/zika/vector/range.html>. Accessed 18 Feb. 2017.

²⁸ "Estimated range of *Aedes aegypti* and *Aedes albopictus* in the US - CDC." 19 Jan. 2017, <http://www.cdc.gov/zika/vector/range.html>. Accessed 18 Feb. 2017.

²⁹ "Dengue and the *Aedes albopictus* mosquito - CDC."

<https://www.cdc.gov/dengue/resources/30jan2012/albopictusfactsheet.pdf>. Accessed 18 Feb. 2017.

³⁰ (2017, January 20). Transmission | Zika virus | CDC. Retrieved March 30, 2017, from <https://www.cdc.gov/zika/transmission/>

³¹ "Zika fever and congenital Zika syndrome: An unexpected emerging" 29 Feb. 2016, [http://www.journalofinfection.com/article/S0163-4453\(16\)00061-X/abstract](http://www.journalofinfection.com/article/S0163-4453(16)00061-X/abstract). Accessed 19 Feb. 2017.

Transmission and Clinical Implications

The Zika virus is spread in several ways. The primary route of infection is through a bite from an infected mosquito.³² Mosquitoes become infected when they bite a person already infected with the virus.³³ Zika can also be transmitted through sex.³⁴ The period of which couples are subject to infecting one another with Zika is not yet confirmed, however it has been reported that men can carry the virus in their sperm for up to six months.³⁵ Another form of transmission is from a pregnant woman to her fetus.³⁶ The CDC recommends limited travel for pregnant women, meaning avoiding areas with cases of Zika.³⁷

There are other modes of transmission that have not yet been confirmed. Breastfeeding is a potential route. Although there is not enough evidence to support it yet, the CDC recommends that women suspected to have come in contact with the

³² "Zika Virus | CDC." <https://www.cdc.gov/zika/>. Accessed 30 Mar. 2017.

³³ Id.

³⁴ Id.

³⁵ (2016, August 12). Zika virus found to remain in sperm for up to six months - The Telegraph. Retrieved March 30, 2017, from <http://www.telegraph.co.uk/news/2016/08/12/zika-virus-found-to-remain-in-sperm-for-up-to-six-months/>

³⁶ (2017, January 20). Transmission | Zika virus | CDC. Retrieved March 30, 2017, from <https://www.cdc.gov/zika/transmission/>

³⁷ Id.

virus should not breastfeed until cleared.³⁸ A likely but unconfirmed route of transmission is blood transfusion.³⁹

Current data shows that most people are asymptomatic. In fact, around 80% of people infected won't show signs of infection.⁴⁰ This is may be another reason why Zika may have been undetected for so long; if people do not know that they have the disease, there is no cause for alarm. For the minority who do show symptoms, the most common side effect is a fever with possible rashes and joint pain.⁴¹ Similar effects that are found in the dengue and chikungunya viruses, cousins of the Zika virus spread by the same mosquito.⁴²

A second set of symptoms are referred as congenital Zika syndrome, the effects that ravage newborns infected with Zika. The most prominent and reported of the syndromes to be linked to Zika is microcephaly.⁴³ Microcephaly is a condition where a baby's head and brain are undersized and underdeveloped.⁴⁴ This condition can lead to seizures, delays in development (sitting, standing, walking, etc.), and feeding problems

³⁸ Id.

³⁹ (2017, January 20). Transmission | Zika virus | CDC. Retrieved March 30, 2017, from <https://www.cdc.gov/zika/transmission/>

⁴⁰ Id.

⁴¹ "Zika fever and congenital Zika syndrome: An unexpected emerging" 29 Feb. 2016, [http://www.journalofinfection.com/article/S0163-4453\(16\)00061-X/abstract](http://www.journalofinfection.com/article/S0163-4453(16)00061-X/abstract) . Accessed 18 Feb. 2017.

⁴² Id.

⁴³ Id.

⁴⁴ (2016, December 7). Facts about Microcephaly | Birth Defects | NCBDDD | CDC. Retrieved April 3, 2017, from <http://www.cdc.gov/ncbddd/birthdefects/microcephaly.html>

amongst many others.⁴⁵ Microcephaly is estimated to affect 13 percent of babies born to mothers infected while pregnant.⁴⁶ Zika's link to microcephaly was once debatable, but experts in the field seem to agree that there is a direct correlation.⁴⁷ The congenital syndromes also include low birth-weight, reduced fetal movement, excessive/redundant scalp skin, and other effects.

Another implication of the Zika virus is the Guillain-Barre syndrome. During the outbreak in the French Polynesia there were a number of Guillain-Barre syndrome (GBS) cases that occurred at the same time.⁴⁸ This led many, such as the CDC, to believe that GBS is somehow linked to Zika, although the link has yet to be confirmed.⁴⁹ Guillain-Barré syndrome affects the nervous system; a person's immune system begins to damage nerve cells which causes muscle weakness and possible paralysis.⁵⁰

There is a number that is assigned to contagious diseases: the basic

⁴⁵ Id.

⁴⁶ (2016, May 25). For Zika-infected pregnancies, microcephaly risk may be as high as 13 Retrieved April 3, 2017, from <https://www.washingtonpost.com/news/to-your-health/wp/2016/05/25/for-zika-infected-pregnancies-microcephaly-risk-may-be-as-high-as-13-percent/>

⁴⁷ "Zika Is Linked To Microcephaly, Health Agencies Confirm : The Two" 31 Mar. 2016, <http://www.npr.org/sections/thetwo-way/2016/03/31/472607576/health-agencies-confirm-zika-is-linked-with-microcephaly>. Accessed 20 Feb. 2017.

⁴⁸ (n.d.). Guillain-Barré Syndrome outbreak associated with Zika ... - The Lancet. Retrieved March 30, 2017, from [http://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(16\)00562-6/references](http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(16)00562-6/references)

⁴⁹ (2016, August 9). Zika and Guillain-Barré Syndrome | Zika virus | CDC. Retrieved March 30, 2017, from <http://www.cdc.gov/zika/healtheffects/gbs-ga.html>

⁵⁰ Id.

reproduction number.⁵¹ This number denotes the potential transmissibility of a virus.⁵² If the number is under 1, it is unlikely that a virus will be able to find a suitable host and will eventually die out.⁵³ If the number is greater than 1, it has a greater chance of finding new hosts depending on how large the number is.⁵⁴ The number depends on the amount of interaction the infected person has with other humans. For example, influenza has reproductive number of 1.3⁵⁵, meaning there's a chance to infect someone. As Kelly McBride Folkers of the New York Times explains, "in the week that you have the flu, statistically, you are likely to infect one of two people."⁵⁶ The Ebola virus has a range of 1.5-2.5,⁵⁷ being more contagious than the flu.

Zika has been assigned a range of 4.3-5.8.⁵⁸ The range of numbers seem similar to those of dengue and chikungunya viruses⁵⁹ which are carried by the same mosquito. One reason for Zika's wide range is because of the nature of infection. If a particular

⁵¹ "Zika: The Millennials' S.T.D.? - The New York Times." 20 Aug. 2016, <https://www.nytimes.com/2016/08/21/opinion/sunday/zika-the-millennials-std.html>. Accessed 14 Mar. 2017.

⁵² Id

⁵³ Id

⁵⁴ Id

⁵⁵ Id

⁵⁶ Id

⁵⁷ Reproduction number for the 2014 Ebola strand "Estimating the Reproduction Number of Ebola Virus (EBOV) During" 2 Sep. 2014, <http://currents.plos.org/outbreaks/article/estimating-the-reproduction-number-of-zaire-ebolavirus-ebov-during-the-2014-outbreak-in-west-africa/>. Accessed 14 Mar. 2017.

⁵⁸ "Transmission potential of Zika virus infection in the South Pacific" 25 Feb. 2016, [http://www.ijidonline.com/article/S1201-9712\(16\)00037-0/abstract](http://www.ijidonline.com/article/S1201-9712(16)00037-0/abstract). Accessed 14 Mar. 2017.

⁵⁹ Id

host has numerous unprotected sexual encounters the risk of infection increases.

It is unknown whether a person becomes immune to Zika after being infected once. There is a lack of long term data to find out.⁶⁰ Viruses do evolve however, so those who may become immune to this strain of Zika may not be immune to the next.⁶¹

Animals

Currently there is no evidence to support the spread of Zika through animals.⁶² This is mainly due to the fact that the Aedes mosquito prefers feeding on humans. At the current stage of research there are not many resources dedicated to researching the effects on animals. The only known animals to show signs of infection are apes and monkeys.⁶³ After all Zika was discovered in a monkey that had a fever.⁶⁴ The risk of infecting monkeys and apes within the United States is considered low by the CDC. Even so there is a mandatory 31-day quarantine period for imported monkeys and apes.⁶⁵ This quarantine is particularly useful: after around two weeks, monkeys and

⁶⁰ (2016, December 9). Top Questions on Zika Simple Answers Developed by ASTHO 12.9.16 Retrieved April 3, 2017, from <http://www.astho.org/Infectious-Disease/Top-Questions-On-Zika-Simple-Answers-Developed-by-ASTHO/>

⁶¹ Id.

⁶² (2016, August 5). Zika and Animals | Zika virus | CDC. Retrieved April 3, 2017, from <http://www.cdc.gov/zika/transmission/qa-animals.html>

⁶³ Id.

⁶⁴ Id.

⁶⁵ Id.

apes develop an immunity to spreading the disease.⁶⁶

Current State of The Zika Virus

The Zika virus is a national and international threat to human health. In February 2016, the World Health Organization declared Zika a global public health emergency.⁶⁷ As of October 2016, the CDC officially declared parts of Miami “red zones”, and urged pregnant women to avoid these areas due to high risk of infection.⁶⁸

Citizens of Florida in particular has been hurt by the Zika Virus. From the start of 2016, the Florida’s Department of Health in Tallahassee has reported over 200 travel related cases of Zika in Central Florida alone and over 1000 cases of Zika have been confirmed statewide.⁶⁹ Within the continental United States, there have been over 5,000 confirmed cases of the Zika virus, with the majority being in Florida and New York.⁷⁰ A recent survey shows that Zika is an important aspect of public health that Congress

⁶⁶ Id.

⁶⁷ "Director-General summarizes the outcome of the - World Health"
<http://www.who.int/mediacentre/news/statements/2016/emergency-committee-zika-microcephaly/en/>. Accessed 14 Mar. 2017.

⁶⁸ "CDC's New Miami Zika 'Red Zone' Means Stay Out for ... - NBC News." 19 Oct. 2016,
<http://www.nbcnews.com/storyline/zika-virus-outbreak/cdc-s-new-miami-zika-red-zone-means-stay-out-n669401>. Accessed 14 Mar. 2017.

⁶⁹ "PressReader - Orlando Sentinel: 2017-02-15 - Counties add jobs to"
<https://www.pressreader.com/usa/orlando-sentinel/20170215/281496456039415>. Accessed 17 Feb. 2017.

⁷⁰ "Case Counts in the US | Zika virus | CDC." 23 Mar. 2017, <https://www.cdc.gov/zika/geo/united-states.html>. Accessed 29 Mar. 2017. See also, "WHO | Zika situation report." 25 Aug. 2016, <http://www.who.int/emergencies/zika-virus/situation-report/25-august-2016/en/>. Accessed 29 Mar. 2017.

should (and has) focus on by funding.⁷¹ All sides seem to agree that that Zika is a threat to public health. This call for proactivity rather than reactivity; to stop the problem before it becomes a larger problem.

The United States Congress has proven that Zika is in fact a risk to public health and that there is a need to be proactive. One way to be proactive in the event of an outbreak is to fund the appropriate authorities. Congress has allocated over \$1 billion dollars to fight the Zika virus.⁷² This happened despite the arguments over political friction over planned parenthood and what was considered an “emergency”.⁷³

⁷¹ (2016, September 1). POLL: Most Americans Want Congress To Make Zika Funding A ... - NPR. Retrieved April 2, 2017, from <http://www.npr.org/sections/health-shots/2016/09/01/492103236/poll-most-americans-want-congress-to-make-zika-funding-a-high-priority>

⁷² (2016, September 28). Congress Stops Bickering And Approves \$1.1 Billion To Fight Zika - NPR. Retrieved April 3, 2017, from <http://www.npr.org/sections/health-shots/2016/09/28/495806979/congress-ends-spat-over-zika-funding-approves-1-1-billion>

⁷³ Id.

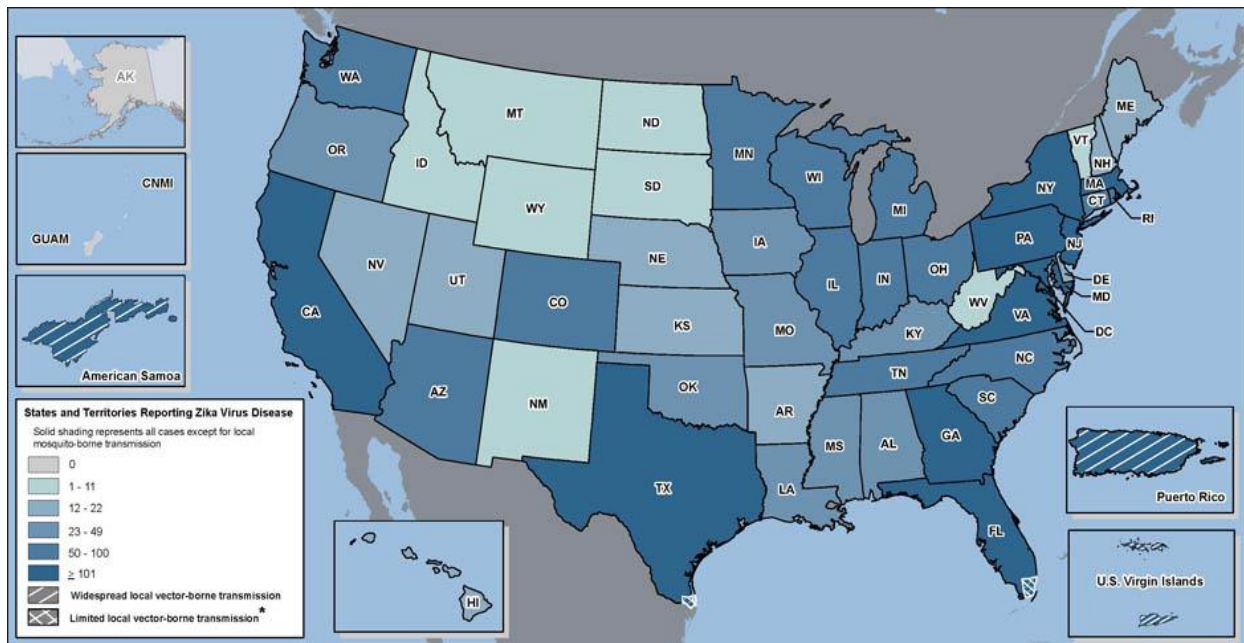


Figure 2 Case Counts in the US | Zika virus | CDC. 23 Mar. 2017, <https://www.cdc.gov/zika/geo/united-states.html>

How Climate Change Has Prompted the Spread of Mosquitoes

Prevailing theories suggest that a new favorable climate is partly responsible for the current circumstances.⁷⁴ Adding to this is the phenomenon of El Niño. Prior to outbreaks in South America, El Niño had caused record high temperatures and severe draughts.⁷⁵ Evidence suggests that El Niño “should be considered one of the contributing factors in the dispersal of Zika virus” and “should also be considered as the

⁷⁴ "El Niño and climate change—contributing factors in the ... - The Lancet." 1 Feb. 2016, [http://thelancet.com/journals/lancet/article/PIIS0140-6736\(16\)00256-7/fulltext](http://thelancet.com/journals/lancet/article/PIIS0140-6736(16)00256-7/fulltext). Accessed 14 Mar. 2017.

⁷⁵ Id.

virus continues to spread.”⁷⁶ The theory of climate change inviting an increase of disease vectors has been around for some time. El Nino often affects climate change through increased rainfall and warmer weather. ⁷⁷

Al Gore in his 2006 film “An Inconvenient Truth”, explains that cities built in an altitude previously devoid of mosquitoes now have mosquitoes invading these territories.⁷⁸ Al Gore is not alone in this assertion. Andrew Monaghan, lead author of the mosquito habitat study and a researcher at the National Center for Atmospheric Research, said that climate change may have prompted the risk of transmissions.⁷⁹ Monaghan states, "Warmer temperatures increase Aedes mosquito development and survival rates, affect biting behavior, and speed up the extrinsic incubation period for Aedes-transmitted viruses such as Zika..."⁸⁰ Furthermore, several continents, including North America, “are projected to have the largest percentage increases in human exposure to [Aedes] aegypti considering only climate change.”⁸¹ In summary, factors of climate change such as warmer temperature and increased rainfall are known factors

⁷⁶ Id

⁷⁷ (n.d.). El Niño & La Niña (El Niño-Southern Oscillation) | NOAA Climate.gov. Retrieved April 15, 2017, from <https://www.climate.gov/enso>

⁷⁸ Citation needed

⁷⁹ "Al Gore claims global warming will lead to faster spread of Zika virus" 28 Oct. 2016, <http://www.politifact.com/global-news/statements/2016/oct/28/al-gore/al-gore-claims-global-warming-will-lead-faster-spr/>. Accessed 14 Mar. 2017.

⁸⁰ Id

⁸¹ "The potential impacts of 21st century climatic and population changes" <http://link.springer.com/article/10.1007/s10584-016-1679-0>. Accessed 18 Feb. 2017.

that increase the number of mosquitoes in a given environment. Another less obvious but known effect related to climate change and the Zika virus is the effect on the mosquitos' habits: its reproduction cycle and metabolism rates.⁸²

There is pushback to this prediction. The main criticism revolves around the very nature of transmission.⁸³ Since there are numerous ways the virus could spread, leading some experts to hesitate branding climate change as the main culprit. Greg Lanzaro, professor at University of California at Davis, pushes back on the theory that the spread of Zika was accelerated by climate change.⁸⁴ Instead, Lanzaro blames human travel habits.⁸⁵ The scientific consensus could be summarized by Walter J. Tabachnik, a professor at the University of Florida's Medical Entomology Laboratory: climate change may alter mosquito behavior (and lead to greater populations) but it is too early to blame it solely on climate change.⁸⁶ While there are other ways the virus may spread, the increase in the number of mosquitos is definitely not a factor to be ignored.

⁸² Citation and Expand

⁸³ "Al Gore claims global warming will lead to faster spread of Zika virus" 28 Oct. 2016, <http://www.politifact.com/global-news/statements/2016/oct/28/al-gore/al-gore-claims-global-warming-will-lead-faster-spr/>. Accessed 14 Mar. 2017. See at "A complicated picture".

⁸⁴ Id.

⁸⁵ Id.

⁸⁶ Id.

EXISTING LAWS ON CONTROLLING DISEASE

Federal and state laws have been utilized in the past to provide authority to assist in the control of the spread of diseases. By examining outbreaks of past contagious diseases, this thesis will draw parallels to a potential Zika outbreak. This section mainly focuses on the executive, legislative, and administrative branches of the government. Federal administrative offices, often seen as the “phantom” fourth branch of the government, are often extensions of the executive branch of the government that have been delegated authority regarding a specific area of law.⁸⁷ The main administrative agency that this thesis will cover is the Center for Disease Control and Prevention (CDC).

The CDC is an agency of the Department of the Health and Human Services (HHS).⁸⁸ While the HHS operates over 100 programs⁸⁹ and provides numerous grants to provide health services,⁹⁰ the CDC is particularly tasked with stopping the spread of disease.⁹¹ The CDC’s mission is to protect “the public health of the nation by providing

⁸⁷ (2016, December 12). Federal Administrative Law: A Brief Overview. Retrieved March 25, 2017, from <http://www.ilsdc.org/federal-administrative-law-a-brief-overview>

⁸⁸ "HHS Agencies & Offices | HHS.gov - U.S. Department of Health and" <https://www.hhs.gov/about/agencies/hhs-agencies-and-offices/index.html>. Accessed 25 Mar. 2017.

⁸⁹ "Programs & Services | HHS.gov." <https://www.hhs.gov/programs/>. Accessed 25 Mar. 2017.

⁹⁰ "Grants | HHS.gov." <https://www.hhs.gov/grants/grants/>. Accessed 25 Mar. 2017.

⁹¹ "Mission, Role and Pledge | About | CDC." 14 Apr. 2014, <http://www.cdc.gov/about/organization/mission.htm>. Accessed 25 Mar. 2017.

leadership and direction in the prevention and control of diseases and other preventable conditions, and responding to public health emergencies.”⁹² The CDC’s role in the public health of United States is to detect and respond to emerging health threats with the use of science and new technology.⁹³ This means they often tackle the biggest health problems in the United States.

Controlling Outbreaks

The Secretary of the HHS has delegated the authority of quarantine law to the CDC. Accordingly, the CDC has enacted regulations covering interstate and foreign quarantine. The regulations authorize the isolation, quarantine, and detention of individuals to prevent the spread, introduction, and transmission, of a certain set of communicable diseases were set forth by the President in an executive order.⁹⁴ Importantly, these provisions also give the director of the CDC the power to take over state efforts when those efforts are insufficient.⁹⁵ Quarantine law when it is established by the federal government, falls under the supremacy clause of the United States

⁹² Id.

⁹³ Id.

⁹⁴ See 42 CFR §70 and 42 U.S.C. §265; "CDC Regulations." 30 Jun. 2016, <https://www.cdc.gov/regulations/>. Accessed 14 Mar. 2017.

⁹⁵ Id

Constitution. The supremacy clause dictates what is the “supreme” law of the land.⁹⁶

The CDC’s powers fall under the United States federal law. Often this means the federal government exerts powers first, acting as a guideline, and the states and local municipalities act subsequently but they cannot act contrary to the federal laws that are established.

The National Response Framework,⁹⁷ the nation's response plan to emergencies and disasters of various types, also reflects the passive nature of the federal response to these emergencies. This strategy leaves the federal government waiting for the states to take the first step despite having the greater resources. The National Response Framework is sometimes referred to as the Federal Plan. The Federal plan guides the national response to various disasters and emergencies, which includes communicable disease emergencies. The Federal Plan covers the gap between the state and federal quarantine law, detailing the responsibilities of the respective authorities. The Federal plan is always in effect, technically, and can be implemented at a moment’s notice. In addition, these elements can be employed to a limited degree, allowing for partial implementation.⁹⁸ Annexes as part of this federal plan provide

⁹⁶ (n.d.). Supremacy Clause | Wex Legal Dictionary / Encyclopedia | LII / Legal Retrieved March 25, 2017, from https://www.law.cornell.edu/wex/supremacy_clause

⁹⁷ "National Response Framework | FEMA.gov." 16 Jun. 2016, <https://www.fema.gov/national-response-framework>. Accessed 14 Mar. 2017.

⁹⁸ Id

additional guidance. These annexes include the Public Health and Medical Services Annex and the Biological Incident Annex.⁹⁹ The former relates to incidents that may lead to public health emergencies.¹⁰⁰ The latter, which is more applicable to the Zika virus, relates to human disease outbreaks.¹⁰¹

Even with these annexes, the states continue to be the primary actors. The two annexes even admit in writing that Federal powers may be there "augment the support provided by the private healthcare sector when requested by ... state ... governments."¹⁰² The federal government may coordinate, support, or provide expert information where needed.

The most recent outbreak which served as a wakeup call for the CDC was the 2014 Ebola outbreak. The Ebola virus is often a fatal disease as it has an average fatality rate of 50 percent, and can be transmitted via person-to-person exchange of bodily fluids, or contact through materials such as needles, bedding, and clothing.¹⁰³ Those infected with Ebola have a period where they are not infectious and have not developed symptoms.¹⁰⁴ This incubation period means patients are not contagious until

⁹⁹ Id

¹⁰⁰ Id

¹⁰¹ Id

¹⁰² Id

¹⁰³ "WHO | Ebola virus disease." <http://www.who.int/mediacentre/factsheets/fs103/en/>. Accessed 14 Mar. 2017.

¹⁰⁴ Signs and Symptoms, CDC, <http://www.cdc.gov/vhf/ebola/symptoms/index.html> Accessed Sept. 17, 2016

they begin to show symptoms.¹⁰⁵ There were a total of 4 confirmed cases in the United States with Thomas Duncan being the most famous case in the United States.¹⁰⁶

The first patient diagnosed with Ebola was Thomas Duncan in Dallas, Texas.¹⁰⁷ The Federal government has the power to regulate airports, yet they failed to do so when Duncan entered the country.¹⁰⁸ Duncan wasn't the only victim of the disease, the two nurses who treated him were consequently infected.¹⁰⁹ The CDC could have controlled the movement of the two nurses, however it did not. While the Federal government let the Ebola patients roam free, Texas did not help with the situation either. Texas had no policies pertaining such an event until after the diagnosis of the disease.

Unlike Ebola, Zika it often not fatal to adults, but it should not warrant any less scrutiny. Regulations and laws that anticipate both severe and even less severe outcomes are needed.

¹⁰⁵ (n.d.). WHO | Frequently asked questions on Ebola virus disease. Retrieved March 25, 2017, from <http://www.who.int/csr/disease/ebola/faq-ebola/en/>

¹⁰⁶ "2014 Ebola Outbreak in West Africa - Case Counts - CDC." 14 Apr. 2016, <http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/case-counts.html>. Accessed 14 Mar. 2017.

¹⁰⁷ "Dallas Nurses Comforted Thomas Duncan as He Died of Ebola | Time" 25 Oct. 2014, <http://time.com/3538782/thomas-eric-duncan-ebola/>. Accessed 14 Mar. 2017.

¹⁰⁸ Kimball, Thomas D. "THE CONTAGION OF GOVERNMENTAL LEADERSHIP: A RENEWED CALL FOR INCREASED FEDERAL PRESENCE IN COMMUNICABLE DISEASE EMERGENCIES." *Loy. L. Rev.* 62 (2016): 113-155.

¹⁰⁹ "2014 Ebola Outbreak in West Africa - Case Counts - CDC." 14 Apr. 2016, <http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/case-counts.html> Accessed 14 Mar. 2017.

The Spanish Flu of 1918

In American history, local governments have utilized their policing powers to stop the spread of disease. These powers were seen during the Spanish Flu pandemic. Pandemic here means a “worldwide spread of a new disease”, with “new” meaning a new strand of a virus, not necessarily a brand-new disease.¹¹⁰ Influenza outbreaks are relevant to Zika since they are often good indicators for how authorities act during times of emergency due to their frequency.¹¹¹

The Spanish flu is an example of how municipalities reacted during an outbreak. The Spanish flu was an H1N1 virus which took 50 million lives within two years.¹¹² During this influenza outbreak two cities in Minnesota, Minneapolis and St Paul, both acted. The two cities disagreed over the proper procedure was in regard to containing the outbreak. The health commissioner of Minneapolis, Dr. Guilford, advocated public closures, a blanket isolation rather than case by case.¹¹³ Closures here would mean the closing of public transportation, movie theaters, and other spaces of public gathering.¹¹⁴ Saint Paul’s health commissioner, Dr. Simon, had the opposite philosophy, wanting to

¹¹⁰ (2010, February 24). WHO | What is a pandemic?. Retrieved March 23, 2017, from http://www.who.int/csr/disease/swineflu/frequently_asked_questions/pandemic/en/

¹¹¹ "Lessons Learned from the 1918–1919 Influenza Pandemic in" <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1997248/>. Accessed 21 Feb. 2017. Influenza outbreaks occur roughly every 30 or 40 years.

¹¹² Id

¹¹³ Id.

¹¹⁴ Id.

do only to isolate individuals.¹¹⁵ The two commissioners quarreled over the different approaches, yet Dr. Guilford's philosophy was adopted by the St Paul's government.¹¹⁶

Isolation was the favored method in other cities as well. San Francisco practiced isolation by designating one hospital to house all of the patients affected by the Spanish flu, and sending all non-flu patients elsewhere.¹¹⁷ Many cities which practiced isolation did so on a very makeshift method. For example, Philadelphia placed patients in armories and parish houses in addition to conventional hospitals.¹¹⁸

On the Federal level some international events that need to be kept in mind. The flu pandemic occurred during the first World War, which took much of the federal executive branch's time. The war may have also accelerated the growth and spread of the flu.¹¹⁹ Another fact to take into consideration is the lack of technology. Many states were unable to keep up with the reporting that was necessary.¹²⁰ In addition, there was a lack of international efforts since many of the organizations which provide guidelines (such as WHO) have yet to be created.¹²¹

The world has seen another influenza outbreak in more recent years. In 2009

¹¹⁵ Id.

¹¹⁶ Id.

¹¹⁷ 7 Yale J. Health Pol'y L. & Ethics 99 n37

¹¹⁸ Id.

¹¹⁹ 19 Ann. Health L. 155

¹²⁰ Id.

¹²¹ WHO, and agency of the United Nations, was established in 1948 (citation)

there was another H1N1 influenza, the swine flu.¹²² The circumstances surrounding the 2009 outbreak differ greatly. Though there was a war going on, the Obama administration could handle the outbreak. This is may be due to the technology available at the time allowing for greater communication on the administrative side, and the arsenal of antibiotics on the medical side. In 2009, the states exercised greater policing powers available. States had the authority to mandate vaccinations and impose quarantines during times of a public health emergency.¹²³ Internationally, WHO implemented the International Health Regulations (IHR), which allowed for greater coordination and communication.

Action by governmental authorities are not the only factor during an outbreak; the public's reactions must be considered as well. During the blanket closures of public places in Minneapolis and St Paul, crowds would flock to buildings such as movie theaters to catch one last showing.¹²⁴ Paranoia is a large part of a pandemic as people may act upon their fears in irrational ways... In 1918 the technology and information that can be used today was obviously not available at the time. Information about the disease in general was not entirely accurate. Misinformation on professional levels trickle down to the public levels. The Spanish Flu was a virus, H1N1, and while its origin

¹²² Id.

¹²³ Id.

¹²⁴ "Lessons Learned from the 1918–1919 Influenza Pandemic in ... - NCBI." <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1997248/>. Accessed 22 Feb. 2017.

is still debated.

The public's response may not be the correct way to combat an outbreak, so it is important to have the correct information available widely available to the public during an outbreak. It is not always easy to have the correct information during times of emergency of course, but there is a way to increase the chances of having the information. Being proactive rather than reactive. Researching and taking precautions before an outbreak begins would reduce the chances of an outbreak even occurring. Scientists and medical professionals did not have the advantage that the world has today and the world experienced the consequences. It is beneficial for today's experts to learn from the past shortcomings and missed opportunities so that they may prevent a future emergency.

Local Law

State public health emergency laws vary by each state, but many of them follow a uniform guideline: the Model State Emergency Health Powers Act (MSEHPA).¹²⁵ The MSEHPA has been adopted, in at least some part, by 38 states as of July 15, 2006.¹²⁶

In Florida, the Department of Health's mission is to "promote, protect, and

¹²⁵ "The Model State Emergency Health Powers Act."

<http://www.publichealthlaw.net/ModelLaws/MSEHPA.php>. Accessed 13 Mar. 2017.

¹²⁶ Id

improve the health of all people in the state.”¹²⁷ Several powers are enumerated in the Florida statutes and state health officer holds power to declare emergencies. All municipalities and local ordinances must be consistent with the state laws.¹²⁸

United States Emergency Powers

On a national level there are Federal acts which may be enacted during times of disaster. Two in particular are the Stafford Act and the Public Health Services Act. The Stafford Act is triggered by what is considered an “emergency” or a “major disaster”.¹²⁹ While disasters are categorized as natural disasters such as earthquakes and floods, emergencies are instances which “federal assistance is needed to supplement State and local efforts and capabilities to save lives and to protect property and public health and safety, or to lessen or avert the threat of a catastrophe in any part of the United States.”¹³⁰ These conditions are declared by the President of the United States, and subsequently, the governors of individual states. State governors are the ones who declared state emergencies, which in turn allows the President to utilize the Stafford Act if need be.¹³¹ If the President does provide assistance, it cannot exceed \$5 million

¹²⁷ Title 29 Fla. Stat. sec. 381.001

¹²⁸ 29 Fla. Stat. sec. 381.0016

¹²⁹ 7 Yale J. Health Pol'y L. & Ethics 99, n198

¹³⁰ Id.

¹³¹ Id

unless determined otherwise by the President.

In relation to the Zika outbreak, the initial \$5 million may not be all that much. In times of emergency, every dollar seems to help but Congress has already exceeded that amount exponentially. In September 2016, Congress passed a bill allocating \$1.1 billion to the fight against Zika.¹³² In light of the \$5 million cap, the Stafford Act may not be all that helpful during the current state of Zika. Under the Act, the federal government must be the absolute last resort, including private funds.¹³³ The question now is whether the Stafford Act would actually be effective in the fight against Zika. The answer may be no if the President is unwilling to exceed the \$5 million in face of the billion dollars given by Congress. The act may be enacted for very specific purposes however.

Congress explicitly broke down the amount of money that should be used in fighting the Zika virus.¹³⁴ The bulk of the money (\$993 million) was granted to agencies such as the HHS, while the research for vaccines and mosquito control got just under \$400 million each.¹³⁵ The areas that were granted the least amount of money may be candidates for the Stafford Act. \$4 million was allocated to “Emergencies in the Diplomatic and Consular Service” which supports the evacuation of U.S. citizens from

¹³² (2016, September 28). Congress Ends Spat, Agrees To Fund \$1.1 Billion To Combat Zika - NPR. Retrieved April 2, 2017, from <http://www.npr.org/sections/health-shots/2016/09/28/495806979/congress-ends-spat-over-zika-funding-approves-1-1-billion>

¹³³ 7 Yale J. Health Pol'y L. & Ethics 99, *133

¹³⁴ 092216-CR-Zika Supplemental Summary

¹³⁵ Id

Zika-affected countries.¹³⁶ In addition, \$1 million was allocated to the Repatriation Loan Program which enables Federal loans to U.S. citizens who “seek to leave Zika-affected areas or who have been exposed to or contracted Zika.”¹³⁷

Considering how Congress has been proactive in the fight against Zika, the Stafford Act does not present itself as a very viable solution for an outbreak. The Stafford Act is not the only federal legislation that can be utilized during a public health emergency. There is the Public Health Service Act (PHSA) which defines the role of the federal government during medical emergencies.¹³⁸ The PHSA is treated as an addition to the Stafford Act and can be executed simultaneously. While the Stafford Act is under the President’s control, the PHSA is under the HHS Secretary’s.¹³⁹ The Surgeon General, under the HHS Secretary’s approval, can declare public health emergencies and provide grants to alleviate those emergencies.¹⁴⁰ While the PHSA’s goal is to “prevent the introduction, transmission, or spread of communicable diseases” within the United States,¹⁴¹ it is meant to solve short term problems. The PHSA’s declaration of emergency only lasts 90 days with possible renewals,¹⁴² so things must be done

¹³⁶ Id at page 2

¹³⁷ Id at page 2

¹³⁸ 7 Yale J. Health Pol’y L. & Ethics 99, *135, PHSA

¹³⁹ 42 U.S.C. § 264(a) (2012).

¹⁴⁰ Id.

¹⁴¹ Id.

¹⁴² Id.

quickly. The PHSA is not meant to be the long term solution to emergencies. The scope of the PHSA is also limited to diseases delineated in Executive orders.¹⁴³

Like the Stafford act, the PHSA is not the optimal solution to combating Zika since Congress has already begun funding preventative measures. If the PHSA needs to be enacted, the HHS has millions to help.¹⁴⁴

Contagious Carriers – Aviation

This section scrutinizes interstate and international travel. From January to December of 2015, over 34 million passengers traveled, by air, from countries with reported cases of Zika to the United States.¹⁴⁵

There has not been any official restriction of air travel because of Zika. Authority on restricting air travel would likely come from WHO, the HHS, or one of the main authorities of aviation law: the Airline Deregulation Act of 1978 (ADA). Per the ADA, no states may control the rates, routes, or services of airlines¹⁴⁶. That being said, it may seem that even prior to takeoff many state quarantine laws would not be valid as they

¹⁴³ Id. at § 264(b).

¹⁴⁴ The HHS has a total of \$1.4 billion to combat Zika, \$993 million were given by Congress at this time. 092216-CR-Zika Supplemental Summary.

¹⁴⁵ Nelson B, Morrison S, Joseph H, Wojno A, Lash RR, Haber Y, Berro A, Cetron M, Grills A. Travel Volume to the United States from Countries and U.S. Territories with Local Zika Virus Transmission. PLOS Currents Outbreaks. 2016 May 31 . Edition 1. doi:

10.1371/currents.outbreaks.ac6d0f8c9c35e88825c1a1147697531c.

¹⁴⁶ (49 USC 1301).

would constrict airlines' rates, routes, and services.

The World Health Organization has several recommendations regarding air travel. These recommendations include disinfecting an airplane after every flight, and an increased vector surveillance of mosquitoes. If the former recommendation was taken, the states would not be making any laws mandating the disinfection of aircraft, or not successfully at least. That power is preempted by the Federal government, specifically it is held by the Secretary of Health and Human Services (HHS). Applying to civil aircraft prior, during, and on arrival of flights, "The [Secretary] shall from time to time prescribe regulations... for the purpose of preventing the introduction... of any communicable disease by securing the best sanitary condition."¹⁴⁷ Violating such regulations can yield a fine up to \$5000, acting as a lien on the aircraft.¹⁴⁸

In regards to international flight, the director of the CDC may "require disinfection of an aircraft if it has left a foreign area that is infested with insect-borne communicable disease and the aircraft is suspected of harboring insects of public health importance."¹⁴⁹ The actual duty of disinfection falls upon the air carrier, or pilot in cases of "aircraft not for hire", and must be done after landing. Disinfection must be done prior to the

¹⁴⁷ (42 USC §269-270).

¹⁴⁸ Id at §271

¹⁴⁹ 42 CFR §71.44

discharge of both cargo and after the exit of passengers and crew¹⁵⁰. In addition, the disinfection must be done with a CDC approved insecticide¹⁵¹. Moreover, all water intended for consumption must be from an FDA approved water source¹⁵².

Unlike viruses such as influenza, an individual is not at risk of infection if the passenger sitting on his or her right is infected. Unless the two are engaged in a sexual relationship, there should not be a cause for concern.¹⁵³ What should be worrisome, for the passenger, is whether there is an infected mosquito either within the plane or at the destination. Aside from state and local governments, the Federal government has a multitude of regulations that affect aviation. Most of these regulations authorize administrations to take action.

The CDC has the power to enact measures when they deem local efforts as inadequate; though the power to restrict travel is within the Secretary of HHS' authority.¹⁵⁴ In regards to the yellow fever and other noted diseases, the Secretary can keep individuals who are in the communicable period of infection from traveling.¹⁵⁵ Part 70 of the Code of Federal Regulations states, "No such person shall travel from one

¹⁵⁰ Id

¹⁵¹ Id

¹⁵² Id

¹⁵³ See section II clinical implications. Current research does not support peer to peer infection outside of sexual contact i.e. sneezing, coughing, and saliva does not prompt infection.

¹⁵⁴ 42 CFR §71

¹⁵⁵ Id.

State or possession to another, or on a conveyance engaged in interstate traffic, without a written permit of the [Secretary] or his/her authorized representative.”¹⁵⁶ Although air travel is not specifically mentioned in the statute, it seems likely that it would be included as flights are often “interstate travel”. Military personnel are not subject to the same restrictions, yet there should still be some precaution.¹⁵⁷

The CDC is able to detain or quarantine individuals “for the purpose of preventing the introduction, transmission, and spread of the communicable diseases listed in an Executive Order.”¹⁵⁸ Quarantine measures are applicable only to the diseases listed in section 361(b) of the Public Health Service Act Executive Order 13295 (2014). The Executive Order includes yellow fever (which again is a cousin of Zika, so it should be easy amended), Ebola, and SARS¹⁵⁹.

International Authorities

The international Health Regulations (IHR) are “to prevent, protect against, control and provide a public health response to the international spread of disease in ways that are commensurate with and restricted to public health risks, and which avoid

¹⁵⁶ 42 CFR §70.5

¹⁵⁷ Id at §70.8

¹⁵⁸ Id at §70.6

¹⁵⁹ (n.d.). Executive Order 13295: Revised List Of Quarantinable ... - CDC. Retrieved April 20, 2017, from <http://www.cdc.gov/sars/quarantine/exec-2004-04-03.html>

unnecessary interference with international traffic and trade”.¹⁶⁰ Largely based on reporting, important provisions in the IHR include requiring each State:

- To designate a national focal point accessible at all times for communications with the WHO;
- To meet minimum core capacities to detect, assess, report, and respond to public health events and to support disease detection and control at designated ports and borders;
- To develop a framework for notifying the WHO within twenty-four hours of an event that may constitute a public health emergency of international concern as defined by the IHR;
- To take evidence-based actions sensitive to impact on trade, travel, and human rights; and perform self-assessments and report to the WHO”¹⁶¹

After the ebola outbreak in 2014, many found the WHO’s response to be subpar.¹⁶² The virus led to over 11,000 deaths and almost 30,000 confirmed cases.¹⁶³

¹⁶⁰ (2005) International Health Regulations, The World Health Organization

¹⁶¹ Id.

¹⁶² German Chancellor Angela Merkel made clear that the WHO’s response to the 2014 Ebola epidemic was nothing less than catastrophic. Kirsten Grieshaber, German Chancellor Merkel Tells WHO Global Catastrophe Plan Needed for Epidemic Outbreaks, US News (May 18, 2015).

<http://www.usnews.com/news/world/articles/2015/05/18/merkel-global-catastrophe-plan-needed-after-ebola-crisis>

¹⁶³ Ebola Data and Statistics, World Health Org. (WHO), <http://apps.who.int/gho/data/view.ebola-sitrep.ebola-summary-latest?lang=en> (last visited Sept. 17, 2016)

The lack of response from WHO left many wondering of its usefulness considering its lack of enforcement powers.¹⁶⁴ Unlike the CDC, the WHO does not have the same quarantine powers to pin down infected individuals. As stated above, the WHO relies mainly on recommendations and reporting. In developed countries that have their own response capabilities, such as the United States, the WHO is not the most helpful entity. It is in countries that lack a governmental response that the WHO should be able to help.¹⁶⁵

Funding is also an issue for the WHO, in contrast to the Department of Health and Human Services. In the United States Congress granted just over a billion dollars to the HHS in an effort to combat Zika alone. That is one country and one disease. The cost to cover the world for several diseases would be astronomical. While the WHO is still defending its reputation from the 2014 outbreak, there are competitors looking to trump the WHO entirely. The World Bank has been gaining funding for its own global health initiative: the Pandemic Emergency Facility (PEF).¹⁶⁶ The PEF is made of private

¹⁶⁴ See WHO Leadership Statement on the Ebola Response and WHO Reforms, WHO (Apr. 16, 2015), <http://www.who.int/csr/disease/ebola/joint-statement-ebola/en/> [https://perma.cc/BQ5Z-LJAM] (archived Sept. 18, 2016); See also http://www.who.int/about/who_reform/emergency-capacities/who-health-emergencies-programme-progress-report-march-2016.pdf?ua=1

¹⁶⁵ Maria Merritt, Bioethics, Philosophy and Global Health, 7 Yale J. Health Pol'y, L. & Ethics 273, 278 (2013).

¹⁶⁶ Pandemic Emergency Facility: Frequently Asked Questions, World Bank, <http://www.worldbank.org/en/topic/pandemics/brief/pandemic-emergency-facility-frequently-asked-questions>

funding, nongovernmental organizations (NGOs).¹⁶⁷ The PEF focuses on a sort of insurance in the event that a global public health crises were to surface.¹⁶⁸ The emergence of other global players may spur the WHO to garner more enforcement powers.

¹⁶⁷ Id

¹⁶⁸ Id

APPLICABLE CASE LAW

Plaintiffs suing for environmental injustices. Lawsuits may arise from a Zika virus outbreak and one “vector” of these lawsuits may be to include them with other environmental based cases. There are often issues with bringing suits for environmental cases; these issues often live in the realm of justiciability. Cornell Law describes justiciability as “the types of matters that the federal courts can adjudicate”, meaning if a case is not justiciable a court is unable to hear it.¹⁶⁹ There are several doctrines of justiciability yet, only two often come into play in environmental cases: whether there is standing, that is injury; and if there is a political question, that is a conflict of governmental powers.

Environmental Case Law

Standing is the prevailing issue in cases revolving around global climate change. The success of actually gaining standing is divided. There is negative treatment towards standing in global warming cases. In *Comer v Murphy Oil USA*, 607 F.3d 1049 (5th Cir. 2010)¹⁷⁰, plaintiffs’ suit was halted when a panel of judges held the case to lack

¹⁶⁹ "Justiciability | Wex Legal Dictionary / Encyclopedia | LII / Legal"
<https://www.law.cornell.edu/wex/justiciability>. Accessed 15 Feb. 2017.

¹⁷⁰Mississippi homeowners sued 34 energy companies and utilities alleging that the defendants had emitted greenhouse gases contributed to the severity of the hurricane. The appellate court found that the homeowners had standing in the case. "COMER v. MURPHY OIL USA, 607 F.3d 1049 (5th Cir. 2010) | Casetext." <https://casetext.com/case/comer-v-murphy-oil-usa>. Accessed 15 Feb. 2017.

standing. The suit was brought as a result of the destruction of hurricane Katrina, plaintiffs sought to recover damages. In *Comer*, oil, coal, electric, and chemical companies were sued for aggravating the intensity of hurricane Katrina due to their emissions of greenhouse gases. These emissions, according to the plaintiffs, caused Katrina to develop an unprecedented amount of strength that was fueled by the waters warmed by the emissions.

Standing is, as Cornell law states, the “capacity of a party to bring suit in court.”

¹⁷¹ This includes the requirement that plaintiffs have sustained or will sustain a direct and actual injury and that there is a remedy to this injury. There are three requirements deemed in *Lujan v Defenders of Wildlife*, 504 US 555 (1992)¹⁷²: (1) Actual invasion of concrete legal interest. (2) There must be a causal connection between injury and the action of the defendant. (3) There must be a likely remedy to the injury. The presence of a concrete legal interest can relate to environmental injuries. Standing was held in *Massachusetts v. Environmental Protection Agency*, 549 U.S. 497 (2007).¹⁷³ Massachusetts petitioned to the EPA to regulate emissions of carbon dioxide and other gases, arguing that the powers were available under the Clean Air Act. The Court found

¹⁷¹ "Standing | Wex Legal Dictionary / Encyclopedia | LII / Legal"
<https://www.law.cornell.edu/wex/standing>. Accessed 15 Feb. 2017.

¹⁷² "Lujan v. Defenders of Wildlife | Oyez." <https://www.oyez.org/cases/1991/90-1424>. Accessed 15 Feb. 2017.

¹⁷³ "Massachusetts v. EPA - Supreme Court." 2 Apr. 2007,
<https://www.supremecourt.gov/opinions/06pdf/05-1120.pdf>. Accessed 18 Feb. 2017.

the case to be perfectly justiciable, the plaintiffs had standing. The Court relied upon *Lujan*, accordingly, a litigant who has concrete interests can assert these interests without meeting all standards if the interests are concrete.

Regarding standing, Zika may have some sway. If a court finds the clinical implications to be concrete enough of an interest, it will constitute standing. It is not unreasonable to see the side effects of Zika, on both adults and newborns, as actual injuries to a case. Effects of the Zika virus may appear as additional ammunition for plaintiffs suing companies for their greenhouse gas emissions. This legal theory is linked to the theory that climate change has prompted the spread of mosquitoes. This would satisfy the second requirement for standing under *Lujan*. There is also a likely remedy to the injury. Most of the injuries will result in medical bills, which fall under monetary damages; something the courts are likely to award as a remedy.

The Political question doctrine is the second common hurdle environmental suits find themselves facing.¹⁷⁴ The factors for determining what is a political question, and what is not justiciable, is found in *Baker v. Carr* 369 US 186 (1962)¹⁷⁵. The main factor is whether there is a “textually demonstrable constitutional commitment of the issue to a coordinate political department.” The judiciary Judiciary cannot do things that other

¹⁷⁴ "Political Question Doctrine | Wex Legal Dictionary / Encyclopedia | LII"
https://www.law.cornell.edu/wex/political_question_doctrine. Accessed 15 Feb. 2017.

¹⁷⁵ "Baker v. Carr (full text) :: 369 U.S. 186 (1962) :: Justia U.S. Supreme"
<https://supreme.justia.com/cases/federal/us/369/186/case.html>. Accessed 15 Feb. 2017.

branches can do. If an issue lies within the authority of another branch, or if a court finds that another branch is more competent to resolve the issue, it may be a political question. Unless there are specific laws enacted, regulation relating to Zika may be considered a political question.

Constitutional Case Law

A major concept regarding state and Federal laws is preemption. Preemption happens when state law and Federal law conflict by covering the same issue. The issue of preemption is commonplace when an area of law has not been fully explored, or simply overlooked by lawmakers. If a law is successfully preempted, it is the law of the Federal government that is the authority on the matter. Though much of quarantine law is preempted by the federal government, the states have a history of acting as the first line of defense. Most Federal authority regarding the regulation of communicable diseases comes from the United States Constitution and will be explored in the following cases. Quarantine law in this thesis, includes inspection, quarantine, and other reporting laws relating to communicable diseases.

A landmark decision regarding preemption is *Gibbons v Ogden*. In this case, there was a conflict between state and federal law regarding interstate commerce. Naturally, Congress has authority over interstate commerce which is enumerated in the commerce clause of the US Constitution. In *Gibbons*, the Court found a broad meaning

of interstate commerce, granting much wider authority to Congress.¹⁷⁶ This case also establishes a link between interstate commerce and quarantine law. Chief Justice Marshall, in his majority opinion, states that “inspection laws are said to be regulations of commerce, and are certainly recognised in the constitution...”¹⁷⁷ By establishing that quarantine and health are subject to the Commerce Clause, Marshall puts the authority over such laws in the hands of the legislative branch.¹⁷⁸ Marshall then gives the states the opportunity to act first in such situations.

The concept of allowing states to act first in quarantine laws was upheld in *Compagnie Francaise de Navigation a Vapeur v. Board of Health*. Here the Court found Louisiana's quarantine laws to be valid until a federal law was passed.¹⁷⁹ Preemption could occur, but only if a law expressly covered the same issue as Louisiana's statute. This means there would only be conflict if the two entities (state and federal) covered the exact same subject. The Court echoed the reasoning of Marshall by recognizing both the preemption of Federal law and the validity of state quarantine laws.

Continuing this examination of what the Courts have recognized as interstate commerce is *Wickard v. Filburn*. The Court held that Congress could regulate local

¹⁷⁶ *Gibbons v Ogden*

¹⁷⁷ *Gibbons v Ogden*

¹⁷⁸ Quarantine laws were "most advantageously exercised by the States themselves." (citation)

¹⁷⁹ *Compagnie Francaise de Navigation a Vapeur v. Board of Health*

activities since "it may still, whatever its nature, be reached by Congress if it exerts a substantial economic effect on interstate commerce, and this irrespective of whether such effect is what might at some earlier time have been defined as 'direct' or 'indirect.'"¹⁸⁰

Would a Zika pandemic be considered interstate commerce? Likely so since the estimated loss in the world's economy could be over \$4 trillion.¹⁸¹ In the United States alone, there would be a \$250 billion price tag.¹⁸²

Religious and Cultural Implications and the Treatment of Corpses

Laws pertaining to diseases also relate to individuals on a case by case basis. Religion, culture, and the treatment of corpses are topics the government must consider when introducing and enforcing laws. In the past, religion and culture are disregarded in times of public health crises. Regulators often rely on their policing powers to keep the public safe, even if that means infringing on religious observations. Normally this would be considered discrimination, however regulators can bypass this by proving what is

¹⁸⁰ Wickard v. Filburn

¹⁸¹ Warwick J. McKibbin & Alexandra A. Sidorenko, Lowy Inst. for Int'l Policy, Global Macroeconomic Consequences of Pandemic Influenza 26 (2006). <http://www.brookings.edu/~media/research/files/papers/2006/2/development-mckibbin/200602.pdf>.

¹⁸² Martin I. Meltzer et al., The Economic Impact of Pandemic Influenza in the United States: Priorities for Intervention, 5 Emerging Infectious Diseases 659 (1999). <http://www.ncbi.nlm.nih.gov.ezproxy.net.ucf.edu/pmc/articles/PMC2627723/pdf/10511522.pdf>.

considered “compelling interest.” There are certain standards of judicial review when a policy is challenged under the law. The most stringent of these reviews is strict scrutiny and is often used when dealing with the courts have deemed as fundamental rights. When courts are determining constitutionality under this level, the government must prove that they had a compelling interest that was narrowly tailored to the situation.¹⁸³ In cases that involve religious rights, strict scrutiny is likely to apply as it is deemed a fundamental right.

In New Jersey, the state attempted to control Tuberculosis (TB). In this widespread control, they mandated the Mantoux test to help fight the spread of the disease.¹⁸⁴ A prisoner did not want to take the test as it went against his religious beliefs as a Christian scientist. The prisoner stood behind the protection of the Religious Freedom and Restoration Act (RFRA). Though the court recognized his religious rights, there was a “compelling state interest in preventing the spread of TB in its prisons by detection at the earliest possible opportunity”, and that “TB is a highly contagious disease that is likely to have devastating and far-reaching effects, unless the infection is held in check by an aggressive tracking program.”¹⁸⁵ The court also found the test to be

¹⁸³ (n.d.). police powers | Wex Legal Dictionary / Encyclopedia | LII / Legal Retrieved April 19, 2017, from https://www.law.cornell.edu/wex/police_powers

¹⁸⁴ 66 Cath. U.L. Rev. 117

¹⁸⁵ Id.

the least restrictive- and most effective- method in preventing TB.¹⁸⁶ The state has an interest in preserving the public health, thus the state's TB test was enforceable.¹⁸⁷

There is further evidence to support the policing power of the government. Smallpox vaccinations were the subject in *Jacobson v. Massachusetts*.¹⁸⁸ Here, the United States Supreme Court described health officials as being there to "protect the public health and public safety."¹⁸⁹ Essentially, smallpox endangered the greater good and it was the government's job to stop it. Protecting the community from disease is more important than an individual's actions based upon religious beliefs.¹⁹⁰

Another important consideration in the realm of quarantine law is the treatment of corpses. Religion and culture aside, dead bodies can and do transmit infections to humans.¹⁹¹ Throughout history there is evidence of using corpses to spread disease. In both medieval and Greek times, corpses would be used against enemies.¹⁹²

The post-mortem handling of Ebola patients played a major role in a significant increase in the number of Ebola infections in the West Africa outbreak. This was often a

¹⁸⁶ Id.

¹⁸⁷ Id.

¹⁸⁸ Id.

¹⁸⁹ Id.

¹⁹⁰ Id.

¹⁹¹ (Navin Paul & Mini E. Jacob, An Outbreak of Cadaver-Acquired Chickenpox in a HealthCare Setting, 43 CLINICAL INFECTIOUS DISEASES 599, 599 (2006)).

¹⁹² (James W. Martin et al., History of Biological Weapons: From Poisoned Darts to Intentional Epidemics, in MEDICAL ASPECTS OF BIOLOGICAL WARFARE 2 (Zygmunt F. Dembek ed., 2007).)

result of religious practices¹⁹³. Bodies of Ebola victims are highly contagious post mortem.¹⁹⁴ During the 2014 West African Ebola outbreak, Liberian President Ellen Johnson Sirleaf demanded the cremation of the bodies of Ebola patients in an attempt to stem the spread of the virus.¹⁹⁵ This caused such anxiety that Ebola cases actually rose as a result since people would refuse to cremate the bodies of their loved ones and instead would keep the bodies in their homes.¹⁹⁶

On an international level, WHO has found room to allow a certain level of tradition while still being subject to the IHR and WHO recommendations. States in WHO affected by the Ebola outbreak, “should ensure funerals and burials are conducted by well-trained personnel, with provision made for the presence of the family and cultural practices, and in accordance with national health regulations, to reduce the risk of Ebola infection.”¹⁹⁷

On a national level, within the US, cultural practices once again take a back seat during outbreaks. There are two points of reasoning for this. First, it has happened before. During the Ebola outbreak in West Africa, CDC gave recommendations that

¹⁹³ New WHO Safe and Dignified Burial Protocol - Key to Reducing Ebola Transmission, WHO (Nov. 7, 2014), <http://www.who.int/mediacentre/news/notes/2014/ebola-burial-protocol/en/>.)

¹⁹⁴ (Joseph Prescott et al., Postmortem Stability of Ebola Virus, 21 EMERGING INFECTIOUS DISEASES 856, 857 (2015)).

¹⁹⁵ Id.

¹⁹⁶ Id.

¹⁹⁷ Statement on the 1st Meeting of the IHR Emergency Committee on the 2014 Ebola Outbreak in West Africa, WHO (Aug. 8, 2014), <http://who.int/mediacentre/news/statements/2014/ebola-20140808/en/>).

were not only less detailed than WHO's, but it also lacked accommodation for religious practices. The federal government often defers to states to decide on such issues. Second, the US has a history of weighing the clinical implications greater than the cultural implications as proven by the above cases. There is also an issue of imbalance. When the CDC leaves broad guidelines, the states often do not fill in the gaps in the same way.

Political Implications

There are times when outbreaks are unknown. After WHO has declared a disease a matter of international concern, it catches some attention. Alternatively, if there are no warnings, the spread of a virus can go unimpeded. When an unknown disease is suspected, it is crucial to have the corpse analyzed. Zika is not in this category (as WHO has declared it an international emergency), however other diseases have been undetected.

An example of how quickly a disease can travel when unhindered and unreported is the SARS (Severe Anti-Respiratory Syndrome) outbreak in China. The outbreak began in China in 2002, although the virus was made public in 2003.¹⁹⁸The disease begins with a high fever, aches, and respiratory symptoms which may develop

¹⁹⁸ "China's Response to SARS - Hoover Institution."
http://www.hoover.org/sites/default/files/uploads/documents/clm7_if.pdf. Accessed 15 Mar. 2017.

into pneumonia and worsened respiratory issues.¹⁹⁹ SARS is spread via respiratory droplets such as coughs, sneezes, or physical contact.²⁰⁰ Even speaking to a person in close range (three feet) can be dangerous.²⁰¹ The disease spread to over 30 countries and was declared a global health threat by the WHO.²⁰²

There are lessons to be learned from this outbreak even if SARS is a very different virus than Zika, both in clinical aspects and in its emergence. A major factor in the spread of SARS was China's failure to properly report the disease.²⁰³ The result of this mishandling not only cost billions,²⁰⁴ but also caused great strain on China's health care system.²⁰⁵ The United States got only a very small sample of the virus. Of the 8,098 people infected, only 8 were in the United States; of the 774 deaths, none of them

¹⁹⁹ "SARS | Home | Severe Acute Respiratory Syndrome | SARS-CoV" 16 Apr. 2013, <https://www.cdc.gov/sars/>. Accessed 15 Mar. 2017.

²⁰⁰ Id.

²⁰¹ Id.

²⁰² "Fear and Stigma: The Epidemic within the SARS Outbreak - Volume" 2 Feb. 2010, <https://wwwnc.cdc.gov/eid/article/10/2/03-0750>. Accessed 16 Mar. 2017.; see also, "SARS | Frequently Asked Questions | CDC." 2 Jul. 2012, <http://www.cdc.gov/sars/about/faq.html>. Accessed 16 Mar. 2017.

²⁰³ "Regulating SARS in China: Law As an Antidote? - Washington" 14 Feb. 2005, http://openscholarship.wustl.edu/cgi/viewcontent.cgi?article=1198&context=law_globalstudies. Accessed 16 Mar. 2017.; See also, "China's Response to SARS - Hoover Institution." http://www.hoover.org/sites/default/files/uploads/documents/clm7_if.pdf. Accessed 15 Mar. 2017.

²⁰⁴ Sun Yuting, Zhongguo neidi jingji yin feidian sunshi 179 yi meiyuan [SARS Caused \$17.9 Billion in Damages in Mainland China], ZHONGGUO QINGIAN BAO [CHINA YOUTH DAILY], Nov. 11, 2003, available at <http://news.sina.com.cn/c/2003-11-11/06122109319.shtml>

²⁰⁵ "Regulating SARS in China: Law As an Antidote? - Washington" 14 Feb. 2005, http://openscholarship.wustl.edu/cgi/viewcontent.cgi?article=1198&context=law_globalstudies. Accessed 16 Mar. 2017.

occurred in the United States.²⁰⁶ The WHO declared the outbreak to be over in 2003.²⁰⁷

Luckily for the world, and the United States, Zika has not followed a similar path. With Zika, the world has been proactive. On the international level countries, and the WHO, have been keeping up with reporting the disease.²⁰⁸ In the United States numerous precautions are being set including funding from Congress. Reporting leads to better precautions, which leads to minimized (or outright nullified) damages from an outbreak.

²⁰⁶ "SARS | Frequently Asked Questions | CDC." 2 Jul. 2012, <http://www.cdc.gov/sars/about/faq.html>. Accessed 16 Mar. 2017.

²⁰⁷ "CDC SARS Response Timeline | About | CDC." 26 Apr. 2013, <http://www.cdc.gov/about/history/sars/timeline.htm>. Accessed 16 Mar. 2017.

²⁰⁸ To be changed: "Zika Virus in Brazil - Alert - Level 2, Practice Enhanced Precautions" <https://wwwnc.cdc.gov/travel/notices/alert/zika-brazil>. Accessed 16 Mar. 2017.

PREVENTION METHODS

This section covers the prevention methods and possible cures for the Zika virus. While some background information is given, what follows is an analysis of the legal implications of each method. The section begins with mosquito control as the most immediate method of prevention that is currently being done. The progress of the Zika virus vaccine and genetically modified mosquitoes are also discussed. The latter two prevention methods are not immediately available and still need time to be developed to combat Zika. All of the methods mentioned below benefit from establishing a dialogue with the general public. Some of the methods are controversial topics, so keeping the public informed of the benefits and effects of these methods will make it easier to implement them.

Mosquito Control and Surveillance

Mosquito control and surveillance is something Congress seems to believe would be effective considering \$394 million was granted to the HHS to “support vector control, technical assistance for states, and international response activities.”²⁰⁹ This section will examine mosquito control in two venues, being in the sky and on land.

A large part of Zika prevention is the spraying of insecticides via airplane, referred to as aerial spraying by the CDC. The choice to spray is left to the states;

²⁰⁹ 092216-CR-Zika Supplemental Summary

according to the CDC, and the actual insecticides allowed are also under local discretion. All insecticides have to be approved by the EPA. In accordance to a CDC recommendation, Florida has completed aerial spraying near Miami. As a result there has been some backlash, mostly stemming from a misunderstanding of the process. When released, droplets of the insecticide- which kill mosquitoes on contact- are light enough to stay airborne for some time. The concerns lies with the use of the insecticide ingredient, Naled. The EPA, and CDC, have stated that Naled poses no health risks when used in the small quantities of aerial spraying.

Spraying potential breeding grounds of the virus will not be done solely in the air. Many counties in Florida are planning on adding numerous jobs to combat Zika.²¹⁰ These jobs pertain to “mosquito control operations” and will start in May when mosquito populations are at their peak.²¹¹ The duties of the new hires will be to set and retrieve mosquito traps.²¹² Another duty will be to educate nearby residents, telling them to empty anything that holds stagnate water.²¹³ The education of residents is important as some people may not know what exactly mosquito operators do. Educating the public about what is being sprayed and reasons will help the operation go smoothly. People

²¹⁰ "PressReader - Orlando Sentinel: 2017-02-15 - Counties add jobs to"
<https://www.pressreader.com/usa/orlando-sentinel/20170215/281496456039415>. Accessed 17 Feb. 2017.

²¹¹ Id.

²¹² Id.

²¹³ Id.

may be wary of what chemicals are being spread, telling the people that the insecticide is approved by the EPA and poses no risk to humans will help alleviate this fear.

Vaccines

There may be skeptics to a vaccine for several reasons. Some people believe that a vaccine may cause several side effects. This reluctance is real as proven by the measles outbreak in 2015. If a vaccine for Zika is ever available, it will be an important matter for the public to accept it, but the law will also play a role. While vaccinations can be viewed as a positive reaction to a Zika outbreak, there may be lawsuits to follow.

Vaccines for Zika may lead to liability issues. If an employer knows that an employee is likely to transmit a disease, should the employer mandate a vaccine? In times of outbreaks (emergencies), would employers have a responsibility to mandate a vaccine?²¹⁴ As seen in several cases, ignoring vaccines can yield consequences. The CDC reported that in 2015, 189 people from twenty-four states and the District of Columbia were infected with measles. Most of the measles cases originated from a single amusement park in California (Kimball).

A major authority in this field is the Occupational Safety and Health

²¹⁴ "From Influenza to Ebola: Legal and Business Implications of ... - SSRN." 17 Aug. 2016, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2814405. Accessed 16 Feb. 2017.

Administration (OSHA) 29 U.S.C.A. § 654.²¹⁵ This imposes an obligation on employers to ensure that the workplace is “free from recognized hazards that are causing or are likely to cause death or serious physical harm to [their] employees...”²¹⁶ There are some situations where the employer may have the duty to mandate a vaccine to prevent the spread of a disease in a work place.

Is it likely that there will be a mandated vaccine? It is unlikely. Zika is not deadly to most individuals and the public may feel the threat only really pertains to pregnant women. It is very likely that there will strong recommendations to get the Zika vaccine, however outside of the couples considering children, the vaccine may not be popular. When regulating vaccines, the government must be reasonable and neither arbitrary nor oppressive.

Other diseases have warranted a mandated vaccine. The Ebola virus for instance, is a deadly disease with a death rate of up to 90%.²¹⁷ Ebola is a much more contagious disease as it may be contracted through bodily fluids such as sweat, blood, and vomit. Ebola was not around long enough to make it to the legal stage, thus many questions were left unanswered. Judging by the way the public acted, it would seem reasonable that a mandatory vaccine could be required in the future. The severity and

²¹⁵ "29 U.S.C. 654(a) - Legal Information Institute - Cornell University."
<https://www.law.cornell.edu/uscode/text/29/654>. Accessed 16 Feb. 2017.

²¹⁶ Id.

²¹⁷ "Centers for Disease Control and Prevention." <https://www.cdc.gov/>. Accessed 16 Feb. 2017.

the probability of contracting the virus are both very high, regulators would have the evidence needed to make a vaccine mandatory. The regulations are unlikely to be found as unreasonable, arbitrary, or oppressive when considering the policing powers available.

Intellectual property is a major component of vaccines and Zika treatments. There are scientist who advocate for shared patents and to share knowledge (and property) of past diseases. The example here is the Zika virus's close relation to Dengue and the West Nile. This relation isn't only useful for tracing the history of the virus, but it may be useful for finding its cure.²¹⁸ If a vaccine is created for the Zika virus, it could prove to be useful for the related viruses as well.²¹⁹ In a way that a communicable disease such as Zika has the potential to infect more individuals when in contact with a large number of people, a vaccine for a communicable disease has the potential to cure a number of diseases when related to more similar viruses.

A vaccine for the Dengue virus, a cousin of Zika and spread by the same mosquito, may be the gateway to a Zika vaccination.²²⁰ In addition there is the West

²¹⁸ <http://www.nbcnews.com/storyline/zika-virus-outbreak/new-dengue-vaccine-may-form-basis-zika-vaccine-n540851>

²¹⁹ 16 Chi.-Kent J. Intell. Prop. 241

²²⁰ Maggie Fox, New Dengue Vaccine May Form Basis for Zika Vaccine, NBC NEWS (Mar. 17, 2016, 12:08 PM), <http://www.nbcnews.com/storyline/zika-virus-outbreak/new-dengue-vaccine-may-form-basis-zika-vaccine-n540851>.

Nile virus vaccine, also a cousin who is spread by the same mosquito.²²¹ These two viruses dictate the road map for the National Institute for Allergy and Infectious Diseases (NIAID).²²² The existence of two very similar viruses (and their vaccines) is helpful in starting the development of a Zika vaccine and may result in clinical trials by the end of 2017.²²³ Even with this head start, a widespread and safe²²⁴ vaccine may still be years away.²²⁵

Genetically Modified Organisms

A controversial prevention method is the use of genetically modified mosquitos. The mosquitos are predicted to lessen the mosquito population since their offspring die almost immediately, Naseem Miller of the Orlando Sentinel reports. According to a study from the University of Pennsylvania, around 60% of Floridians were at least “somewhat” favorable of the use of genetically modified mosquitos.²²⁶ Two thirds of that sample were determined as “Strongly” favored. Spraying repellents is the prevailing

²²¹ "Could We Have a Zika Vaccine Soon? - NBC News." 30 Jan. 2016, <http://www.nbcnews.com/storyline/zika-virus-outbreak/could-we-have-zika-vaccine-soon-n507186>. Accessed 13 Mar. 2017.

²²² Id

²²³ Id

²²⁴ Side effects

²²⁵ Id, Dr. Tony Fauci, head of the National Institute for Allergy and Infectious Diseases

²²⁶ Naseem Miller (2016). Survey: Floridians OK with GM mosquitoes - Orlando Sentinel

method of prevention.²²⁷

There is an ethical question here, whether one can patent life. This thesis is not looking to answer the philosophical conundrums of communicable diseases. Instead, this thesis looks to whether this question can be answered by the law. The specific field of law which holds the answer to this question seems to be patent law. Thus the question, can you patent life?

The United States code specifies what subject matter is patentable.²²⁸ Naturally occurring life is not patentable, e.g. the *Aedes* mosquito was not patentable when it was discovered.²²⁹ The mosquito falls within the United States Code's parameters, "Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title."²³⁰ So does a genetically engineered organism qualify as a "new composition of matter"?

The United States Supreme Court seems to think so. In the case of *Diamond v. Chakrabarty*, the Court was faced with the above question, whether life is patentable.²³¹ Chakrabarty sought to patent a genetically modified bacteria but was denied on the

²²⁷ Id.

²²⁸ 35 U.S.C. 101

²²⁹ Id.

²³⁰ Id.

²³¹ *Diamond v. Chakrabarty* 447 U.S. 303

grounds that the bacteria was a live organism.²³² Although the organism was alive, the Court found it to be eligible for a patent under United States patent law.²³³ Here the bacteria was considered manufactured and a composition of matter under the law.²³⁴ So yes, life is patentable.

Powered by Congress – The University of Central Florida

The University of Central Florida (UCF) had been granted \$1.3 million dollars to fight Zika. This money is divided into several areas of study throughout the different colleges on the campus. Professors in the college of medicine were granted the largest sum of money for their work. \$500,000 of the grant are going towards studying how Zika fends off the body's immunity response and how a mosquito's saliva may counteract that.²³⁵ Other professors are seeking to develop a new point-of-care diagnostic test for Zika infection detection.²³⁶ This testing conducted at the time and place of patient care could be effective in dealing with the Zika virus since patients diagnosed with Zika are often the few who show symptoms. This type of testing allows for more patients to be tested routinely.

²³² Id. The organism was a genetically modified version of another bacteria

²³³ Id. See also 35 U.S.C. 101

²³⁴ Id. at 305

²³⁵ "College of Sciences NewsUCF Gets \$1.3 million to Fight Zika" 2 Feb. 2017, <https://sciences.ucf.edu/news/ucf-gets-1-3-million-fight-zika/>. Accessed 16 Feb. 2017.

²³⁶ Id.

PROPOSED LAWS

This Section introduces the new or proposed regulations relating to the Zika virus. New laws may help in the battle against the Zika virus. Some of these would be state statutory changes and others could include administrative rules. Many of these rules are a direct reaction to the 2014 Ebola outbreak.

Notice for Proposed Rulemaking and New CDC Powers

Besides the framework in place, the CDC and HHS are currently proposing to amend its quarantine regulations. This is called the Notice for Proposed Rulemaking, NPRM, and is in a direct response to the recent outbreaks of Ebola, measles, and other new diseases such as Zika. Among the major provisions of the NPRM are new definitions, an increased effort to screen the health of travelers, and requiring airlines to report instances of passenger death or illness. In addition, the NPRM suggests a “provision allowing for implementation of travel restrictions and issuance of travel permits by CDC”.²³⁷

The provision that impacts aviation the most is the reporting of passenger and crew who have been exposed. The NPRM analyses the costs and benefits of these reports in respect to airlines. The proposed provision, according to the NPRM, “is

²³⁷ NPRM 2016

intended to provide airlines with flexibility regarding the exact routing of reports of deaths or ill persons” and allows airlines to make their own system (NPRM, 2016). The notification system could be based on the pilot in command sending a report to air traffic control, ATC, who eventually then relays it to HHS.

The Health and Human Services (HHS) for the Center for Disease Control and Prevention (CDC) have published proposed amendments for the CDC’s quarantine powers. The new powers were set to come into play February 21st, 2017, and will affect both the interstate and foreign abilities available to the CDC. These new powers are referred to as the “Final Rule” on the CDC’s website. The summary as stated in the document (82 FR 6890) is as follows:

- This rule is concerned with care of persons who are ill by
- Increasing the number of people who qualify for aid to 200% of the poverty level
- Providing legal counsel for those who are isolated or quarantined
- Providing for medical review of those who may have been exposed and are isolated or quarantined
- Protecting individuals by providing administrative due process which includes translators and interpreters (define due process notice and a chance to be heard in definitions)
- Implementing measures to protect the public in the least restrictive

manner

The final rule focuses on reporting and quarantine powers. A major provision of the powers are definitions. Examples being “reasonably believed to be infected” and what a “qualifying stage” is. The exact meaning and extent of these definitions are decided by the CDC.²³⁸ The HHS and CDC believe it is the necessary step following the Ebola and MERS outbreaks, but time will be needed to find out if these new powers are actually needed.

²³⁸ Id at 6891

CONCLUSION

The Zika virus remains a global health issue. Throughout this thesis, there have been four central recommendations which acted as the drivers for change. The first recommendation was for a change of ideology: practicing proactivity rather than reactivity. The second recommendation was a change in national quarantine law procedure. Congress' power of the purse allows it to have the most effective means to combat the Zika virus. The third recommendation called for the reexamination of international authority. The World Health Organization lacks the same authority as the Center for Disease Control and Prevention in the United States. This has left the WHO unable to help countries that do not have the ability to fight disease on their own. The last recommendation was to simply educate the public. This thesis has shown that the public's reaction in an outbreak is often important in the promulgation of regulations and overall mitigation of the disease. Authorities such as the CDC have already begun providing as much information as they can through page length summaries, booklets, and even children's pamphlets.²³⁹

Recommendations and Proposals

In line with this thesis recommendation, there is a great deal of evidence for

²³⁹ CDC (n.d.). Mosquito Bites are Bad. Retrieved April 21, 2017, from <https://www.cdc.gov/zika/pdfs/zika-activity-book.pdf>

efforts around the world and the United States to be proactive in stopping Zika. The United States Congress has demonstrated proactivity in their appropriation of \$1.1 billion to the Health and Human Services and other organizations. The commitment shown by Congress opens the way for another recommendation, reform on a national level. Congressional action creating regulations based upon interstate commerce would be more effective than a state by state approach.

There are advocates for reform on a national level. Through the commerce and the supremacy clause, the Federal government's authority supersedes the states'. As described in this thesis, that power extends to agencies such as the CDC. Advocates of this top-down approach promote the uniformity of having the national government take the first steps and allowing some wiggle room for the states. This is the prevailing theory of quarantine law in the United States as provided by the Federal Plan and the powers available to agencies.

As for reform on an international level, there is rhetoric concerning the validity of authorities such as the WHO. The organization lacks the policing powers that are available to entities such as the CDC. Without these powers the WHO may be seen as hollow guidelines that do not have any actual effect. The solution to this appears to be a call for greater global funding. While competitors are on the heels of the WHO, it is crucial that the WHO is able to respond to the next potential outbreak lest it faces the same level of scrutiny it did during the 2014 Ebola outbreak.

Zika could become an issue in upcoming legal cases. Many environmental cases require the demonstration of what is considered to be “actual damages”. These damages must relate to the plaintiffs directly, if not there is no reason for a court to hear the case. These damages range from cancer resulting from toxic waste to global climate change accelerated by greenhouse gas emissions. Zika fits into these categories as a basis for actual damages. In the more personal and acute injuries, such as those which cause physical harm, Zika can find its way in nicely through its clinical implications. The effects on adults are not extreme, especially compared to other diseases in this thesis. Instead, the effects on newborns (i.e. microcephaly and other congenital diseases) could make up the basis for any claims arising from Zika.

This thesis has examined numerous venues of quarantine laws that have yet to have the opportunity to be utilized. This is may seem like a good problem to have, but these laws must remain in place in case an outbreak does emerge. The WHO had previously called for a public health emergency for the Zika virus. As of November 18, 2016, it is no longer considered an emergency,²⁴⁰ although the WHO maintains that there be high vigilance over the matter.²⁴¹ This announcement takes the pressure off of the agencies contemplating quarantine laws, and more pressure on active precautions.

²⁴⁰ "WHO ends Zika public health emergency - CNN.com." 18 Nov. 2016,

<http://www.cnn.com/2016/11/18/health/who-ends-zika-public-health-emergency/>. Accessed 16 Mar. 2017.

²⁴¹ "WHO | Zika situation report." <http://www.who.int/emergencies/zika-virus/situation-report/10-march-2017/en/>. Accessed 16 Mar. 2017.

Vaccine research, mosquito control, detection technology, genetically modified mosquitoes, these prevention methods all stem from funding. Research and R&D require money to be sustained. The solution to this has traditionally been public funding; however, private funding has been gaining momentum as seen by the World Bank's effort to construct an organization similar to the WHO.

The United States could be considered lucky. In the past few global outbreaks that ravaged the world- SARS, Ebola, and the recent H1N1 outbreaks – the United States has only gotten a fraction of what other countries have dealt with. The measles outbreak is something entirely different however. A major factor in this outbreak was the number of individuals who were not vaccinated.²⁴² The outbreak mainly originated in the United States, and it was mainly up to the public to deal with it. Could the same could be said for the Zika virus? The outbreak did not originate in the United States but a second wave could if left unattended.

The Zika virus may seem like it is on its way out, it would be best for the country (and the world) to remain vigilant and to continue to support efforts to stop the spread of Zika. At the current state, funding is there: The United States Congress supports the fight against Zika. It is perhaps the greatest way the government to act proactivity through federal funding.

²⁴² "Measles | Cases and Outbreaks | CDC." 6 Mar. 2017, <https://www.cdc.gov/measles/cases-outbreaks.html>. Accessed 16 Mar. 2017.

Areas of Future Research

The research and data on the Zika Virus is relatively young. Despite its emergence in 1947, there was not much cause for alarm until 2007. Even then, the United States had not been affected until around 2015. Further research is likely to be done on the clinical aspects of Zika, the amendments on quarantine law, and the production of prevention methods. Clinically there is still much that authorities do not yet know. For example, it is still unknown whether there is a certain period where a woman is most vulnerable to Zika while pregnant. There are still studies to be done to find a link to Guillain-Barre syndrome, more accurate statistics on microcephaly, and whether humans become immune to Zika once they are exposed.

Quarantine law is another venue for further research. New powers are likely to come to the organizations such as the Center for Disease Control and Prevention. There could also be an amendment to the executive order, allowing national response doctrines to include the Zika virus. There is much to research in the international venue as the World Health Organization may try to implement a reform of their own with the pressure of privately funded rivals. Lastly an area rich in potential is prevention of the virus itself. Much of the focus of future research would likely not be on mosquito control, but on prevention of the disease and its spread. Prevention methods such as vaccines and genetically modified mosquitoes have not yet come to fruition are ripe for legal

analysis. Further research is needed for the general public as well. As the virus is studied more there may be certain things that the public can do to mitigate the spread of Zika. Backed by research, authorities can help spread awareness through a constant dialogue. Without this communication, the public may be unaware of proper prevention and may end up helping to spread the disease rather than preventing it.²⁴³

Lastly with further areas of research, it is important not to lose interest in the Zika virus. Zika remains a threat to global public health even during a hiatus. Looking at its past, it is not uncommon for the virus to disappear after an outbreak only to reemerge in a new region a few years after. Retaining interest in Zika also means constant reporting and keeping track of it. Tracking and reporting cases of the virus during a hiatus is just as important as reporting during an outbreak since a great deal of information is still needed. The long term effects of the virus, if any, are still unknown and will need further research. Because these long term effects are not known, it is up to both national and international authorities to keep up with reporting cases of Zika. While the 2014 Ebola outbreak acted as a wakeup call for some authorities, the 2015-2016 Zika outbreak acted as a benchmark for what quarantine laws are either available or have yet to come. It will take time to see whether the \$1.1 billion allocated by the United States Congress and the new powers of the CDC and HHS will be effective in combating Zika.

²⁴³ Refer to the incident in the 2014 West African Ebola outbreak where the cremation of the bodies of Ebola patients were mandated yet many chose not to for cultural reasons. This reluctance resulted in a rise in Ebola cases.

Many authorities mentioned in this thesis are practicing proactivity, and it is important that it stays that way. It is the time to remain vigilant, to continue funding efforts to fight the virus, and to keep the public informed about the clinical and legal implications of the Zika virus.

BIBLIOGRAPHY

092216-CR-Zika Supplemental Summary

29 Fla. Stat. sec. 381.001

29 Fla. Stat. sec. 381.0016

29 U.S.C. 654(a)

35 U.S.C. 101

35 U.S.C. 101

42 CFR §70.5

42 CFR §71

42 CFR §71.44

42 Code of Federal Regulations §70

42 U.S.C. § 264(a) (2012).

42 U.S.C. §265

42 USC §269-270

49 USC §1301

Baker v. Carr, 369 U.S. 186 (1962)

Basics | Vaccines.gov. (n.d.). Retrieved March 25, 2017, from

<https://www.vaccines.gov/basics/>

Cao-Lormeau, V. M., Blake, A., Mons, S., Lastère, S., Roche, C., Vanhomwegen, J., ... &

Vial, A. L. (2016). Guillain-Barré Syndrome outbreak associated with Zika virus

infection in French Polynesia: a case-control study. *The Lancet*, 387(10027), 1531-1539.

Case Counts in the US | Zika virus | CDC. 23 Mar. 2017,

<https://www.cdc.gov/zika/geo/united-states.html>. Accessed 29 Mar. 2017.

CDC (14 April 2016). "2014 Ebola Outbreak in West Africa - Case Counts - CDC."

<http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/case-counts.html>.

Accessed 14 Mar. 2017.

CDC (n.d.). Mosquito Bites are Bad. Retrieved April 21, 2017, from

<https://www.cdc.gov/zika/pdfs/zika-activity-book.pdf>

CDC's New Miami Zika 'Red Zone' Means Stay Out for ... - NBC News. 19 Oct. 2016,

<http://www.nbcnews.com/storyline/zika-virus-outbreak/cdc-s-new-miami-zika-red-zone-means-stay-out-n669401>. Accessed 14 Mar. 2017.

CDC SARS Response Timeline | About | CDC. 26 Apr. 2013,

<http://www.cdc.gov/about/history/sars/timeline.htm>. Accessed 16 Mar. 2017.

Chan, J. F., Choi, G. K., Yip, C. C., Cheng, V. C., & Yuen, K. Y. (2016). Zika fever and congenital Zika syndrome: an unexpected emerging arboviral disease. *Journal of Infection*, 72(5), 507-524.

China's Response to SARS - Hoover Institution.

http://www.hoover.org/sites/default/files/uploads/documents/clm7_jf.pdf. Accessed 15 Mar. 2017.

College of Sciences NewsUCF Gets \$1.3 million to Fight Zika 2 Feb. 2017,
<https://sciences.ucf.edu/news/ucf-gets-1-3-million-fight-zika/>. Accessed 16 Feb.
2017.

Communicable Disease - ACPHD. <http://www.acphd.org/communicable-disease.aspx>.
Accessed 26 Mar. 2017.

Compagnie Francaise de Navigation a Vapeur v. Bd. of Health., 186 U.S. 380 (1902).

Congress Ends Spat, Agrees To Fund \$1.1 Billion To Combat Zika - NPR. (2016,
September 28). Retrieved April 2, 2017, from <http://www.npr.org/sections/health-shots/2016/09/28/495806979/congress-ends-spat-over-zika-funding-approves-1-1-billion>

Congress Stops Bickering And Approves \$1.1 Billion To Fight Zika - NPR. (2016,
September 28). Retrieved April 3, 2017, from <http://www.npr.org/sections/health-shots/2016/09/28/495806979/congress-ends-spat-over-zika-funding-approves-1-1-billion>

Contributors' names (Last edited date). *Title of resource*. Retrieved from <http://Web address>
for OWL resource

Could We Have a Zika Vaccine Soon? - NBC News.30 Jan. 2016,
<http://www.nbcnews.com/storyline/zika-virus-outbreak/could-we-have-zika-vaccine-soon-n507186>. Accessed 13 Mar. 2017.

Dallas Nurses Comforted Thomas Duncan as He Died of Ebola | Time" 25 Oct. 2014,

<http://time.com/3538782/thomas-eric-duncan-ebola/>. Accessed 14 Mar. 2017.

Dengue and the Aedes albopictus mosquito - CDC.

<https://www.cdc.gov/dengue/resources/30jan2012/albopictusfactsheet.pdf>.

Accessed 18 Feb. 2017.

Diamond v. Chakrabarty, 447 U.S. 303

Director-General summarizes the outcome of the - World Health

<http://www.who.int/mediacentre/news/statements/2016/emergency-committee-zika-microcephaly/en/>. Accessed 14 Mar. 2017.

Ebola Data and Statistics, World Health Org. (WHO),

<http://apps.who.int/gho/data/view.ebola-sitrep.ebola-summary-latest?lang=en> (last visited Sept. 17, 2016)

El Niño & La Niña (El Niño-Southern Oscillation) | NOAA Climate.gov. (n.d.). Retrieved

April 15, 2017, from <https://www.climate.gov/enso>

El Niño and climate change—contributing factors in the ... - The Lancet. 1 Feb. 2016,

[http://thelancet.com/journals/lancet/article/PIIS0140-6736\(16\)00256-7/fulltext](http://thelancet.com/journals/lancet/article/PIIS0140-6736(16)00256-7/fulltext).

Accessed 14 Mar. 2017.

Estimated range of Aedes aegypti and Aedes albopictus in the US - CDC. 19 Jan. 2017,

<http://www.cdc.gov/zika/vector/range.html>. Accessed 18 Feb. 2017.

Executive Order 13295: Revised List Of Quarantinable ... - CDC. (n.d.). Retrieved April 20, 2017, from <http://www.cdc.gov/sars/quarantine/exec-2004-04-03.html>

Facts about Microcephaly | Birth Defects | NCBDDD | CDC. (2016, December 7). Retrieved April 3, 2017, from <http://www.cdc.gov/ncbddd/birthdefects/microcephaly.html>

Fear and Stigma: The Epidemic within the SARS Outbreak - Volume 2 Feb. 2010, <https://wwwnc.cdc.gov/eid/article/10/2/03-0750>. Accessed 16 Mar. 2017.; see also, "SARS | Frequently Asked Questions | CDC." 2 Jul. 2012, <http://www.cdc.gov/sars/about/faq.html>. Accessed 16 Mar. 2017.

Federal Administrative Law: A Brief Overview. (2016, December 12). Retrieved March 25, 2017, from <http://www.ilsdc.org/federal-administrative-law-a-brief-overview>

Federal Administrative Law: A Brief Overview. (2016, December 12). Retrieved March 25, 2017, from <http://www.ilsdc.org/federal-administrative-law-a-brief-overview>

For Zika-infected pregnancies, microcephaly risk may be as high as 13 (2016, May 25). Retrieved April 3, 2017, from <https://www.washingtonpost.com/news/to-your-health/wp/2016/05/25/for-zika-infected-pregnancies-microcephaly-risk-may-be-as-high-as-13-percent/>

From Influenza to Ebola: Legal and Business Implications of ... - SSRN. 17 Aug. 2016, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2814405. Accessed 16 Feb. 2017.

German Chancellor Angela Merkel made clear that the WHO's response to the 2014 Ebola epidemic was nothing less than catastrophic. Kirsten Grieshaber, German Chancellor Merkel Tells WHO Global Catastrophe Plan Needed for Epidemic Outbreaks, US News (May 18, 2015).

<http://www.usnews.com/news/world/articles/2015/05/18/merkel-global-catastrophe-plan-needed-after-ebola-crisis>

Gibbons v. Ogden 22 U.S. (9 Wheat.) 1, 203-04 (1824).

Grants | HHS.gov. <https://www.hhs.gov/grants/grants/>. Accessed 25 Mar. 2017.

Guillain-Barré Syndrome outbreak associated with Zika ... - The Lancet. (n.d.). Retrieved March 30, 2017, from [http://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(16\)00562-6/references](http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(16)00562-6/references)

HHS Agencies & Offices | HHS.gov - U.S. Department of Health and <https://www.hhs.gov/about/agencies/hhs-agencies-and-offices/index.html>. Accessed 25 Mar. 2017.

<http://www.nbcnews.com/storyline/zika-virus-outbreak/new-dengue-vaccine-may-form-basis-zika-vaccine-n540851>

James W. Martin et al., History of Biological Weapons: From Poisoned Darts to Intentional Epidemics, in MEDICAL ASPECTS OF BIOLOGICAL WARFARE 2 (Zygmunt F. Dembek ed., 2007).

Joseph Cariz (28 Oct. 2016) "Al Gore claims global warming will lead to faster spread of Zika virus" 28 Oct. 2016, <http://www.politifact.com/global-news/statements/2016/oct/28/al-gore/al-gore-claims-global-warming-will-lead-faster-spr/>. Accessed 14 Mar. 2017.

Joseph Prescott et al., Postmortem Stability of Ebola Virus, 21 EMERGING INFECTIOUS DISEASES 856, 857 (2015)

Justiciability | Wex Legal Dictionary / Encyclopedia | LII / Legal (n.d.). Retrieved March 25, 2017, from <https://www.law.cornell.edu/wex/justiciability>

Justiciability | Wex Legal Dictionary / Encyclopedia | LII / Legal <https://www.law.cornell.edu/wex/justiciability>. Accessed 15 Feb. 2017.

Kelly Folkers (2016) Zika: The Millennials' STD? New York Times. Retrieved from http://www.nytimes.com/2016/08/21/opinion/sunday/zika-the-millennials-std.html?_r=0

Kimball, T. D. (2016). The Contagion of Governmental Leadership: A Renewed Call for Increased Federal Presence in Communicable Disease Emergencies. *Loy. L. Rev.*, 62, 113-155

Lessons Learned from the 1918–1919 Influenza Pandemic in ... - NCBI." <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1997248/>. Accessed 22 Feb. 2017.

Lujan v. Defenders of Wildlife, 504 US 555 (1992)

Maggie Fox (2016) CDC's New Miami Zika 'Red Zone' Means Stay Out for Pregnant Women. NBC News.

Maggie Fox, New Dengue Vaccine May Form Basis for Zika Vaccine, NBC NEWS (Mar. 17, 2016, 12:08 PM), <http://www.nbcnews.com/storyline/zika-virus-outbreak/new-dengue-vaccine-may-form-basis-zika-vaccine-n540851>.

Maria Merritt, Bioethics, Philosophy and Global Health, 7 Yale J. Health Pol'y, L. & Ethics 273, 278 (2013).

Martin I. Meltzer et al., The Economic Impact of Pandemic Influenza in the United States: Priorities for Intervention, 5 Emerging Infectious Diseases 659 (1999). [http://www-ncbi.nlm.nih.gov.ezproxy.net.ucf.edu/pmc/articles/PMC2627723/pdf/10511522.pdf](http://www.ncbi.nlm.nih.gov.ezproxy.net.ucf.edu/pmc/articles/PMC2627723/pdf/10511522.pdf).

Massachusetts v. Environmental Protection Agency, 549 U.S. 497 (2007)

Measles | Cases and Outbreaks | CDC. 6 Mar. 2017, <https://www.cdc.gov/measles/cases-outbreaks.html>. Accessed 16 Mar. 2017.

MedicineNet (n.d.). Medical Definition of Virus. Retrieved March 23, 2017, from <http://www.medicinenet.com/script/main/art.asp?articlekey=5997>

Merriam-Webster (n.d.). Disease | Disease Definition. Retrieved April 6, 2017, from <https://www.merriam-webster.com/dictionary/disease>

Naseem Miller (2016). Survey: Floridians OK with GM mosquitoes - Orlando Sentinel

Mission, Role and Pledge | About | CDC. 14 Apr. 2014,

<http://www.cdc.gov/about/organization/mission.htm>. Accessed 25 Mar. 2017.

Monaghan, A. J., Sampson, K. M., Steinhoff, D. F., Ernst, K. C., Ebi, K. L., Jones, B., & Hayden, M. H. (2015). The potential impacts of 21st century climatic and population changes on human exposure to the virus vector mosquito *Aedes aegypti*. *Climatic Change*, 1-14.

Naseem Miller (September 1, 2016) Survey: Floridians OK with GM Mosquitoes. Orlando Sentinel.

National Response Framework | FEMA.gov. 16 Jun. 2016, <https://www.fema.gov/national-response-framework>. Accessed 14 Mar. 2017.

Navin Paul & Mini E. Jacob, An Outbreak of Cadaver-Acquired Chickenpox in a HealthCare Setting, *43 CLINICAL INFECTIOUS DISEASES* 599, 599 (2006)

Nelson B, Morrison S, Joseph H, Wojno A, Lash RR, Haber Y, Berro A, Cetron M, Grills A. Travel Volume to the United States from Countries and U.S. Territories with Local Zika Virus Transmission. *PLOS Currents Outbreaks*. 2016 May 31 . Edition 1. doi: 10.1371/currents.outbreaks.ac6d0f8c9c35e88825c1a1147697531c.

New WHO Safe and Dignified Burial Protocol - Key to Reducing Ebola Transmission, WHO (Nov. 7, 2014), <http://www.who.int/mediacentre/news/notes/2014/ebola-burial-protocol/en/>.)

Nicastri, E., Castilletti, C., Liuzzi, G., Iannetta, M., Capobianchi, M. R., & Ippolito, G. (2016). Persistent detection of Zika virus RNA in semen for six months after symptom onset in a traveller returning from Haiti to Italy, February 2016. *Eurosurveillance*, 21(32).

Nishiura, H., Kinoshita, R., Mizumoto, K., Yasuda, Y., & Nah, K. (2016). Transmission potential of Zika virus infection in the South Pacific. *International journal of infectious diseases*, 45, 95-97.

NPRM 2016

Ott, M., Shaw, S. F., Danila, R. N., & Lynfield, R. (2007). Lessons learned from the 1918–1919 influenza pandemic in Minneapolis and St. Paul, Minnesota. *Public Health Reports*, 122(6), 803-810.

Pandemic Emergency Facility: Frequently Asked Questions, World Bank,
<http://www.worldbank.org/en/topic/pandemics/brief/pandemic-emergency-facility-frequently-asked-questions>

Paul, N., & Jacob, M. E. (2006). An outbreak of cadaver-acquired chickenpox in a health care setting. *Clinical infectious diseases*, 43(5), 599-601.

Paz, S., & Semenza, J. C. (2016). El Niño and climate change—contributing factors in the dispersal of Zika virus in the Americas?. *The Lancet*, 387(10020), 745.

Police powers | Wex Legal Dictionary / Encyclopedia | LII / Legal (n.d.). Retrieved April 19, 2017, from https://www.law.cornell.edu/wex/police_powers

Political Question Doctrine | Wex Legal Dictionary / Encyclopedia | LII (n.d.). Retrieved March 25, 2017, from https://www.law.cornell.edu/wex/political_question_doctrine.

POLL: Most Americans Want Congress To Make Zika Funding A ... - NPR. (2016, September 1). Retrieved April 2, 2017, from <http://www.npr.org/sections/health-shots/2016/09/01/492103236/poll-most-americans-want-congress-to-make-zika-funding-a-high-priority>

Preemption | Wex Legal Dictionary / Encyclopedia | LII / Legal (n.d.). Retrieved March 25, 2017, from <https://www.law.cornell.edu/wex/preemption>

PressReader - Orlando Sentinel: 2017-02-15 - Counties add jobs to <https://www.pressreader.com/usa/orlando-sentinel/20170215/281496456039415>.

Accessed 17 Feb. 2017.

Programs & Services | HHS.gov." <https://www.hhs.gov/programs/>. Accessed 25 Mar. 2017.

Regulating SARS in China: Law As an Antidote? - Washington" 14 Feb. 2005, http://openscholarship.wustl.edu/cgi/viewcontent.cgi?article=1198&context=law_globalstudies. Accessed 16 Mar. 2017.;

Reproduction number for the 2014 Ebola strand "Estimating the Reproduction Number of Ebola Virus (EBOV) During" 2 Sep. 2014, <http://currents.plos.org/outbreaks/article/estimating-the-reproduction-number-of-zaire-ebolavirus-ebov-during-the-2014-outbreak-in-west-africa/>. Accessed 14 Mar. 2017.

Sandra Anderson-Guerra Sosa* and Adriane Johnson (2010). Emergence and Re-Emergence of H1N1 Influenza: Uncanny Parallels Between the Administrations of U.S. Presidents Woodrow Wilson and Barack Obama

SARS | Frequently Asked Questions | CDC." 2 Jul. 2012,
<http://www.cdc.gov/sars/about/faq.html>. Accessed 16 Mar. 2017.

SARS | Home | Severe Acute Respiratory Syndrome | SARS-CoV" 16 Apr. 2013,
<https://www.cdc.gov/sars/>. Accessed 15 Mar. 2017.

Schaffner, F., & Mathis, A. (2014). Dengue and dengue vectors in the WHO European region: past, present, and scenarios for the future. *The Lancet Infectious Diseases*, 14(12), 1271-1280.

Signs and Symptoms, CDC, <http://www.cdc.gov/vhf/ebola/symptoms/index.html> Accessed Sept. 17, 2016

Standing | Wex Legal Dictionary / Encyclopedia | LII / Legal (n.d.). Retrieved March 25, 2017, from <https://www.law.cornell.edu/wex/standing>

Standing | Wex Legal Dictionary / Encyclopedia | LII / Legal"
<https://www.law.cornell.edu/wex/standing>. Accessed 15 Feb. 2017.

Statement on the 1st Meeting of the IHR Emergency Committee on the 2014 Ebola Outbreak in West Africa, WHO (Aug. 8, 2014), <http://who.int/mediacentre/news/statements/2014/ebola-20140808/en/>).

Sun Yuting, Zhongguo neidi jingji yin feidian sunshi 179 yi meiyuan [SARS Caused \$17.9

Supremacy Clause | Wex Legal Dictionary / Encyclopedia | LII / Legal (n.d.). Retrieved

March 25, 2017, from https://www.law.cornell.edu/wex/supremacy_clause

The Model State Emergency Health Powers Act."

<http://www.publichealthlaw.net/ModelLaws/MSEHPA.php>. Accessed 13 Mar. 2017.

The potential impacts of 21st century climatic and population changes"

<http://link.springer.com/article/10.1007/s10584-016-1679-0>. Accessed 18 Feb. 2017.

The World Health Organization (2005) International Health Regulations

Top Questions on Zika Simple Answers Developed by ASTHO 12.9.16 (2016,

December 9). Retrieved April 3, 2017, from [http://www.astho.org/Infectious-](http://www.astho.org/Infectious-Disease/Top-Questions-On-Zika-Simple-Answers-Developed-by-ASTHO/)

[Disease/Top-Questions-On-Zika-Simple-Answers-Developed-by-ASTHO/](http://www.astho.org/Infectious-Disease/Top-Questions-On-Zika-Simple-Answers-Developed-by-ASTHO/)

Transmission | Zika virus | CDC (2017, January 20).. Retrieved March 30, 2017, from

<https://www.cdc.gov/zika/transmission/>

Transmission potential of Zika virus infection in the South Pacific" 25 Feb. 2016,

[http://www.ijidonline.com/article/S1201-9712\(16\)00037-0/abstract](http://www.ijidonline.com/article/S1201-9712(16)00037-0/abstract). Accessed 14

Mar. 2017.

Warwick J. McKibbin & Alexandra A. Sidorenko, Lowy Inst. for Int'l Policy, Global

Macroeconomic Consequences of Pandemic Influenza 26 (2006).

[http://www.brookings.edu/~media/research/files/papers/2006/2/development-](http://www.brookings.edu/~media/research/files/papers/2006/2/development-mckibbin/200602.pdf)

[mckibbin/200602.pdf](http://www.brookings.edu/~media/research/files/papers/2006/2/development-mckibbin/200602.pdf).

WHO (2010, February 24). What is a pandemic?. Retrieved March 23, 2017, from http://www.who.int/csr/disease/swineflu/frequently_asked_questions/pandemic/en/

WHO | Disease outbreaks. (n.d.). Retrieved March 23, 2017, from http://www.who.int/topics/disease_outbreaks/en/

WHO | Ebola virus disease." <http://www.who.int/mediacentre/factsheets/fs103/en/>.
Accessed 14 Mar. 2017.

WHO | Frequently asked questions on Ebola virus disease. (n.d.). Retrieved March 25, 2017, from <http://www.who.int/csr/disease/ebola/faq-ebola/en/>

WHO | Vector-borne diseases (n.d).. Retrieved April 3, 2017, from <http://www.who.int/mediacentre/factsheets/fs387/en/>

WHO | What is a pandemic? (2010, February 24). Retrieved March 23, 2017, from http://www.who.int/csr/disease/swineflu/frequently_asked_questions/pandemic/en/

WHO | Zika situation report." <http://www.who.int/emergencies/zika-virus/situation-report/10-march-2017/en/>. Accessed 16 Mar. 2017.

WHO ends Zika public health emergency - CNN.com." 18 Nov. 2016,
<http://www.cnn.com/2016/11/18/health/who-ends-zika-public-health-emergency/>.
Accessed 16 Mar. 2017.

WHO Leadership Statement on the Ebola Response and WHO Reforms, WHO (Apr. 16, 2015), <http://www.who.int/csr/disease/ebola/joint-statement-ebola/en/>

[<https://perma.cc/BQ5Z-LJAM>] (archived Sept. 18, 2016); See also

http://www.who.int/about/who_reform/emergency-capacities/who-health-emergencies-programme-progress-report-march-2016.pdf?ua=1

WHO, and agency of the United Nations, was established in 1948 (citation)

WHO: Zika mosquitos can travel by planes - AeroTime." 19 Feb. 2016,

<https://www.aerotime.aero/en/civil/10320-who-zika-mosquitos-can-travel-by-planes>.

Accessed 18 Feb. 2017.

Wickard v. Filburn, 317 U.S. 111, 125 (1942).

ZHONGGUO QINGIAN BAO (Nov. 11). 2003Billion in Damages in Mainland China,

available at <http://news.sina.com.cn/c/2003-11-11/06122109319.shtml>

Zika and Animals | Zika virus | CDC (2016, August 5). Retrieved April 3, 2017, from

<http://www.cdc.gov/zika/transmission/qa-animals.html>

Zika and Guillain-Barré Syndrome | Zika virus | CDC (2016, August 9). Retrieved March 30,

2017, from <http://www.cdc.gov/zika/healtheffects/gbs-qa.html>

Zika fever and congenital Zika syndrome: An unexpected emerging" 29 Feb. 2016,

[http://www.journalofinfection.com/article/S0163-4453\(16\)00061-X/abstract](http://www.journalofinfection.com/article/S0163-4453(16)00061-X/abstract).

Accessed 19 Feb. 2017.

Zika Is Linked To Microcephaly, Health Agencies Confirm : The Two" 31 Mar. 2016,

<http://www.npr.org/sections/thetwo-way/2016/03/31/472607576/health-agencies-confirm-zika-is-linked-with-microcephaly>. Accessed 20 Feb. 2017.

Zika Virus | CDC." <https://www.cdc.gov/zika/>. Accessed 30 Mar. 2017.

Zika virus found to remain in sperm for up to six months - The Telegraph (2016, August 12). Retrieved March 30, 2017, from

<http://www.telegraph.co.uk/news/2016/08/12/zika-virus-found-to-remain-in-sperm-for-up-to-six-months/>

Zika Virus in Brazil - Alert - Level 2, Practice Enhanced Precautions"

<https://wwwnc.cdc.gov/travel/notices/alert/zika-brazil>. Accessed 16 Mar. 2017.

Zika: The Millennials' S.T.D.? - The New York Times." 20 Aug. 2016,

<https://www.nytimes.com/2016/08/21/opinion/sunday/zika-the-millennials-std.html>.

Accessed 14 Mar. 2017.