

Spring 2019

The Economic and Social Impact of Zika on Women in the United States and Brazil

Kayla Chipongian
Carroll College

Follow this and additional works at: https://scholars.carroll.edu/langlit_theses

Part of the [International Public Health Commons](#), [Medicine and Health Commons](#), [Other Economics Commons](#), and the [Women's Health Commons](#)

Recommended Citation

Chipongian, Kayla, "The Economic and Social Impact of Zika on Women in the United States and Brazil" (2019). *Languages and Literature Undergraduate Theses*. 131.
https://scholars.carroll.edu/langlit_theses/131

This Thesis is brought to you for free and open access by the Languages and Literature at Carroll Scholars. It has been accepted for inclusion in Languages and Literature Undergraduate Theses by an authorized administrator of Carroll Scholars. For more information, please contact tkratz@carroll.edu.

SIGNATURE PAGE

This thesis for honors recognition has been approved for the

Department of Languages & Literature.

Ryan Hallows
Director

4/29/19
Date

RYAN HALLOWS
Print Name

Jennifer Glowienka
Reader

4/29/19
Date

Jennifer Glowienka
Print Name

Elvira Roncalli
Reader

4/29/19
Date

Elvira Roncalli
Print Name

The Economic and Social Impact of Zika on Women in the United States and Brazil

Kayla Chipongian

Honors Thesis

Carroll College

May 1, 2019

Abstract

Zika is a disease common in tropical areas that is transmitted primarily by *Aedes* mosquitoes. However, Zika can also be transmitted through sexual intercourse. In 2016, the World Health Organization declared the spread of Zika to be a public health emergency. The year before, the Brazilian Ministry of Health reported an unusual increase in cases of microcephaly in the state of Pernambuco, located in the northeast of Brazil, and in 2016 the first outbreak of Zika in the continental United States occurred in Florida. Additionally, there is a causal relationship between prenatal Zika virus infection and microcephaly and other serious brain abnormalities. This thesis discusses the consequences of the Zika virus and investigates the reasons why some populations in the United States and Brazil were disproportionately impacted by the effects of the Zika virus. This thesis also discusses the responses made by the United States and Brazil in response to the Zika virus and proposes responses to limit the unequal effects of the Zika virus on vulnerable populations in the future.

Introduction

According to the World Health Organization, the Zika virus is a disease that is transmitted primarily through *Aedes* mosquitoes and has many different symptoms, including mild fever, rash, conjunctivitis, muscle and joint pain, and malaise or headache. Research conducted by Yuan, et al., stated that Zika virus was first discovered in the Zika Forest in Uganda in 1947 and spread throughout Africa and Asia. Wang, et al., report that these strains have been circulating in the population since the mid 20th century, but the Zika infection has not been associated with significant human pathology until the recent outbreaks in Latin America. While the Zika virus has always been common in certain tropical countries, the first recorded Zika outbreak occurred on the Island of Yap in 2007, followed by another larger outbreak in French Polynesia in 2013 (WHO). The Pan American Health Organization (PAHO) reported that the Brazilian Ministry of Health recorded an unusual increase in cases of microcephaly in the state of Pernambuco, located in the northeast of Brazil in October of 2015. According to the Center for Disease Control (CDC), the World Health Organization declared the spread of the Zika virus an international public health emergency in February 2016. The first outbreak in the continental United States was identified in the Wynwood neighborhood of Miami-Dade County, Florida in July of 2016 (Marini, 2017). As of May 2017, the virus had been detected in 85 countries and territories around the world (Klasing, 2018).

Although the Zika infection presents itself through either mild symptoms or no symptoms, the consequences of the widespread Zika epidemic are much more drastic and lasting. These consequences make themselves known particularly in pregnant women, as Zika infection during pregnancy has been linked with adverse pregnancy and birth

outcomes, most notably microcephaly and other serious brain abnormalities (Rasmussen, et al., 2016). Microcephaly, among other brain abnormalities, is a condition that presents parents and caregivers with demands that coincide with an increase in cost of living, especially if quality of life is maintained. For this reason, the Zika virus presents unique consequences both before and after infection that disproportionately impact those who are in vulnerable populations, such as those in poverty who cannot afford access to healthcare. The Zika epidemic, because of this causal relationship and its rapid transmission, created a global panic that resulted in countries and their governments responding with the best course of action they could. The United States and Brazil are two such countries that experienced the effects of Zika and will be addressed in this thesis. These two countries were chosen for various reasons. Brazil was chosen because it is the country that has been most drastically impacted by this strain of the Zika virus, and thus greater amounts of research and data have been collected for this country. The United States was chosen because epidemics occur all throughout the globe, but are not often brought to the attention of the media until they become a risk to the United States. These two countries were additionally chosen to compare and contrast between different political and social landscapes in response to the Zika virus, as the United States and Brazil had somewhat similar responses to the Zika virus. However, there are various differences in the measures each country took to address the epidemic and its consequences. The United States and Brazil were also selected to best illustrate the disproportionate impact that the Zika virus has on vulnerable populations. Only two countries were chosen to study due time limitations and the limited scope of this thesis.

Women in the United States and Brazil experience variable treatment and access to knowledge regarding the spread and consequences of the Zika virus. Certain populations of women are more vulnerable to the effects of the Zika virus due to socioeconomic disparities, inadequate access to healthcare, water, and sanitation, and restrictions on sexual and reproductive rights and education. In order to adequately respond to these disparities and properly care for these vulnerable populations, several courses of action need to be taken. First, changes need to be made regarding access to female sexual and reproductive care, including access to contraceptive methods and education. Secondly, adequate access to healthcare, water, and sanitation, needs to be established and structured for continued use. Third, support systems for those affected, particularly those in vulnerable populations, such as the poor, women, and women of color, must be established and available for the long term.

Background

The Zika virus is a complicated disease, in that it can be transmitted through mosquito bites, sexual contact, and from mother to child (WHO). The virus is primarily transmitted through the bite of an infected mosquito from the *Aedes* genus (WHO). According to the Center for Disease Control, the areas with high risk of Zika are tropical and subtropical, including many countries in Africa, Asia, the Caribbean, Central and South America. The *Aedes* mosquito is similarly responsible for the transmission of dengue, chikungunya, and yellow fever, which are common in these tropical and subtropical areas as well (WHO). Both *Aedes aegypti* and *Aedes albopictus*, two species from this family of mosquitos, are capable of transmitting the Zika virus; however, *Aedes*

aegypti are more likely to spread viruses than *Aedes albopictus* (CDC). The incubation period of the Zika virus is estimated to be 3-14 days, but the majority of people infected with the disease do not develop symptoms (WHO). If they do develop them, they are generally mild, including fever, rash, and other symptoms that last for 2-7 days. To further complicate the effects and impact of Zika, there is a causal relationship between prenatal Zika virus infection and microcephaly and other serious brain abnormalities (Rasmussen, et al., 2016). Microcephaly is a neurological disorder in which the occipitofrontal circumference is smaller than that of other children of the same race, age, and sex (PAHO). According to the PAHO, children with microcephaly may present with developmental problems. There is no treatment for microcephaly, but early intervention can improve the development and quality of life of the child (PAHO).

The United States and Brazil are two countries that experienced the effects of Zika to various degrees, and will be addressed in this thesis. Establishing the political and social climates in the United States and Brazil within the context of the Zika virus is crucial in order to fully understand the virus' impact in these countries. In the United States, abortion is legal; however, according to Sifferlin and the Guttmacher Institute, the number of restrictions to access this legal procedure vary by state (Sifferlin, 2016).¹ For example, countries in the Southeast region of the United States, such as Florida, Alabama, Mississippi, and Texas, all have greater than 6 state-based restrictions to abortion (Sifferlin, 2016). Coincidentally, Florida was the first location in the continental United States where a Zika outbreak was reported in 2016 (Marini), and the other states with high levels of restriction against abortion and high hostility to abortion happen to lie

¹ Sifferlin conducted research based on information reported by the Guttmacher Institute regarding hostility and restrictions to abortion in 2016.

directly in the path of the travel of the *Aedes* mosquito through the United States, as seen in Figure 1 in the Appendix according to Dreweke at the Guttmacher Institute (Dreweke, 2016). These areas further coincide with areas where high percentages of women are uninsured. According to the Guttmacher Institute, in 2014, 20-27% of women were uninsured in Florida, Texas, Alabama, and Mississippi, along with many other southern states. This also happens to be the same region with the highest rates of unintended pregnancy (Dreweke, 2016). In a study done by the United States Department of Health and Human Services in 2016, it was revealed that these areas also have high numbers of women who are uninsured, currently sexually active, and in need of contraception (United States Department of Health and Human Services, 2016). All of these factors constitute a glaring public health problem, particularly in the context of the Zika epidemic: women are in need of access to contraceptives and education regarding contraceptives and family planning in order to protect themselves and the children they may have.²

² Access to contraceptives is necessary in order to prevent women from taking drastic measures. In an ideal world, women would not feel the need to pursue methods of preventing or terminating pregnancy, but the world as it stands is far from ideal. While the reasons why women seek contraceptive methods and abortion are unique, they are ultimately seeking the same thing: methods to prevent or terminate their pregnancies for a real or perceived benefit. Whether this pertains to their health, economic status, or familial pressure, women will use the channels that are available to them. If women have access to contraceptives, they can take the course of action they feel they need to safely with the approval of a medical professional and the assistance of trained professionals. However, if they do not, women are forced to pursue contraceptives or methods of terminating pregnancy that are unsafe and not approved by medical professionals, often done painfully and sometimes resulting in the death of the mother. Access to contraceptives is necessary to prevent unnecessary maternal death, and prevent women from being made criminals in pursuing what they feel is necessary for their individual situations. In regards to Zika, many women seek abortion and contraceptive care and are faced with many obstacles in their search, which result in women settling on unsafe procedures. The World Health Organization reported that an estimated 95 percent of the 4.4 million pregnancy terminations in Latin America and the Caribbean are conducted in unsafe conditions, resulting in 12 percent of all maternal deaths, prior to the Zika outbreak (International Federation of Red Cross and Red Crescent Societies). With the causal relationship between the Zika virus and microcephaly and the

Unlike the United States, abortion is strictly illegal in Brazil as of 2000, except to save the woman's life or in cases of rape according to a report by Guedes (2000) (p. 66). When the news of the Zika epidemic spread and the governments issued health advisories, Aiken reported that women in Brazil were advised to avoid pregnancy, with little to no access to contraceptives. A non-governmental non-profit organization, Women on Web (WoW), provides online medical abortion information outside the formal healthcare setting through online telemedicine in areas where safe abortions are not available, such as Brazil. With the announcement of the Zika epidemic, the demand for contraceptives from WoW increased from its expected amount for women in Brazil. While these medicines were able to be delivered to women in other countries in Latin America, Brazil customs officials began seizing them to prevent women from having access to contraceptive tools (Aiken, 2016). Additionally, while access to contraceptives is difficult for all women in Brazil, women in poor urban areas were disproportionately affected. According to the Human Rights Watch, women and girls in northeastern Brazil were disproportionately affected because of "long standing human rights problems, including inadequate access to water and sanitation, racial and socioeconomic health disparities, and restrictions on sexual and reproductive rights" (Klasing, 2018). The impact of Zika was felt all throughout Brazil; however, socioeconomic status and geographical location were both highly influential in the lack of access to contraceptives and education that women in these situations experienced.

As a result of the different social and political climates in the United States and Brazil, these respective countries had different responses to the Zika epidemic. In Brazil,

resulting increase in women in Brazil seeking abortion, the number of maternal deaths as a result of unsafe abortion conditions stands to increase.

one of the responses that the Brazilian government implemented to combat the effects of Zika is the *Bolsa Familia*, a conditional cash transfer program established by the national government, according to the International Federation of Red Cross and Red Crescent Societies (IFRCRCS) (p. 49). The package grants social benefits to reduce poverty and inequality and offers families with children with microcephaly an additional payment of 880 Brazilian Reais monthly. Additionally, insecticides were offered to families receiving benefits to support prevention efforts, but it was not made clear how long these benefits would be offered.

Another response that was implemented in Brazil in order to respond to the Zika epidemic was a national surveillance system that focuses specifically on detecting microcephaly (p. 43). Clinical protocols have also been implemented to guide health care and psychological support for those affected by Zika. In Brazil, Community Health Promotion Agents play a key role in providing information for Zika prevention and treatment to households, specifically in the context of low-income populations with limited access to primary and specialized healthcare services. According to the study, these agents work in collaboration with “endemic agents” of the dengue control program. Community Health Promotion Agents visit houses, identify suspected cases of Zika or dengue and refer them to a Health Unit to be confirmed as cases (p. 44). For example, a Community Health Promotion Agent will see a location with mosquitos and will call the endemic agents to clean the area (International Federation of Red Cross and Red Crescent Societies, p. 44). Additionally, many governments in Latin America and the Caribbean made blanket recommendations that women should avoid pregnancy over long periods of

time. This included Brazil, Colombia, Ecuador, and El Salvador, among others, that recommended women should avoid becoming pregnant altogether (Dreweke, 2016).

The United States government implemented several different responses from those of the Brazilian government; however, the general blanket recommendations is a response on which the countries did not differ greatly. For example, in the state of Texas, Darney, et al., report that a general statement was released, making recommendations of how women and men could avoid mosquito bites without addressing the issue of whether women should plan or avoid pregnancy (Darney, et al., 2017).

Additionally, Jamila Taylor, PhD, (2016) reports that the United States allocated funds in order to respond to the Zika virus. For example, President Obama called on Congress to approve of \$1.9 billion in emergency supplemental funds to support the response to the Zika virus in the United States and abroad (p. 3). Kaplan reported Congress approved \$1.1 billion to be used for Zika vaccine research and health care in southern states, particularly Florida and Puerto Rico (Kaplan, 2018). Members of the House of Representatives introduced their own Zika response package of \$622 million in funds cut from other programs, and a Zika funding measure was introduced in the senate for \$1.1 billion for Zika response efforts (Taylor, 2016, p. 3). However, both of these measures include long-standing abortion restrictions, which have a disproportionate impact on low-income women, making it virtually impossible for them to access the full range of reproductive and maternal health care (p. 3). Taylor reports that none of these funding measures are enough to implement an adequate response to the Zika virus that involves several government agencies, public health experts, and local stakeholders,

reporting that a cost estimate by public health experts could exceed the \$1.9 billion requested by the president (Taylor, p. 3).

The Puerto Rico Department of Health also made a response in the form of its Special Supplemental Nutrition Program for Women, Infants, and Children, or WIC clinics (Taylor, p. 2). These clinics are intended to increase lab capacity for testing, enhancing surveillance systems, health messaging and education, distribution of Zika prevention kits, and increasing the availability of contraception, vector control and targeted outreach to women (p. 2).

Literature Review

Due to the widespread and profound impact of the Zika epidemic, many studies have been conducted to investigate its effects, analyze the current responses, and propose new or alternate responses that should be made moving forward. One such study investigating the effects of the Zika virus was conducted by The Global Virus Network in the second year of the Zika epidemic in the Americas, establishing what has been learned about the Zika virus in humans, its modes of transmission, and the cause and nature of associated congenital manifestations (Aliota, et al., 2017). The study establishes that the Zika virus was a problem in Asia and Africa for decades before becoming a topic of intense discussion and research. The event that sparked this change was the epidemic of infection in Brazil, with cases of Zika infection resulting in several cases of Guillain-Barre syndrome and infants born with microcephaly and other neurological defects. After the initial epidemic in Brazil, the Zika virus spread throughout Brazil, and then on to other countries in South America and Central America. Patients were also later identified

in the United States, most commonly in areas to the south such as Florida and Texas (Aliota, et al., 2017).

The Global Virus Network study discusses underlying conditions that are in place to facilitate such a rapid spread of Zika throughout the Americas. The first of the underlying conditions this study identifies is the extensive presence of *Aedes aegypti*, a species of mosquito acting as a very efficient vector, that inhabits the majority of the Americas, from Argentina to the United States. The study also points out that the mosquito control programs are inefficient and widely variable across this expansive area. The second underlying condition is the susceptibility of the populations in the Americas, due to the lack of previous Zika epidemics in the area. The third underlying condition is the virus's ability to induce viremia shortly after the infectious mosquito bite which allows the infected person to act as an efficient amplification host for several days after infection. The fourth condition is the mobility of individuals among vast areas, between states and countries over short periods of time. This mobility drastically increases the number of areas where the vector is present, granting it the ability to spread to new and susceptible populations. The study also discusses the role of sexual transmission in the spread of Zika, stating that sexual transmission may be responsible for a still-unknown number of transmission cases.

After establishing the problem Zika presents, the study discusses vaccine development, antiviral therapeutics, new diagnostic tests, and the likely future of the pandemic (Kallas, 2017). Kallas states that with the accumulation of areas with herd immunity, Zika will begin to spread in smaller outbreaks in remaining susceptible groups; however, the study acknowledges that further transmission will still occur. As

such, alternative responses need to be established, such as vaccine development. Kallas further discusses the current state of vaccine development, with vaccine candidates being developed at an unprecedented pace in response to the Zika epidemic. Four distinct approaches to the vaccine response have been taken thus far: subunit vaccines, inactivated vaccines, chimeric flavivirus vaccines, and live-attenuated vaccines (Shan, et al., 2017). Among these approaches, subunit and inactivated vaccines have shown efficacy in both mice and NHPs, and several of these candidates have already advanced to phase 1-II clinical evaluation in humans (Shan, et al., 2017). Additionally, Shan, et al. goes on to discuss the need for safe, potent Zika virus antiviral agents; however, due to its distinct pathogenesis ZIKV presents unique challenges in developing and identifying antiviral agents that are safe, potent, and specific to prevent and treat infection, specifically in pregnant women (Schinazi, et al., 2017). This is particularly important because of the possible effects on the infants if a woman is infected with the virus while pregnant, such as microcephaly and other neurodegenerative disorders. A potential antiviral drug would act as a preventative or treatment option, but the drug would need to adhere to many very specific conditions, specifically not impairing the growth of the fetus. While the development of medication to treat Zika is complicated, the study is optimistic about future treatment options, as the information obtained to date provides an excellent foundation for informed drug discovery efforts and the potential for safe, specific, and potent antiviral agents that prevent transmission as pre-exposure prophylaxis or eradication of ZIKV infection (Schinazi, et al., 2017).

Social Inequality

Another study conducted by the International Federation of the Red Cross and Red Crescent Societies (2017) assessed the socioeconomic impact of the Zika virus in Latin America with specific focus on Brazil, Colombia, and Suriname. For the interest of this thesis, only the discussion on Brazil will be reviewed. One of the first things the study discusses is the inequality present in Latin America, which is often categorized by hierarchies of race and rural-urban status, exemplified by (often rural) Afro-descendent and indigenous groups earning the lowest per capita household incomes and experiencing poor health and education outcomes (IFRCRC, p. 14). The study goes on to discuss that many vulnerable populations remain underserved despite the improved health systems and coverage. Specifically, the study investigates the short and long term costs associated with Zika and the neurodegenerative disease that it is capable of causing, describing the short term costs of detecting, diagnosing, and treating symptomatic individuals, the lost productivity due to symptomatic individuals missing work, and the effect on tourism revenues for the investigated regions. Regarding long term cases, the study discusses the costs associated with raising an infant with microcephaly, living with microcephaly, and the cost of Guillain-Barré syndrome. Due to the inequality in areas of Latin America, specifically Brazil, these short and long term costs disproportionately impact those who are from lower socioeconomic status and already experiencing poor health outcomes. The study further expands on this by stating that the Zika epidemic exacerbated poverty and inequities. It specifically cites Recife, the “center” of the Brazilian Zika epidemic, which has a history of water-related infections that primarily affect poor neighborhoods (p. 38). The deficient water supply and sanitation (including waste disposal) systems, specifically

in highly populated, poor urban areas, forced households to store drinking water which provided ideal conditions for mosquito breeding, increasing the risk of infection (p. 38). Furthermore, the study reports that poor families are not only disproportionately exposed to risk, they also pay a higher cost in terms of household finances, health, and quality of life, given that they often do not have the resources to seek adequate care and support once they are affected by infection (p. 39).

Another problem that this study identifies is the issue of gender inequality, specifically regarding women's sexual and reproductive health and rights. This topic is important to Zika specifically because it can disrupt embryo and fetal development. Before the Zika epidemic, the World Health Organization estimated that 95 percent of the 4.4 million pregnancy terminations in Latin America were conducted in unsafe conditions, contributing to 12 percent of all maternal deaths (p. 40). The study further reports that the increase in demand for abortion services in Brazil rose 100 percent from previous years. Another factor that this study discusses related to gender inequality is the unequal pressure on women and girls to serve as caregivers for their family members affected by Zika, such as those pulled from school or the labor force (p. 40). The study reported that in other epidemics, the burden of care falls disproportionately on women. Throughout the study there are numerous quotes from women, specifically young mothers of children born with microcephaly in Brazil, who discuss the limitations the disease has placed on their lives and the lives of their children (p. 41).

One mother of a baby with microcephaly stated that:

My life stopped. I finished my studies and I wanted to take a course in college but cannot do anything. I cannot work. I see my friends work and I say [crying], 'My

God, what did I do with my life.' I went and got pregnant and I'm staying still in time. I do not have someone to leave my child with, my mother cannot look after her. I would have taken advantage of life more, studied more. (p. 41)

Another mother stated that:

In our house, my mother is the only breadwinner. I finished my studies, I became pregnant. The father of the baby disappeared. At home, we only have the 'benefit' for special children, like a minimum salary. The benefit is not enough. I have to perform miracles to pay for everything: transportation, medical tests and medication. I am waiting to have her tested for two months, my baby is already seven months and she did not have these tests. The only tests that have already been done I paid for on my own, I have not gotten anything from the [Unified Health System]. Nothing. And I looked online, I complained, but nothing. (p. 41).

The study further discusses the increased stigma and challenges to the wellbeing of those affected that has resulted from the Zika epidemic, especially in the context of women from lower socio-economic status (p. 41). The study reports that women from higher socioeconomic status were far more responsive to public health messages directed at postponing pregnancy than were women from lower socioeconomic status (p. 42). There are several factors that may have contributed to this. One being the lack of sufficient information for women in lower socioeconomic positions, and another being the private clinics that only provide services to wealthier clientele, directing messages to the middle class, that have little to no impact on the poor who are in need of the information these messages can offer. Another important factor that the study briefly

discusses is the high frequency of sexual violence and unplanned pregnancies in Northeastern Brazil, as well as the unequal access to reproductive and health information services (p. 42).³ Some of the reported obstacles to these are religious obstacles and concern that women would be able to understand and act on recommendations made to them.

One of the responses this study discusses is the *Bolsa Familia*, a conditional cash transfer program established by the national government (p. 49). The study additionally reports that insecticides were offered to families receiving benefits to support prevention efforts. Despite the presence of these programs, the study states that the costs associated with Zika transmission, such as transportation and out-of-pocket costs for diagnostic tests and drugs, combined with lost income due to increased childcare responsibilities commonly exceed this governmentally granted financial aid.

Another response that was implemented in Brazil in order to respond to the Zika epidemic was a national surveillance system (p. 43). However, the lack of easy and affordable point-of-care tests has hindered the confirmation of cases, particularly in areas with limited healthcare capacities. Many of the tests required for surveillance require complicated techniques and these complicated techniques, coupled with under-resourced and rural regions with low numbers of trained personnel, made it difficult to maintain surveillance data. In Brazil, the low numbers of trained personnel in the complicated surveillance techniques were particularly prevalent in impoverished regions. Along with a national surveillance system, some prevention interventions have been made; however,

³ In the United States, poverty is similarly a risk factor for sexual violence, with other factors such as lack of employment opportunities, lack of institutional support from police and judicial system, and a high tolerance for crime and other forms of violence also contributing to increased risk levels (Greco, *et al.*, 2007).

they are varied in extent, quality, and economic capacity across the region. According to the study, messages around prevention of sexual transmission from public institutions are inconsistent, and there has been little guidance from international organizations on pregnancy management in the context of the Zika virus (p. 44).

The study conducted by the International Federation of the Red Cross and Red Crescent Societies goes on to make several recommendations to address the impact of Zika in general, stating that budgetary plans need to be established to account for the fact that Zika is likely to become endemic (p. 48). The study also recommends that efforts aimed at multiple mosquito-borne viruses need to be integrated, while allowing room to tailor approaches to each disease's unique effects (p. 49). Some examples of these diseases are dengue, chikungunya, yellow fever, and Zika, which are all spread by the same vector, *Aedes aegypti*. The study makes another recommendation to address the equity challenge at the core of the Zika epidemic: equity considerations need to be at the forefront of the Zika strategies and provide adequate social protection mechanisms for those affected, because of the disproportionate impact on the poorest of the region (p. 49). The most vulnerable groups, such as the poor women in peri-urban areas are some of the most disproportionately affected. The study further makes recommendations in order to address the gender inequality issue brought to the spotlight by Zika, stating that public policies that support gender equality and sexual and reproductive health rights should be promoted, specifically those targeting affected communities (International Federation of Red Cross and Red Crescent Societies, p. 49). Some of the specific policy recommendations the study makes are: respect for women's decision-making, access to

accurate and comprehensive information, access to contraception, and access to maternal health care, including family planning and prenatal diagnostic services.

The Human Rights Watch also published a study by Klasing (2018) discussing the impact of the Zika outbreak on Women and Girls in Northeastern Brazil, similarly emphasizing the unequal impact of the Zika virus on women in poverty and the importance of information regarding reproductive health. The study focused on Pernambuco and Paraíba, two of the states in Brazil hardest hit by the virus (Klasing, 2018). The study reports many factors that potentially played a role in the rapid transmission of Zika, citing the 2015 El Niño climate, climate change and the steadily rising global temperature, and the poor regions of the country with decades of underinvestment in public water and wastewater services that exacerbated the proliferation of *Aedes aegypti*. The study also reports that the outbreak occurred during Brazil's worst economic recession in decades, which forced authorities to make difficult decisions about allocating resources in response to the epidemic. One of the issues addressed by the study is that initially, when hundreds of thousands of people arrived in clinics in late 2014, they were diagnosed with what was thought to be milder cases of dengue, a disease that had been present in Brazil for decades. It was only when waves of children were born with microcephaly that the Brazilian government declared a national health emergency, followed by the World Health Organization declaring a public health emergency in 2016. The study found that the Zika virus outbreak disproportionately impacted women and girls and aggravated long standing human rights problems, including inadequate access to water and sanitation, racial and socioeconomic health disparities, and restrictions on sexual and reproductive rights. The report concedes that

these problems existed long before the outbreak, but the epidemic brought renewed attention to ongoing unaddressed challenges to public health and human rights in Brazil.

After the investigation, the study concludes that there are gaps in the Brazilian authorities' response that had particularly harmful impacts on women and girls, and left the general population vulnerable to continued outbreaks of serious mosquito-borne illnesses in the future. Klasing states that the Brazilian authorities' response to the Zika epidemic centered on the fight against the mosquito, vector control, without addressing systemic problems with public water and sanitation systems that exacerbated the Zika crisis by contributing to ideal conditions for mosquito breeding. The study criticizes this response, citing the years of dengue outbreaks that should have made it clear that water and sanitation conditions were dangerous and needed attention and investment of resources. Access to clean water and adequate sanitation conditions is particularly important, because one-third of Brazil's population lacks access to a continuous water supply, forcing people to fill tanks with water for household use, which unintentionally become potential mosquito breeding grounds. The Brazilian government did address this issue to some extent, focusing on encouraging households to clean water storage containers and eliminating standing water in homes; however, this only served to be a short-term solution, as it never addressed the structural water and sanitation failures, particularly in poor areas.

Another gap the Human Rights Watch study points out is the lack of clear and accessible basic information about reproductive health available to women and girls in Brazil. The findings from the study indicate that the Brazilian public health system may not be consistently providing comprehensive reproductive health information and

services to some women and girls. One example of the lack of access to comprehensive reproductive healthcare and services is abortion, which is criminalized in Brazil, causing women to turn to clandestine and often unsafe procedures to terminate unwanted pregnancies. The study reports that an estimated half a million in women in Brazil had abortions⁴, the vast majority of which were performed clandestinely, using caustic acid or other unsafe methods to induce abortion. The study notes that the risk of Zika infection during pregnancy and the resulting consequences will likely lead even more women to seek unsafe and clandestine abortions. Another example of this lack of access to reproductive health information and services was that the women and girls interviewed for this study, who stated they had been exposed to Zika, also stated they had difficulty accessing diagnostic tests or sonograms to find out if they had Zika or if their pregnancies could be affected by the virus. Many of these women are from low-income households and said they do not have the means to purchase mosquito repellent for everyday use. The study goes on to emphasize the fact that the children born with effects from the Zika virus, such as microcephaly, need long-term support and care. Their caregivers are more often than not the women whose lives are changed by having children with disabilities, and they do not receive the support they need from government and society. Many of these women report that they faced obstacles in accessing adequate information and support both at the time of their delivery and as their children grew and developed. Some of the ways that this manifests itself is in difficulties buying expensive medicine, traveling to urban areas for appointments, and continuing paid work. The study also reports that the Brazilian authorities are in the process of enacting fiscal austerity

⁴ Comparatively, in the United States in 2015, 638,169 legally induced abortions were reported to the CDC from 49 reporting areas (Abortion Data and Statistics, CDC).

measures that may decrease funding for public health, education, and other services that could help children with Zika syndrome, and their caregivers, have the best possible quality of life in the long term.

The Human Rights Watch study emphasizes that Brazilian authorities need to confront the long-term implications of the Zika outbreak, specifically taking steps to address the underlying contexts that made its impacts so severe. It cites international human rights laws, stating that the Brazilian population has the right to sufficient, safe, and affordable water and sanitation, and persons with disabilities and their families have the right to an adequate standard of living. The government also has an obligation to ensure access to reproductive health information and services, and is obligated to eliminate excessive restrictions on access to safe and legal abortions. The report goes on to analyze the situation from a human-rights based approach, and make recommendations accordingly, the first being an improvement of Zika virus prevention, detection, and response. In order to improve Zika virus prevention, detection and response, various recommendations that address some of the issues pointed out earlier in the study are made, such as making insect repellent accessible to all pregnant women free of charge in the public health system. Another recommendation the report makes is providing comprehensive sexual and reproductive health care, such as updating relevant national, state, and local health protocols to ensure men and boys receive also counseling and information about contraceptive and family planning methods, and access to condoms and voluntary sterilization. Another suggestion under this recommendation is developing and implementing an extensive training program to ensure all health care providers can competently and consistently implement sexual and reproductive health protocols. The

study also emphasizes the need for support to both families raising children with Zika syndrome and the children themselves, as well as changes to the environmental, water, and wastewater infrastructure (Klasing, 2018).

A report by Dreweke for the Guttmacher Institute in the Guttmacher Policy Review in 2016 argues that “women’s right to self-determination must be central” in countering Zika, similarly emphasizing the unequal impact of the Zika virus on women, particularly in the context of reproductive and sexual healthcare needs. The report states that the Zika crisis exposed long-standing neglect of women’s reproductive health needs in Latin America and the United States. Specifically, the report refers to the often hostile, programmatic and legal environment women face on issues surrounding pregnancy, whether they are looking to have a healthy birth and raise their child, prevent an unplanned pregnancy, or obtain an abortion (Dreweke, 2016).

The study establishes that the impact of Zika in Latin America and the Caribbean is falling hardest on those with the fewest resources. Poor women, including those living in remote areas, have the least access to high-quality contraceptive services to prevent pregnancy. They are also the least protected from mosquitos that transmit the disease for various reasons, such as the poor sanitation of where they live or work, or the inability to afford repellent. If these women do decide to terminate a pregnancy, whether out of fear of Zika or for other reasons, poor women are less likely than other women to have access to safe abortion care, putting them at higher risk of complications and prosecution from clandestine procedures. The report goes on to state that the response to Zika from governments in Latin America and the Caribbean has often been inadequate, reflecting the long-standing neglect of women’s health, citing the blanket recommendations that

women should avoid pregnancy over long periods of time as one example of this neglect. The study argues that these unrealistic recommendations shift the burden of responding to the current public health crisis to individual women, which potentially exposes them to blame and stigma should they become pregnant or give birth to a child with a disability. This results in leaving affected women, especially those who are poor, young, or otherwise lacking resources, even more vulnerable. This vulnerability can happen for a number of reasons, such as through abandonment by their partners or families, or through lacking government and community support to help them and their children during and after pregnancy.

The study goes on to discuss the impact of the Zika virus in the United States, stating that although the situation is very different from the situation in Latin America and the Caribbean, women in the United States face many similar challenges. Some of these include long-standing failures by policymakers at the federal and state levels to ensure adequate access to reproductive health coverage and care, including contraceptive services, and especially abortion care. Similarly to the situation in Latin America, poor women and women of color may be at the greatest risk of negative health and economic consequences from Zika, faring far worse than other women on a range of critical indicators, from access to health insurance to unintended pregnancy rates to difficulty pursuing contraceptive options. The study further reports that disadvantaged women are also more likely than others to lack the resources to parent a child born with microcephaly, a situation that is further exacerbated by an absence of affordable health care, paid family leave, paid sick leave, and a living wage for many women and families. The study goes on to note that many of the states that may feel the initial brunt of Zika

are among the least equipped to deal with the outcomes of a possible epidemic because they tend to have high rates of poverty, low levels of health insurance, and unintended pregnancy (Figure 1). These states also perform poorly on several important sexual and reproductive health indicators, according to the study. It cites Florida, Georgia, Louisiana, Mississippi, and Texas among the top 10 states when it comes to women of reproductive age who are uninsured. For example, 27% of women aged 15-44 in Texas do not have insurance, with Florida following shortly after with 23%. respectively (Dreweke, 2016). Women in these states who are facing an unwanted pregnancy and have decided on abortion generally face a hostile environment when it comes to accessing abortion care, with 27 states categorized as “hostile” to abortion rights, and 18 “extremely hostile” because of the restrictions that have been imposed on women seeking abortion care and on the providers that offer it (Dreweke, 2016). These restrictions make terminating a pregnancy more costly and time-consuming, and can be out of reach for women who are poor or otherwise vulnerable. The causal relationship between Zika and microcephaly further complicates these issues, as the study reports. Microcephaly can usually only be diagnosed later in pregnancy, but 12 states ban abortion at about 20 weeks post-fertilization, and efforts are underway in additional states and at the federal level to enact similar bans (Dreweke, 2016). The study reports that the ongoing policy failures in many U.S. states are reflected at the federal level as well, with conservative lawmakers fighting policies and programs that are key to combating Zika and its potential impact, including attempts to repeal the Affordable Care Act, and with it, general insurance coverage, and contraceptive coverage. The study goes on to discuss the support that women need in the wake of the Zika virus epidemic, stating that the virus illustrates

why all women must have the necessary counseling, information, and services to prevent unintended pregnancy, safely terminate an unwanted pregnancy, and carry a pregnancy to term. It emphasizes that women must have access to the medical, social, and economic supports that are necessary to raise their child securely and with dignity, especially if their child has a disability. the study further goes on to say that as women are warned against becoming pregnant, governments and health care providers have a responsibility to protect individuals from discrimination and coercion. The study concludes with a recommendation to address the issues it discusses, stating that sound policies and resources to support the rights of women to prevent pregnancy, obtain safe abortion care or become a parent and raise a child should be an ongoing priority, not just a response to an epidemic (Dreweke, 2016).

Another report conducted to investigate the effects of Zika in the United States and what responses should be made moving forward was published by the Center for American Progress, by Jamila Taylor, PhD (2016). This report briefly discusses Puerto Rico, a United States territory that other studies have not focused on with the same attention. Taylor reports that in December 2015, Puerto Rico became the first U.S. territory to report local transmission of the virus, with the effects exacerbated by the fact that half of its residents are living in poverty, most of them women and children, as a result of a decade-long recession (Taylor, 2016, p. 1). In response to the Zika epidemic, the Puerto Rico Department of Health established the Special Supplemental Nutrition Program for Women, Infants, and Children, or WIC, clinics (p. 2). Taylor describes the disproportionate risk of Zika transmission for low-income people who live in homes without air conditioning or door and window screens or work jobs that require extended

periods of time outside (p. 2). Another group at risk are those in the South, with high rates of poverty and lack of access to health education, with support services disproportionately plaguing African Americans and Latinos (p. 2). The report also states that these communities also disproportionately experience poor health outcomes, including poor maternal health and infant health. Furthermore, Taylor also emphasizes that economically disadvantaged communities tend to lack access to comprehensive health care and other supports needed to effectively grapple with a public health concern, such as Zika (p. 2).

The response that this report concludes with is the need for a comprehensive approach to reproductive and maternal health (p. 4). This includes a comprehensive approach to meeting the sexual, reproductive, and maternal health needs of women. Women living in areas where there is an increased risk in infection must be provided with counseling and access to contraceptive methods of their choice, and both male and female condoms should be made available. Additionally, because of the birth defects associated with Zika infection in pregnant women, women who have tested positive for the virus and choose to carry their pregnancies to term must have access to comprehensive prenatal and postnatal care. In the long-term, these women and their infants must also be given access to counseling, education, pediatric care, and social supports. Taylor goes on to state that for women who do make the difficult decision to terminate their pregnancy, safe abortion should be made available to them. However, many of the states in the CDC estimation for an uptick in Zika transmission also ban safe abortion after the first trimester of pregnancy. Changes in local health systems are necessary to meet the need for a comprehensive approach to reproductive and maternal health are changes in local

health systems, particularly in the American South and U.S. territories. These regions, specifically the Southern states, have high concentrations of underserved communities due to an inadequate number of healthcare providers, hospitals, and clinics. They also have a poor track record in meeting the health needs of high-risk communities, particularly in the areas of reproductive and maternal health. In order to ensure access to timely, quality care, these systems must be enhanced. Furthermore, low-income women may need targeted outreach for comprehensive health services and education, with information spread through local channels including content related to all forms of transmission, including through mosquito bites, as well as perinatal and sexual transmission. Taylor cites Puerto Rico Department of Health's WIC clinics for reaching pregnant women as an effective strategy for this suggested targeted outreach.

A report by Darney, et al. (2017) titled "Access to Contraception in the Context of Zika: Health System Challenges and Responses" is another source that has investigated the effects of Zika and what responses should be made moving forward. The report focuses on Mexico and the U.S. State of Texas to highlight the role of health system factors in contraceptive access in the context of Zika, and highlights efforts in Puerto Rico as an example of efforts to improve access to contraception. For the purposes of this thesis, only the information regarding Texas and briefly Puerto Rico will be reviewed. Darney, et al. report that the Zika virus highlights weakness in health systems that make it difficult for women to use contraception if they want to delay birth, and state that women across the globe need access to contraception to prevent unintended pregnancy, and providers require functioning health systems that offer the support to ensure access is a reality (Darney, et al., 2017).

Regarding the state of the health care system and its responses to Zika in Texas, Darney, et al. state the Department of State Health Services in Texas has issued recommendations to help women and men avoid mosquito bites, but has not addressed the issue of whether women should plan or avoid pregnancy. Darney, et al. report that in the U.S., the areas most likely to experience local transmission of the Zika virus due to the presence of the *Aedes* mosquitoes are also those with the highest rates of unintended pregnancy and the largest deficiencies in contraceptive access. They state that unintended pregnancy is a complex concept and not solely reliant on access to contraception, but for many women, the greatest barrier to preventing pregnancy in the wake of the Zika virus will be a lack of access to contraceptive services. Darney, et al. state that as of 2018, over the past five years, publicly-funded family planning services in Texas have been dismantled and only partially pieced back together. Texas also declined to participate in Medicaid expansion, with the consequence being that 687,000 women in the “coverage gap” between the Affordable Care Act health insurance and regular Medicaid qualification lost the opportunity to access contraception without co-pay (Darney, et al., 2017). Furthermore, inequities in access to contraceptive counseling and provision disproportionately affect women living in poverty, women of color, and women who are undocumented immigrants. The study reports that there is a socioeconomic gradient associated with Zika risk, and women with the fewest resources are not only at the greatest risk for unintended pregnancy, but also of Zika infection.

The response of the Texas Department of State Health Services to the Zika virus was to issue recommendations to help women and men avoid mosquito bites, leaving the issue of whether women should plan or avoid pregnancy unaddressed and left to the

discretion of individual healthcare providers to refer to CDC guidance. The governor of Texas asked for \$11 million to fund public health and surveillance measures to combat Zika, with no inclusion of expanding access to family planning services or meeting unmet need for contraception among Texans at risk (Darney, et al., 2017). Darney, et al. report that the United States Office of Population Affairs developed a provider toolkit to facilitate counseling on the risks and implications of Zika to help women, men, and couples make decisions on contraceptive use. However, the study reports that without the health systems infrastructure to back them up, health care providers will be limited to issuing advice many of their patients cannot follow. Darney, et al. further report that unfortunately, Texas is not alone in its inadequate response to Zika, nor in the inequities faced by its most vulnerable residents. Neither Arizona nor Florida, two Southern states with local *Aedes* mosquito populations that have high pregnancy rates and restricted access to reproductive services, have made attempts to increase access to contraception services for low-income women (Darney, et al., 2017).

In this study, Darney, et al. discuss the merits of the course of action that has been taken in Puerto Rico with the assistance of the CDC Foundation, which established the Zika Contraception Access Network (Z-CAN), a publicly and privately funded network. Z-CAN offers the full range of FDA-approved contraceptive options at no cost, since August 2016, through participating clinics in Puerto Rico, as well as provider training and donated birth control to address shortages. Darney, et al. report that Z-CAN took a health systems lens in that it created a network of trained providers across the island, and recent analysis presents strong evidence that increasing access to contraception both reduced the number of Zika-associated microcephaly cases and healthcare costs. Darney,

et al. do acknowledge that Z-CAN is unique in its explicit acknowledgement that health systems must be strengthened and providers supported to ensure access to contraception and undesired pregnancy in Zika-affected areas; however, it provides a successful example of Zika intervention strategy focused on health systems and expanding access to contraception to prevent undesired pregnancy.

Economic Inequality

A study done by Snyder, et al., titled “Zika: A Scourge in Urban Slums” establishes that Zika is a disease of the urban poor (Snyder, et al., 2017). It begins by discussing briefly the presence and impact of the Ebola virus in West Africa in 2014 and the statement the authors made at the time: “the Ebola virus epidemic is only the beginning and only one disease; even if we are to control the current epidemic, the future introduction of this and other highly contagious and virulent microbes to and from global slums is inevitable” (Snyder, et al., 2017). Their prediction proved true in 2015 with the outbreak of the Zika virus and its major neurological complication, microcephaly. Snyder, et al. point out that the world’s attention was focused on issues related to where the virus originated, the need to control vectors, how quickly a vaccine could be developed, and how long the epidemic would continue; however, it points out that a very important topic was never included in the discussion: urban slums. The study establishes that Zika is a disease of the urban poor, with slum-defining characteristics such as poor water and sanitation infrastructure, crowding, and poor structural quality of housing all creating ample opportunities for mosquitoes to breed and spread the Zika virus. The authors criticize the fact that the discussion of urban slums has largely been absent from published research and reports, considering that the greatest proportion of Zika infection

and its complications have occurred, and will continue to occur, among residents of the large, densely packed informal human settlements of Latin America and the Caribbean. The study further criticizes that the focus of research has been on the implications of Zika among low-risk populations, ignoring the implications for disadvantaged populations. For example, predictive models suggest that the ongoing epidemic may “run out of steam” after two or three more seasons, as of 2017. However, none of these models consider how urban slums and their highly mobile populations affect the disease’s dynamics. The study goes on to use dengue, a virus genetically similar to Zika, as an example, stating that it goes through seasonal epidemics, and there is nothing to suggest that the Zika virus will not behave similarly. The study also goes on to point out that although there is only one major viral clade of Zika circulating in Latin America, the RNA virus is mutating rapidly and will likely be driven by the selective pressure of the hundreds of thousands of transmissions facilitated by the region’s densely packed slum populations.

Synder, et al. strongly criticize several responses that have been proposed in response to the Zika virus, such as the control of mosquitoes, and the development of a new vaccine. They argue that even if the vaccine is developed and shown to be effective, it will not be able to successfully control Zika or future epidemics of this virus that ravage urban slums. The authors do acknowledge the value of a vaccine that could reduce infection in pregnant women and neurological complications in their children; however, this will only be valuable if the poverty and disenfranchisement of slum dwellers does not prevent them from being the last to receive such a vaccine despite being at greater risk. The study proposes that the proper response should be that the energy, media attention, and research resources revolving around the Zika virus epidemic be harnessed and used

to bring the largely ignored urban slum populations of megacities around the world into the global spotlight. Without this change, they argue that the world will continue to have the same inconsequential discussions until the next deadly epidemic is sparks in slums.

An article published by Norad (the Norwegian Agency for Development Cooperation), the Centre for Global Health at the University of Oslo, and The Journal of the Norwegian Medical Association written by Skråning and Lindskog (2017) further discusses the unequal burden of Zika in Brazil, stating that the outbreak had detrimental medical, financial, and social consequences for many children and their families. The article explores the current challenges that are being faced by these children and their families, and how these issues can be met. The article begins by stating that the burden of the Zika outbreak encompasses challenges related to gender equality, poverty, social stigma, as well as women's actual and legal access to reproductive and maternal care, including safe abortions. It goes on to say that many of the affected women and their families in Brazil are experiencing additional challenges in their everyday lives due to poverty, as well as systemic and structural issues related to healthcare delivery and social security.

Two of the first issues Skråning and Lindskog discuss are financial constraints and access to specialized healthcare. The article states that the Brazilian health system is divided into a public and private sector, with the majority of the population relying solely on the publicly funded system. Since the national healthcare system is decentralized, access to specialized care and diagnostic services is restricted for those who rely on the public system due to financial constraints and weak referral systems of the Sistema Unico de Saúde (SUS), the publicly funded system.

Skråning and Lindskog then go on to discuss the need for an interdisciplinary and multilevel approach, emphasizing the importance of seeing the environment and animal behavior as inseparable from human activity. One of the ways that this is illustrated specifically in the context of the Zika virus is the direct relationship between human activity and the creation of perfect habitats for mosquitos in over-crowded slums. The article emphasizes that the effects of the Zika outbreak were most strongly felt by those already living in poverty, highlighting the escalating vulnerability and precariousness poor people face in societies and the severe socio-economic inequalities. Skråning and Lindskog propose that a comprehensive framework, such as a One Health perspective that embraces multilevel, systematic, as well as contextual approaches is essential to understand and tackle the consequences of the Zika epidemic. Additionally, social, political, and economic determinants of the One Health triad of humans, animals, and the environment need to be acknowledged.

Compounding Risks

Studies were also conducted that illustrate some points made in the aforementioned studies, such as the low levels of education about the Zika virus. One such study was conducted by Guerra, et al. in 2018 investigating the knowledge of Zika and perception of risk among sexually-active adults in the United States of America using a nationally representative sample. The study concluded that sexually active adults in the United States, especially younger men, have limited knowledge of non-mosquito borne forms of Zika transmission and low perception of their risk of infection (p. 7). Guerra, et al. further conclude that long-term Zika prevention faces several challenges as a result of the multiple forms of Zika transmission. The most prevalent form, mosquito-borne

transmission, has been the focus of the majority of messaging and public health actions, but the results of the study suggest that it is necessary to increase public knowledge of sexual and vertical transmission of the virus (p. 7).

This study differs from the others discussed in that it focuses on recommendations in regards to men instead of women. However, it does acknowledge that vulnerable groups, made up of both men and women, who are less educated and have less access to healthcare, are less likely to have knowledge about Zika transmission (p. 6). Guerra, et al. propose that the creation of programs and messaging specifically targeting men, and more importantly young men, are needed for Zika prevention, particularly because the main prevention of sexual transmission of Zika is the male condom (p. 7). As such, it is important to emphasize the importance of correct and consistent condom use, even in the absence of symptoms. Guerra et al. go on to recommend that Zika information should be folded into broader STI prevention efforts in the same way HIV interventions have done. The authors conclude by stating that the new endemic nature of the Zika virus will require full integration of preventative messages in sexually transmitted infections to vulnerable populations, improving access to condoms, and promoting their use (Guerra, et al., p. 7).

Another similar study by the U.S. Department of Health and Human Services reported that there were gaps in contraception access in the United States in the context of Zika. The report recommends that access to family planning services, including access to the full range of contraceptive methods to prevent unintended pregnancy is an important way to prevent Zika-related birth defects, as sexually active women who do not have access to contraception are at greater risk of an unplanned pregnancy. However,

certain areas of the United States are at an increased risk for unplanned pregnancy with Zika-infected fetuses. For example, cities with large diaspora populations and areas where the *Aedes* mosquitos are present are at increased risk for local Zika transmission. Coincidentally, these areas also contain high concentrations of uninsured sexually active women. The study reports several areas for concern, most specifically two cities: Dallas and Houston, Texas. This state also contains many areas with large concentrations of uninsured women in need of contraception, as was seen in a study reviewed earlier (United States Department of Health and Human Services, 2016).

Methodology

This thesis seeks to compare responses made in the United States and Brazil to the Zika epidemic and its consequences. I reviewed research produced on the impact of Zika virus in the United States and Brazil, paying particular attention to how national and international organizations helped the United States and Brazil respond to and analyze Zika outbreaks. Research papers were chosen based on their focus, specifically from the perspective of socioeconomic disparity and women's healthcare and reproductive rights. The data used was both quantitative and qualitative. The data used included rates of insurance among women and levels of hostility towards abortion rights. Situational reports regarding Zika transmission among women in the United States and Brazil included qualitative data. These data were taken from various sources, including the Center for Disease Control, the World Health Organization, and the Pan American Health Organization and were chosen for their objective reporting of data in the context of this project. Other sources, such as the study from the International Federation for Red Cross

and Red Crescent Societies and the study from the Guttmacher Institute were also used to investigate the consequences of Zika virus outbreaks from a socio-medical perspective, particularly involving socioeconomic status, women's healthcare and reproductive rights. After comparing the responses addressed in the United States and Brazil and reviewing the recommendations proposed by various authors, suggestions are made about how to address Zika outbreaks and their consequences.. These suggestions specifically address inequities discussed in the literature review, namely individual socioeconomic disparities and gender inequality.

Discussion

Women in the United States and Brazil experienced the impact of the Zika outbreak to unequal extents and had variable treatment and access to knowledge regarding the spread and consequences of the Zika virus. Certain populations of women were more vulnerable to the effects of Zika during its outbreak because various risk factors. Namely, socioeconomic and racial disparities, inadequate access to healthcare, water, and sanitation, and restrictions on sexual and reproductive rights and education. As evidenced above, the responses made by the United States and Brazil did little to counter the effects of the Zika virus, and generally do not account for the disproportional impact felt by those in vulnerable populations, specifically women and women in poverty, who were exposed to these risk factors. In order to adequately respond to the unequal impact of the Zika virus in the United States and Brazil, changes need to be made regarding female sexual and reproductive health, targeted support needs to be established for

women in vulnerable populations, and adequate access to healthcare, water, and sanitation need to be established and available.

One of the responses that I recommend making based on my research in order to decrease the unequal treatment experienced by women in vulnerable groups in the United States and Brazil, respectively, is adequate access to healthcare. This includes access to health care providers, hospitals and clinics with trained professionals, and adequate access to water and sanitation. In the United States, access to healthcare is the main source of inequality, as inadequate access to water and sanitation are less of an issue. According to Dreweke in the report for the Guttmacher Institute, disadvantaged women, such as poor women and women of color, are more likely than others to lack the resources to parent a child born with microcephaly, which is exacerbated by an absence of affordable health care, paid family leave, and paid sick leave. This inequality regarding lack of resources highlights the importance of access to healthcare, and other such necessities related to it, such as insurance, for those impacted by the Zika virus. This access to healthcare is particularly important for women in areas where high numbers of women are uninsured, which makes accessibility to healthcare incredibly difficult. Despite the fact that public health insurance programs have expanded coverage for the poor, and family physicians provide essential services to these populations, DeVoe, et al., (2007) report that many Americans do not have access to basic medical care. In a survey conducted with 722 low-income Oregon families in the United States, DeVoe, et al. found that 87% of uninsured parents reported experiencing difficulties obtaining insurance coverage, compared with 40% of those with insurance (DeVoe, et al., 2007). Additionally, gaining access to services and providers was reported as a large challenge

for low-income families, as well as high costs of medical care, specifically unaffordable private insurance premiums and a hesitancy to seek care because of high deductibles and copayments (DeVoe, et al., 2007).

In Brazil, adequate access to healthcare is incredibly important, but adequate access to water and sanitation is a factor that needs to be established in order to prevent another epidemic such as that of Zika in the urban slum areas that are the most highly impacted. According to a report by the Human Rights Watch, one-third of Brazil's population lacks access to a continuous water supply. This forced large numbers of individuals in densely packed areas to unintentionally create mosquito breeding grounds (Klasing, 2018). In order to prevent further unequal consequences for women in lower socioeconomic situations, the systemic problems with public water and sanitation need to be addressed. If they are not, the same groups that were vulnerable for the Zika virus will continue to be vulnerable to other mosquito-borne diseases. As the Human Rights Watch report states, the Brazilian population has the right to sufficient, safe, and affordable water and sanitations (Klasing, 2018), and changes need to be made in order to ensure that this right is being met.

In both the United States and Brazil, lack of access to healthcare related to in-person procedures disproportionately impacted vulnerable groups. For example, in Brazil, microcephaly detection was hindered by the lack of easy and affordable point-of-care tests, particularly in areas with limited health capacities (International Federation of Red Cross and Red Crescent Societies, p. 43). Additionally, many of these tests require complicated techniques, and the rural areas where these tests were more needed had low numbers of trained personnel (p. 43). A similar situation arose in the United States, in

which the United States Office of Population Affairs developed provider toolkits to facilitate counseling on the risks and implications of Zika to help individuals make decisions on contraceptive use, but the health systems infrastructure was lacking and resulted in health care providers issuing advice their patients were unable to follow (Darney, et al., 2017). Both of these scenarios outline the necessity for increased access to healthcare, particularly for vulnerable groups in order to decrease the unequal impact of the Zika virus. With an increase in training for healthcare professionals, more women can be tested to find out if their child will have microcephaly, and health care providers will be more well-equipped to advise families in decision-making. If there is an increase in accessibility to healthcare, particularly in the context of health system infrastructure, these women and their families can also take the advice of their providers and apply it in their lives, hopefully making lasting positive impact. Ideally, healthcare professionals will be trained in complicated and diagnostic techniques in both rural and urban areas, and have access to the necessary equipment to complete these practices. Additionally, access to these healthcare resources, such as education and visits to a healthcare professional would not be cost-prohibitive to these vulnerable populations.

Another response that I recommend based on my research involves directing attention to social inequalities, and establishing long term and targeted support for those in vulnerable groups. This includes education, infection prevention, and caregiver support. Support for caregivers, particularly the women who give birth to children with microcephaly, is incredibly important, because disadvantaged women are much more likely than others to lack the resources necessary to parent a child born with microcephaly (Dreweke, 2016). Part of this is financial, as the cost of raising a child with

microcephaly and other neurodegenerative diseases is incredibly high, both in short and long term costs. Additionally, the task of caregiving often falls to women, many of whom reported facing obstacles in accessing adequate information and support at their time of delivery and as their children grew and developed. Increased support to these women, in terms of education and information, as well as caregiver support would greatly impact these women in a positive manner, as well as decreasing the disparity that they experienced as a result of their socioeconomic situation. The continued targeted support of these vulnerable women will also aid in increasing the quality of life for both them and their children as time goes on. With long term support, these families are more likely to take advantage of the resources of the healthcare system and less likely to fail to get the care and attention they need.

Another aspect of the need for support for those in vulnerable groups is providing infection protection for vulnerable populations. Many low-income women in Brazil reported that they did not have the means to purchase mosquito repellent for everyday use (Klasing, 2018). If these women had access to daily mosquito repellent, their chances of being infected by Zika would have decreased significantly, and thus would also decrease or negate the likelihood of their children being born with microcephaly. This support measure is particularly important for women in lower economic situations, especially in Brazil, as the urban slums provided ideal breeding grounds for the *Aedes* mosquito and the very women living in those areas were the ones lacking adequate access to infection prevention. Other methods that protect against the infection of Zika via vector transmission, such as lack of air conditioning or door or window screens should also be

part of the targeted support for those in vulnerable populations, as these features are often missing from those who live in low-income homes.

Education is another aspect of support that needs to be targeted to vulnerable populations. In the study conducted by Guerra, et al., it was found that groups that are less educated are less likely to have knowledge about Zika transmission (p. 6). This emphasizes the need for targeted educational support, one example being the creation of programs specifically targeting young men, as the main prevention of sexual transmission of Zika is the male condom. Education targeted to young men would aid in the decreasing of sexual transmission levels and thus potentially the number of microcephaly cases. Additionally, targeted outreach for health services and education would be beneficial particularly for those in areas with high rates of poverty and lack of access to health education, as it would provide targeted support despite the disproportionate lack of support services for vulnerable groups.

Another important aspect of support is more general, with the necessity of drawing support for the socioeconomic disparities that exist in urban slum populations. This type of support, such as through media attention and research resources, dedicated to bringing attention to urban slums, would allow for the potential correction of these largely disproportionate situations. This would in turn lead to the reduction of the unequal consequences of epidemics such as Zika for those in urban slums and other vulnerable groups.

Finally, based on my research, I recommend changes regarding sexual and reproductive rights, specifically making changes to the inequality that Zika has brought to light. This includes making access to contraceptives more accessible and decreasing the

hostile environment that women face on issues surrounding pregnancy. This recommendation is particularly important for Brazil, and much of Latin America, as abortion is still illegal in the majority of the region, and as a result 4.4 million pregnancy terminations in Latin America were conducted in unsafe conditions, contributing to 12 percent of all maternal deaths (International Federation of Red Cross and Red Crescent Societies, p. 40). While abortion is not illegal in the United States, women in many states face hostile or extremely hostile environments when attempting to access abortion care, with many obstacles making obtaining an abortion more costly and time consuming, often making abortion even more out of reach for women who are poor or fall into other vulnerable populations. In Brazil, abortion is illegal and there are many obstacles in place to prevent women from terminating pregnancy, many women are driven to levels of desperation that cause them to turn to illegal and unsafe abortion methods. If women are given the choice to terminate a pregnancy by their government, they would not be forced to expose their bodies to an unnecessary risk of infection and potential death. Along with access to the choice of terminating a pregnancy, it is also important for women to have access to the necessary counseling, information, and services to prevent unintended pregnancy, to safely terminate an unwanted pregnancy, and to carry a pregnancy to term (Dreweke, 2016).

Another important point of this recommendation is access to contraceptives, which is often difficult for women in remote areas, women in poverty, and women in other vulnerable groups, such as African American and Latina women, to access. The Zika Contraception Access Network (Z-CAN) present in Puerto Rico is a model that I believe would be effective in minimizing the unequal consequences of the Zika virus for women

in vulnerable groups, as well as decreasing the likelihood of unintended pregnancy and microcephaly cases. Z-CAN offers the full range of FDA-approved contraceptive options at no cost, and strong evidence has been presented that reports increased access to contraceptive reduced Zika-related microcephaly cases and healthcare costs (Darney, et al., 2017). This type of model would decrease healthcare costs, which is particularly important for the vulnerable groups addressed here.

While both access to contraceptives and the choice to terminate a pregnancy are incredibly important for women in vulnerable groups facing the consequences of the Zika virus, changes also need to be made to address the unequal burden placed on women in the wake of the Zika virus. This comes in the form of women being unequally pressured to serve as caregivers for their families, dropping out of school or the labor force to care for a child or relative affected by the Zika virus, which has also been reported for other epidemics, for example HIV (p. 40). In order to respond to this inequality, public policies supporting gender equality and sexual and reproductive health need to be promoted, specifically targeting vulnerable and affected communities (International Federation of Red Cross and Red Crescent Societies, p. 49).

Another form of inequality is found in the public health responses that governments had in the wake of the Zika epidemic. For example, many governments in Latin America and the Caribbean made blanket recommendations that women should avoid pregnancy over long periods of time (Dreweke, 2016).⁵ This vague statement reflected the neglect of women's health in many of these areas, as it does not serve to provide any advice for women on how to avoid pregnancy, and only serves to shift the burden of responding to a

⁵Brazil, Colombia, Ecuador, and El Salvador, among others, recommended that women should avoid becoming pregnant altogether (Dreweke).

public health crisis to individual women (Dreweke, 2016) and off the government. Changes in the way that women's reproductive health and maternal health are viewed are necessary in order to prevent this unequal pressure on women in the face of crises that should be dealt with, at some level, by governing bodies. Women's reproductive health and maternal health should be prioritized, especially in the context of public health crises such as Zika, with such lasting influences on women's individual lives. The vague blanket recommendations that these governing bodies made also serve to expose women to blame and stigma should they become pregnant or give birth to a child with a disability, leaving affected women even more vulnerable (Dreweke, 2016). Increased specificity and support in regards to women's reproductive health need to be made in order to prevent further unequal consequences for women in vulnerable positions and populations, in the wake of the Zika virus.

Similar blanket statements were given in the United States, such as in Texas. Darney, et al. reported that Texas issued a similar general statement, making recommendations for how women and men could avoid mosquito bites, while not addressing the issue of whether women should plan or avoid pregnancy. This response is even less specific than that of many governments in Latin America, as it does not address the issues of family planning at all.

More directed and specific public health statements need to be made in both the United States and Brazil in order to increase the number of individuals, particularly expecting or potential mothers, that understand the risk Zika infection during pregnancy. Because of the causal relationship between the Zika virus and microcephaly, the public health responses and messages need to be informative and directed towards these women

that are at the most risk. These directed and educational messages may prevent the high numbers of Zika-related birth defects in both the United States and Brazil.⁶

Conclusion

The Zika virus is a disease that has had widespread global impact, affecting 85 countries and territories around the world as of May 2017 (Klasing, 2018), and leaving a profound and lasting impact on the Americas after its initial outbreak in Brazil in October of 2015 (PAHO, 2015). The Zika epidemic in Brazil led to the World Health Organization declaring an international public health emergency, after an increase in both cases of Zika infection and an unusual increase in infants born with microcephaly (CDC, 2018). The first case of Zika in the continental United States was reported in Florida in 2016 (Marini, 2017). However, the consequences of the Zika virus would make themselves known for women in both the United States and Brazil as a medical crisis, and also one of gender and socio-economic status.

The Zika virus has rampant healthcare consequences and the Zika epidemic in 2015 and 2016 presented a medical crisis during the outbreak and the years following. The medical crisis Zika caused is largely due to the causal relationship between the Zika virus and microcephaly, and the necessity for adequate access to healthcare in order to treat and diagnose the Zika virus. This healthcare crisis as a result of Zika presented itself

⁶ In the United States, according to data collected in 2016, Zika virus-associated birth defects were reported for 51 (5%) of the 972 fetuses/infants from completed pregnancies with laboratory evidence of possible recent Zika virus infection (Reynolds, *et al.*, 2017). Additionally, approximately one in 10 pregnancies with laboratory-confirmed Zika virus infection resulted in a fetus or infant with Zika virus-associated birth defects (Reynolds, *et al.*, 2017).

In Brazil, according to data collected up until June 2016, 1638 cases of 8165 suspected microcephaly Zika-related microcephaly births were confirmed and 3061 were still in ongoing investigation (Coelho and Crovella, 2017). Most of these confirmed cases were in the northeast region, making up 1471 of the 1638 confirmed cases (Coelho and Crovella, 2017).

in Brazil with limited access to healthcare, particularly those in rural or impoverished areas that are limited in their healthcare capacities. Many procedures required for point-of-care tests related to the Zika virus rely on complicated techniques, which these areas cannot provide due to lack of resources and low numbers of trained personnel.

Additionally, Zika presented itself as a healthcare crisis in Brazil because large numbers of individuals were diagnosed with milder cases of dengue when the Zika outbreak was beginning. Only after numerous cases of children born with microcephaly were reported did the Brazilian government declare a national health emergency.

In both the United States and Brazil, access to healthcare is disproportionately difficult for those in vulnerable groups, specifically impoverished populations and women of color, which is even more pronounced in the context of the Zika virus. Due to the fact that Zika can have such a lasting impact on a woman and her infant, the Zika epidemic is not only a healthcare crisis, but one of gender and socioeconomic status as well.

Because of the short and long-term costs that are associated with Zika virus infection, and the potentially resulting microcephaly, many impoverished women are faced with costs and responsibilities that are completely unexpected. These include the costs of detecting, diagnosing, and treating symptomatic individuals, as well as potential lost income due to caring for relatives or children affected by the virus. Various long-term medical costs, including the costs associated with raising an infant with microcephaly, living with microcephaly, and the cost of living with Guillain-Barré syndrome are also present. These short and long term costs, combined with increased risk

of having a lower socioeconomic status result in a socioeconomic crisis as a result of Zika outbreaks.

Similarly, the Zika epidemic revealed long-standing issues of gender inequality in both the United States and Brazil. There are various reasons for this gender inequality, one of the main being that women are often pressured to act as caregivers for family members affected by Zika or children born with microcephaly. Many of these women are pulled from the work force or from school to care for these family members.

Additionally, Zika epidemics expose the need for changes in regards to female and sexual reproductive care, including access to contraceptive methods and education. In the United States, areas with potential Zika risk often coincide with high numbers of women who are uninsured, currently sexually active, and in need of contraception. However, many of these areas similarly have high levels of hostility towards access to contraceptives and abortion. In Brazil, it is incredibly difficult for women to access contraceptives, and even more difficult for them to terminate pregnancy, which is illegal. Despite the illegal status of this procedure, countless pregnancy terminations are still conducted, many in unsafe conditions. Women have limited access to education in both the United States and Brazil that unfortunately leave women vulnerable and exposed to potential dangers, and without options and information for making decisions regarding their pregnancy.

The United States and Brazil differed in their approaches to the 2015 Zika epidemic. The Brazilian government implemented various measures to combat the effects of Zika, namely through the *Bolsa Familia*, as well as through establishing a national surveillance system to investigate the spread of the disease during the epidemic and to detect microcephaly. The *Bolsa Familia* aims to reduce poverty and inequality by

offering families with children with microcephaly an additional monthly stipend and access to insecticides. However, the extent of time to which these services are to be offered is uncertain. The national surveillance system aims to guide health care and psychological support for those affected by Zika.

The responses in the United States were more generalized, compared to the more targeted responses in Brazil. The United States approved large allotments of emergency supplemental funds in order to support community outreach in the United States and abroad. However, the measures that were proposed include various restrictions that make it incredibly difficult for low-income women to access the full range of reproductive and maternal health care. One of the more specific responses that the United States made was implemented in Puerto Rico to support women, infants, and children through a Special Supplemental Nutrition Program.

A response made by both the United States and Brazil in response to the Zika epidemic were generalized healthcare recommendations. Many governments in Latin America, including Brazil, made blanket recommendations that women should avoid pregnancy over long periods of time, or avoid becoming pregnant altogether, with no statements about how to do so. Similarly, men and women received blanket statements about how to avoid mosquito bites with no mention of whether women should avoid pregnancy. This generalized statement is problematic because it does not address or acknowledge the potential risk that Zika infection can pose for women and their potential children, nor the link between Zika and microcephaly.

In order to prevent the disproportionate and drastic impact felt by vulnerable populations as a result of Zika epidemics in the future, several aspects of the 2015 Zika

epidemic responses need to be altered. First, changes need to be made regarding female and sexual reproductive health. In both the United States and Brazil, this includes making more specific official statements informing women about how to prevent and avoid pregnancy, as well as increasing accessibility to contraceptive methods and methods for terminating pregnancy. Specifically, women need to be given more information and education about female healthcare and how the Zika virus can impact sexual and reproductive health. Secondly, targeted support needs to be established for women in vulnerable populations for the long-term. Because of the disproportionate impact of the Zika virus on women in vulnerable populations, namely low-income and women of color, these populations need to be supported through the process of caring for and raising children with microcephaly as caregivers with access to information and education. Thirdly, adequate access to healthcare, water, and sanitation need to be established and available. In Brazil, access to water and sanitation plays a large role in the disproportionate impact that Zika had on women in impoverished areas. Access to water and sanitation will decrease the amount of standing water in impoverished areas and decreases the likelihood of Zika transmission via vector. Access to healthcare is incredibly important in both the United States and Brazil, as women in both countries form vulnerable populations. Women from low-income neighborhoods and/or women of color, have disproportionately less access to healthcare. Access to healthcare and healthcare services is crucial to decreasing the unequal impact, as women from these vulnerable populations, and their children, will be able to receive the assistance and care they need.

In order to address these inequalities in the future, further research on Zika epidemics needs to look at vulnerable populations and the access they have to education and healthcare. For women, issues of inequality need to be investigated, specifically regarding women's reproductive and sexual healthcare. This project focused on vulnerable populations and the individuals affected within these populations, specifically regarding socioeconomic effects. However, there are also other various other consequences. Future projects could investigate macro implications in the United States' and Brazil's regarding healthcare. Additionally, future projects could investigate further risk factors to vulnerable populations, outside of social status and economic disparity.

Appendix

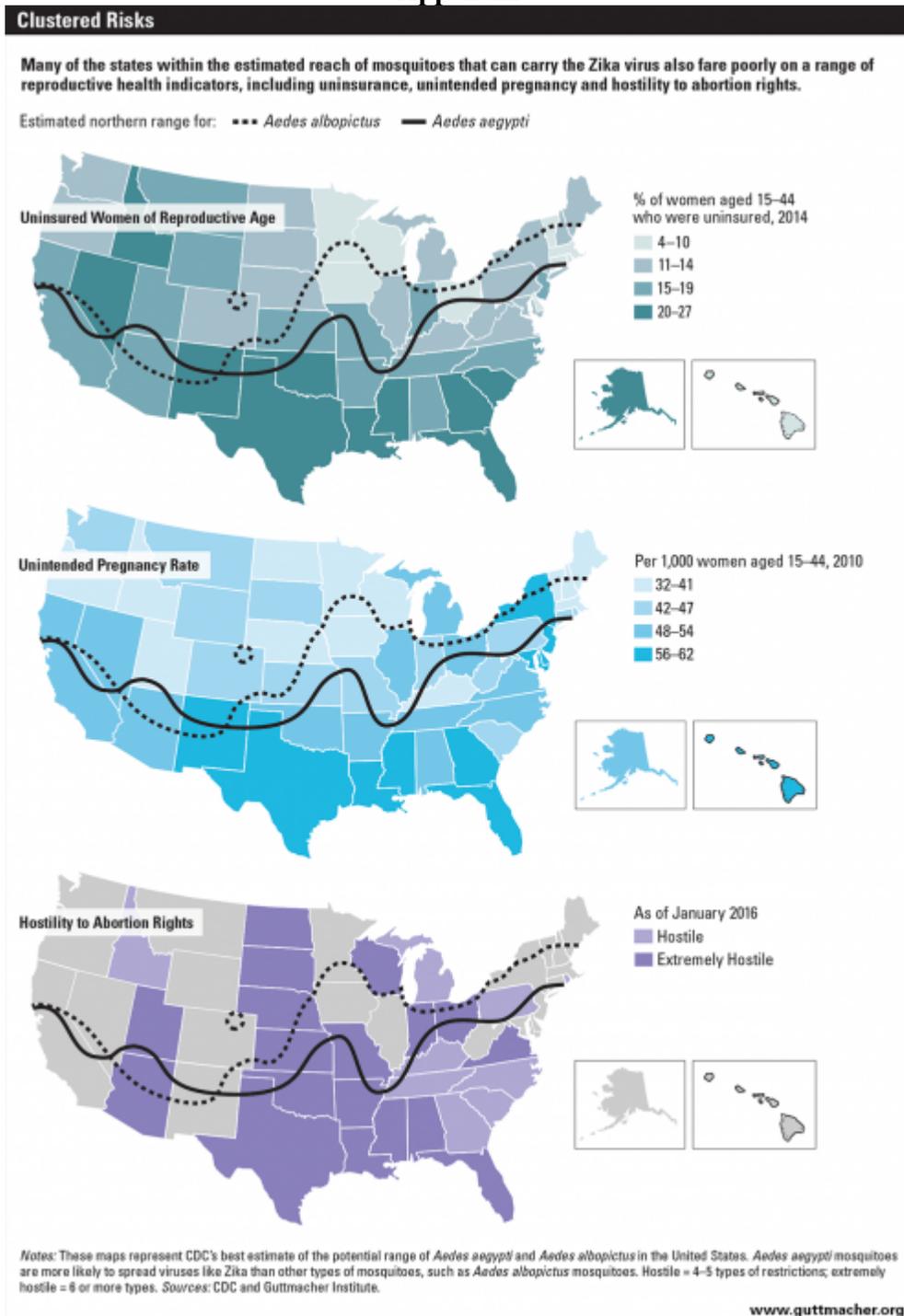


Figure 1. Uninsured Women of Reproductive Age, Unintended Pregnancy Rates, and Hostility to ABortion Rights overlaid with the northern range for the two mosquitos capable of transmitting the Zika Virus

From: Dreweke, Joerg. “Countering Zika Globally and in the United States: Women's Right to Self-Determination Must Be Central.” *Guttmacher Institute*, 19 May 2016

Citations

- Abortion | Data and Statistics | Reproductive Health | CDC. (n.d.). Retrieved from https://www.cdc.gov/reproductivehealth/data_stats/abortion.htm
- Aiken, Abigail R. A., et al. “Requests for Abortion in Latin America Related to Concern about Zika Virus Exposure | NEJM.” *New England Journal of Medicine*, 28 July 2016, www.nejm.org/doi/full/10.1056/NEJMc1605389?query=featured_home.
- Aliota, M. T., Bassit, L., Bradrick, S. S., Cox, B., Garcia-Blanco, M. A., Gavegnano, C., ... Weaver, S. C. (2017). Zika in the Americas, year 2: What have we learned? What gaps remain? A report from the Global Virus Network. *Antiviral research*, 144, 223–246. doi:10.1016/j.antiviral.2017.06.001
- Coelho AVC, Crovella S. Microcephaly Prevalence in Infants Born to Zika Virus-Infected Women: A Systematic Review and Meta-Analysis. *Int J Mol Sci*. 2017;18(8):1714. Published 2017 Aug 5. doi:10.3390/ijms18081714
- Darney, Blair G et al. “Access to Contraception in the Context of Zika: Health System Challenges and Responses” *Obstetrics and gynecology* vol. 129,4 (2017): 638-642.
- Devoe, J. E., Baez, A., Angier, H., Krois, L., Edlund, C., & Carney, P. A. (2007). Insurance + access not equal to health care: typology of barriers to health care access for low-income families. *Annals of family medicine*, 5(6), 511–518. doi:10.1370/afm.748
- “Epidemiological Alert: Increase in Microcephaly in the Northeast of Brazil .” *Pan American Health Organization*, Pan American Health Organization and World Health Organization, 17 Nov. 2015, www.paho.org/hq/dmdocuments/2015/2015-nov-17-cha-microcephaly-epi-alert.pdf.
- Dreweke, Joerg. “Countering Zika Globally and in the United States: Women's Right to Self-Determination Must Be Central.” *Guttmacher Institute*, 19 May 2016
- “Gaps in Contraception Access and Zika.” *HHS Office of the Assistant Secretary for Preparedness and Response - PHE*, United States Department of Health and Human Services , 18 Aug. 2016, www.phe.gov/Preparedness/planning/contraception/Pages/default.aspx.
- Greco, D., & S. D. (2007). *Poverty and Sexual Violence: Building Prevention and Intervention Responses*[PDF]. Pennsylvania Coalition Against Rape.
- Guerra Reyes, Lucia & Fu, Tsung-Chieh (Jane & Williams, Deana & Herbenick, Debby & Dodge, Brian & Reece, Michael & Dennis Fortenberry, J. (2018). Knowledge of Zika and perception of risk among sexually-active adults in the United States of America: results from a nationally representative sample. *Revista Panamericana de Salud Pública*. 42. 1-9. 10.26633/RPSP.2018.43.
- Guedes, A. (2000). Abortion in Brazil: Legislation, Reality and Options. *Reproductive Health Matters*, 8(16), 66-76. Retrieved from <http://www.jstor.org/stable/3775272>
- Kallas, E.G. (2017). The emergence and spread of ZIKV infection. In *Zika in the Americas, year 2: What have we learned? What gaps remain? A report from the Global Virus Network*. *Antiviral research*, 144, 223–246. doi:10.1016/j.antiviral.2017.06.001
- Kaplan, S. (2018, April 19). Congress approves \$1.1 billion in Zika funding. Retrieved from <https://www.statnews.com/2016/09/28/senate-approves-zika-funding/>
- Klasing, Amanda M., et al. “Neglected and Unprotected | The Impact of the Zika Outbreak on Women and Girls in Northeastern Brazil.” *Human Rights Watch*, 21

- Aug. 2018, www.hrw.org/report/2017/07/12/neglected-and-unprotected/impact-zika-outbreak-women-and-girls-northeastern-brazil#.
- Marini, Giovanni et al. "First outbreak of Zika virus in the continental United States: a modelling analysis" *Euro surveillance : bulletin Europeen sur les maladies transmissibles = European communicable disease bulletin* vol. 22,37 (2017): 30612.
- Rasmussen, Sonja A., et al. "Zika Virus and Birth Defects — Reviewing the Evidence for Causality." *New England Journal of Medicine*, vol. 374, no. 20, 2016, pp. 1981–1987., doi:10.1056/nejmsr1604338.
- Reynolds MR, Jones AM, Petersen EE, et al. Vital Signs: Update on Zika Virus—Associated Birth Defects and Evaluation of All U.S. Infants with Congenital Zika Virus Exposure — U.S. Zika Pregnancy Registry, 2016. *MMWR Morb Mortal Wkly Rep* 2017;66:366-373. DOI: <http://dx.doi.org/10.15585/mmwr.mm6613e1>
- Shan, C., & Shi, Pei-Yong. (2017). Current status of vaccine development. In *Zika in the Americas, year 2: What have we learned? What gaps remain? A report from the Global Virus Network. Antiviral research*, 144, 223–246. doi:10.1016/j.antiviral.2017.06.001
- Schinazi, R.F., Gavegnano, C., Cox, B., & Bassit, L. (2017). Current status of antiviral therapeutics. In *Zika in the Americas, year 2: What have we learned? What gaps remain? A report from the Global Virus Network. Antiviral research*, 144, 223–246. doi:10.1016/j.antiviral.2017.06.001
- Sifferlin, Alexandra. "Zika and Abortion Restrictions: How They Could Collide in US." *Time*, Time, 7 July 2016, time.com/4394141/zika-abortion-usa/.
- Skråning, Susanne, and Benedikte V. Lindskog. "The Zika Outbreak in Brazil: An Unequal Burden." *Tidsskrift for Den Norske Legeforening*, Nov. 2017, tidsskriftet.no/en/2017/11/global-helse/zika-outbreak-brazil-unequal-burden.
- Snyder RE, Boone CE, Cardoso CAA, Aguiar-Alves F, Neves FPG, Riley LW (2017) Zika: A scourge in urban slums. *PLoS Negl Trop Dis* 11(3): e0005287. <https://doi.org/10.1371/journal.pntd.0005287>
- "Socioeconomic Impact Assessment of the Zika Virus in Latin America and the Caribbean: with a Focus on Brazil, Colombia, and Suriname." *International Federation of Red Cross and Red Crescent Societies, United Nations Development Programme*, 2017, www.ifrc.org/Global/Photos/Secretariat/201702/UNDP-Zika-04-03-2017-English-WEB.pdf.
- Taylor, Jamila. *Zika Virus in the United States: Plans to Address Transmission Must Include a Comprehensive Approach to Reproductive and Maternal Health*. Center for American Progress, 24 May 2016, cdn.americanprogress.org/wp-content/uploads/2016/05/24083006/TaylorZika-briefv2.pdf.
- "Travelers' Health." *Centers for Disease Control and Prevention*, Centers for Disease Control and Prevention, 14 Aug. 2018,
- Yuan, L., Huang, X., Liu, Z., Zhang, F., Zhu, X., Yu, J., . . . Qin, C. (2017, November 17). A single mutation in the prM protein of Zika virus contributes to fetal microcephaly. Retrieved from http://science.sciencemag.org/content/358/6365/933?ijkey=10635599b2f33a04f34866f76a4c289ee7513980&keytype=tf_ipsecsha

- “Zika Virus.” *Centers for Disease Control and Prevention*, Centers for Disease Control and Prevention, 23 Feb. 2018, <https://www.cdc.gov/zika/index.html>.
- “Zika Virus.” *World Health Organization*, World Health Organization, 20 July 2018, www.who.int/news-room/fact-sheets/detail/zika-virus.

Bibliography

- Harris, Lisa H., et al. “The Paradigm of the Paradox: Women, Pregnant Women, and the Unequal Burdens of the Zika Virus Pandemic.” *Bioethics.net - Where the World Finds Bioethics*, 2016, www.bioethics.net/2016/04/the-paradigm-of-the-paradox-women-pregnant-women-and-the-unequal-burdens-of-the-zika-virus-pandemic/
- Kost, Kathryn. “Unintended Pregnancy Rates at the State Level: Estimates for 2010 and Trends Since 2002.” *Guttmacher Institute*, 21 Mar. 2016, www.guttmacher.org/report/unintended-pregnancy-rates-state-level-estimates-2010-and-trends-2002.
- “One Year into the Zika Outbreak: How an Obscure Disease Became a Global Health Emergency.” *World Health Organization*, World Health Organization, 13 June 2016, www.who.int/emergencies/zika-virus/articles/one-year-outbreak/en/index4.html.
- Pazol K, Ellington SR, Fulton AC, et al. Contraceptive Use Among Women at Risk for Unintended Pregnancy in the Context of Public Health Emergencies — United States, 2016. *MMWR Morb Mortal Wkly Rep* 2018;67:898–902. DOI: <http://dx.doi.org/10.15585/mmwr.mm6732a6>
- Vissoi, João Ricardo Nickenig, et al. “Zika Virus Infection and Microcephaly: Evidence Regarding Geospatial Associations.” *PLOS ONE*, Public Library of Science, 2018, journals.plos.org/plosntds/article?id=10.1371%2Fjournal.pntd.0006392#abstract0.
- Whittemore, Kate et al. “Zika Virus Knowledge among Pregnant Women Who Were in Areas with Active Transmission” *Emerging infectious diseases* vol. 23,1 (2017): 164-166.
- Zielinski , Alex. “Brazil Confiscates Abortion Pills From Pregnant Women Exposed To Zika.” *ThinkProgress*, ThinkProgress, 28 Mar. 2016, thinkprogress.org/brazil-confiscates-abortion-pills-from-pregnant-women-exposed-to-zika-768e4603bad9/.