ENCOURAGING PREVENTIVE ACTION BY EMPLOYING EFFECTIVE RHETORIC IN PUBLIC COMMUNICATION OF THE ZIKA HAZARD AND ASSOCIATED RISKS

by

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Abstract

Threats from Zika and other emergent arboviruses (arthropod-borne viruses) often receive little scholarly attention across most disciplines thanks in no small part to the traditional view that most emergent disease discourse is only immediately relevant to those in medical and economic fields. The reality is that any time endemic threats pose risks to public welfare or become threats to national health and security, scholars from all fields should reevaluate how their current and developing skills and knowledge could be employed to help prevent and/or minimize negative outcomes when outbreaks seem likely. Scholars in the fields of rhetoric and technical communication have developed skills and knowledge that would render us particularly well suited to work with those in medical, economic, and public communication fields to develop or remediate tools and resources to alter potential outbreak outcomes in positive ways if we were offered or willing to claim a seat at their table. This study utilizes surveying of residents in Harlingen, Texas regarding Zika as a springboard into research on public health communication failures as represented by technical documents designed to communicate health and safety information about Zika and validated by revision of those documents to increase their effectiveness in encouraging proactive prevention behaviors and retention of health knowledge.

ENCOURAGING PREVENTIVE ACTION BY EMPLOYING EFFECTIVE RHETORIC IN PUBLIC COMMUNICATION OF THE ZIKA HAZARD AND ASSOCIATED RISKS

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"The next outbreak is not a matter of if, but when." - Dr. Ernesto T.A. Marques

(as quoted by Jacobs, 2019)

"Whoever controls the definition of risk controls the rational solution to the problem at hand."

- Paul Slovic, 1999

Introduction

In the United States, endemic public health crises and pandemics are rare. Influenza and the resurgence of measles may pose the most dastardly viral threats that the nation as a whole will face between 2019 and 2020,[1] but even small outbreaks of viral disease can pose significant threats to community health and safety, especially when the effects may be far reaching, long lasting, and communally devastating, as can easily happen with diseases like Zika. Threats from Zika and other emergent arboviruses (arthropod-borne viruses) often receive little scholarly attention across most disciplines thanks in no small part to the traditional view that most emergent disease discourse is only immediately relevant to those in medical and economic fields. The reality is that any time endemic threats pose risks to public welfare or become threats to national health and security, scholars from all fields should reevaluate how their current and developing skills and knowledge could be employed to help prevent and/or minimize negative outcomes when outbreaks seem likely. Scholars in the fields of rhetoric and technical communication have developed skills and knowledge that would render us particularly well suited to work with those in medical, economic, and public communication fields to develop or remediate tools and resources to alter potential outbreak outcomes in positive ways if we were offered or willing to claim a seat at their table.

[1] When I began writing this and subsequent chapters, the ongoing COVID-19 pandemic did not yet exist, making Ernesto Marques' words, "the next outbreak is not a matter of if, but when," haunting.

Another culprit that may be impacting emergent disease discourse in fields like rhetoric and technical communication are the faulty terministic screens that enable a widely held misperception of diseases like Zika as "low-risk." Seemingly low rates of reported infection along with comparatively insignificant and demographically or geographically isolated associated risks as presented by popular news media sources along with our lack of previous personal experience with Zika leaves us with limited terminology through which we can understand the hazard of Zika and its associated risks. As new narratives of illness are constructed around the term "Zika" by various media outlets with limited information, we develop faulty screens through which to view the new reality the narratives create.

Unfortunately, much recent research suggests that perceptions of statistically low or demographically/geographically isolated risks along with a generalized lack of recent experience with epidemic crises within our borders may lead to both confusion and complacency among United States residents and visitors when outbreaks do occur. In the case of Zika outbreaks experienced on the continental United States and US Territories between 2015 and 2019, the reports of public confusion and complacency may have been the direct result of a lack of effective proactive rhetoric among other problematic communication strategy failures which lead to decreased or stagnant engagement in recommended preventive behavior uptake.

While arbovirus outbreaks are not entirely preventable due to their modes of transmission, the potential for initial infection and subsequent spread can be greatly reduced through a variety of preventive and protective strategies. Arboviruses, as vector-borne diseases, require the management of specific vectors in order to manage the diseases and their associated risks effectively. According to the World Health Organization, a vector can be any organism which transmits diseases between animal species, including humans (WHO, 2014), but many of

the most common vector-borne diseases, such as yellow fever, dengue fever, West Nile fever, chikungunya, eastern equine encephalitis, and Zika, are initially and predominantly spread by Aedes Aegypti and Aedes Albopictus mosquitoes. Both mosquito species are common in the United States, and their prevalence can quickly prove problematic, as it did with the recent re-emergence of the previously little known Zika virus, a virus capable of making those infected ill with "flu-like" symptoms, increasing rates of Guillain-Barre syndrome (Uncini, Shahrizaila & Kuwabara, 2017), and causing complications during pregnancy and birth defects post pregnancy (Chakhtoura, Hazra & Spong, 2018). Data collected by the Pan American Health Organization (PAHO) shows that the re-emergence of Zika first became a serious public health threat in South and Central America as well as in US territories in 2015 and, by 2016, the virus had already spread in small pockets across the continental United States (PAHO, 2017). By the end of 2016, over 5,000 symptomatic cases had been verified within the continental United States with 48 states reporting some form of confirmed infection, including 224 confirmed local mosquito-borne transmission cases from two states--Florida and Texas--and over 36,000 cases verified within US territories (CDC, 2019).

After its peak in 2016, the threat of new Zika cases abated in the continental United States with only seven laboratory confirmed local mosquito-borne cases reported in 2017 (CDC, 2017), none in 2018 (CDC, 2018), and fewer than 500 travel-related cases reported between January 2017 and September 2019 (CDC, 2019). Likewise, cases in US territories had dramatically decreased with only 148 reported in 2018, and only 34 reported before September 1, 2019 (CDC, 2019). However, as Lyle Peterson, the head of one vector-borne disease unit within the CDC pointed out in August of 2017, the lack of cases in the US over the 2017 mosquito season shouldn't be taken as the end of the threat. The mosquitos that cause outbreaks in any

neighboring nations or trade nations could easily cross the border into US territory much as they had the first time, through shipping routes and mass human transit systems (as cited by Cohen, 2017). Roberta DeBiasi, M. D., co-director of the Congenital Zika Program at Children's National Health System, stated in July of 2018 that it's only a matter of time before we see a resurgence of Zika (as cited by Grennell, 2018), a reality echoed again a year later by Dr. Ernesto T.A. Marques, of The Oswaldo Cruz Foundation in Rio de Janeiro (as cited by Jacobs, 2019) and compounded by Dr. Eve Lackritz, head of the WHO's Zika Task Force, when she told New York Times reporter, Andrew Jacobs, that her "biggest fear is complacency and lack of interest by the global community" (Jacobs, 2019).

Preeminent authorities on Zika and its spread agree that the virus remains a threat at the global level. This means U.S. health and safety professionals, politicians, and the publics they serve need to be prepared for resurgences of the virus, and that preparation includes remediating campaigns to not only improve public awareness of Zika as a genuine hazard with significant associated risks, but also ensuring a more proactive public response to prevention and protection through improved risk communication.

Unfortunately, the job of public risk communication too often falls to those who, though professionally trained in relevant areas of expertise, have little if any training in rhetoric or technical communication. Those without adequate training in rhetoric and technical communication can exacerbate problems in already dangerous and confusing situations. They may fail to seek out or acknowledge the most reliable methods of message conveyance in communities, rely heavily on scientific explanations that the public must then translate into layman's terms, or offer inadequate or conflicting information without ever realizing they have done so. Conveying risks to the public and understanding both how they interpret threats to their

health and safety and the methods of reducing risks associated with those threats is paramount in any health and safety campaign.

Thus far, most of the scientifically sound informational and guidance materials produced about Zika and the prevention of it come from health and safety entities like the CDC, the WHO, and the PAHO. These materials function as technical communication texts and medical, political, and institutional narratives for anyone who has access to them because they come from those entities perceived as most reliable. However, the reliability of a source to produce the most accurate and beneficial information has little to do with their ability to deliver that information effectively when audiences vary by community and culture, and even when information communication itself proves reasonably effective, prevention may still not be the outcome. Researchers with the Annenberg Public Policy Center of the University of Pennsylvania in conjunction with a researcher with the CDC recently completed a study examining Floridians' responses to public health campaigns against the spread of Zika following a widely reported Zika outbreak in Miami-Dade. Their study showed that, when compared to the national average, Floridians were much more likely to take preventative measures post-outbreak, but more than half of the study sample took no precautions at all despite their clear demonstrations of a technical awareness of Zika, its associated risks, and publicly promoted prevention strategies (Winneg, Stryker, Romer & Jaimieson, 2018). Studies like this continue to show that, along with effective conveyance of medical facts and disease prevention recommendations, the uptake of proactive prevention measures within individual communities must be improved. Low levels of precautions reportedly taken by the public when outbreaks threaten suggests that facilitating public uptake continues to be problematic and communicating facts and prevention strategies will offer few benefits if they continue being presented in ways that do not generate positive

public reaction in the form of prevention strategy application by individuals. This means that campaign designers and associated actors must continue remediation of materials and messages for public consumption and enactment.

Scientists, economists, and resource marketing departments tend to lead the way in public health and safety campaign remediations, but it's important to remind those leading the way that, while rhetoricians and technical communicators may not have traditionally been invited to the initial design or remediation tables, our training and expertise can render us invaluable contributors. Our inclusion would give those already at work on campaigns a wider range of resources that have been specifically developed to seek and utilize the most effective methods of discourse for promoting action within diverse audiences. Our training and developed expertise uniquely positions us by providing us with the tools to examine previous and current rhetorical strategies that have proven effective and ineffective in public health and safety campaigns based on cultural, ecological, gender, economic, and a host of other factors which significantly impact delivery, uptake, and implementation of health and safety messages to the public. It positions us to see the faults in terministic screens and begin amending them in ways that offer individuals and communities a more complete understanding of existing and emerging pathogenic hazards and how they can individually and collectively take action to reduce or even eliminate the threats of associated risks.

Overview

In this dissertation, I use rhetorics of risk as a theoretical lens through which I examine, discuss, and offer remediation of current practices and artifacts used to encourage preventive measures taken by members of the public within the continental United States to actively combat the infection and spread of the Zika virus. What follows is an overview of each chapter.

- This chapter (Chapter 1) functions as an introduction to the threat posed by the Zika virus, the rhetorics of risk and hazard, and how the fields of rhetoric and technical and professional communication can improve future outcomes in the fight against Zika and similar emergent viruses through the redefinitions I offer. In short, my goal in this chapter is to demonstrate why fellow scholars and practitioners in those fields should be involved in current and future public health and safety campaigns.
- Chapter 2 offers a literature review of cross-disciplinary published work selected for the comprehensive quality of study histories presented in context to current hazard, risk, and crisis communication research undertaken to better understand communication failings and increase effectiveness of strategies employed in response to public health and safety hazards.
- In chapter 3, I detail the methods and methodology I used to collect survey data generated through primary research I conducted in Harlingen, Texas, in May of 2019 as Phase 1 of this project. I then offer detailed analyses of survey data collected. I conclude the chapter by offering a discussion of the results of Phase 1, especially as they pertain to my remediation of previously utilized Zika protection/prevention campaign materials and communication strategies.
- In chapter 4, I provide details about the artifacts collection process and analysis of several artifacts before offering in-depth explanations of rationale and strategies employed during the artifact remediation process before offering a discussion of the methods and methodology employed in the study design, data generation, and data analysis of Phase 2 of this project, wherein participants reviewed and

assessed selections of original Zika campaign artifacts paired with remediated versions. I conclude by discussing the results of phase 2.

- Chapter 5 is my conclusion tin which I discuss the recommendations I offer for improved risk communication strategies in print media and improved community engagement for boots on the ground approaches designed to increase proactive individual and community behaviors in response to Zika and other pathogenic threats. I also discuss how (or if) the completion of this project may have been successful in helping to fill gaps in current evaluation and understanding of the rhetorical effectiveness of public technical communication texts and narratives produced in response to pandemic hazards in the United States.

Rhetorics of Risk

Rhetoric is a word that has taken on myriad meanings over time, lacking any singular acceptable definition at any point I know of in its history. In *Enculturation* issue 5.1, Krista Ratcliffe amusingly asserts, “in the beginning was the word and the word was rhetoric.” Ratcliffe then notes that she tells her own students, “the study of rhetoric is the study of how we use language and how language uses us” (2003). Blake Scot defines rhetoric as the persuasive use of language that includes all forms of discourse (2014). Kenneth Burke tells us that language develops not because of a need to know, but because of the need to act (1966). All human directed action is rhetorical and born of persuasive communication.

We utilize language and a host of other tools everyday as we try to persuade others to listen, to believe, to care, and to act. When we attempt to persuade others, we are engaging in linguistic interaction that “bears the traces of the social structure that it both expresses and helps to reproduce” (Bourdieu & Thompson, 1991). We are then, in effect, crafting a narrative from

our own knowledge and experiences. When a hazard becomes a threat to a specific population, health and safety researchers, leaders, and workers begin crafting narratives based on their knowledge and experience that employ a variety of rhetorical tools and techniques to persuade those at risk to listen, believe, care, share, and act in not only their own best interests, but also in the best interests of the community as a whole. Those narratives are then taken up, shared, modified, mediated, redistributed, and acted on by others as our collective information networks form and expand.

The narratives created offer stories of potential drawn along lines that can be socio-culturally, geographically, and socio-economically specific. Narratives can shift based on who tells them and why. For instance, in *Risky Rhetoric* (2014), Scott noted shifts in narrative between the pre-approval promotion of home HIV testing kits, and the public marketing of them after approval. The preapproval rhetoric focused on serving poor communities of minorities by offering a new way of gaining lifesaving health information, and the post-approval public marketing rhetoric focused on offering reassurances of continued good health to the middle-class majority who was already being painted as lower risk (Scott, 2014). The rhetoric employed during the pre-approval stage was more akin to triage rhetoric, or reactive rhetoric, in which the crisis point had already been reached, and the tests allowed for containment and remediation. The post-approval marketing stage was more closely aligned with self-care or preventative and proactive rhetoric. While both forms of rhetorics of risk, proactive and reactive, employ implied self-efficacy—the ability one has to essentially help themselves when at risk—the use of proactive rhetoric allows for construction of stronger narratives of human resilience to potentially catastrophic events like pandemics.

When I use the term rhetoric then, I am referring to the tools and techniques of persuasion which include language, medium, genre, and mode as they are used to communicate technical information and encourage proactive individual and communal responses to the Zika hazard. To best understand the need for rhetorical research and redesign of public technical communication materials about Zika in the proposed dissertation, I believe it is important to first establish a clearer understanding of why Zika is a hazard, what makes it a threat to the U.S., and what risks are associated with infection.

Why Zika? The Rise and Reign of a Significant Public Health Hazard

As a vector borne disease, Zika (also written as ZIKV) may not be the most devastating virus to infect human populations, but the risks are still significant. Some important factors that make Zika such a threat are the ways it moves through populations, its potential for further mutation and reemergence, and the subsets of the population it has the greatest potential to negatively impact over time. Zika resides in the Flaviviridae family along with dengue, West Nile, yellow fever and other viruses transmitted by the Aedes species of mosquito. According to published case studies, the first recorded case of Zika infection in humans was reported in 1952, only four years after the initial discovery (isolation) of the virus during a yellow fever epidemic that infected rhesus monkeys from Uganda's Zika forest (MacNamara, 1954). After the outbreak in 1952, Zika seemed to have virtually disappeared for more than fifty years, until new outbreaks surfaced in 2007, then 2013, and again in 2015 (Chakhtoura, Hazra & Spong, 2018). Before the 2013 outbreaks, confirmed cases of infection presented primarily—consistently—with flu-like symptoms (MacNamara, 1954), but some 2013 outbreak cases began showing links between ZIKV infection and development of Guillain-Barré syndrome (Uncini, Shahrizaila & Kuwabara, 2017), and then the 2015 outbreak became linked to microcephaly in infants born to mothers

who had been infected with the virus while pregnant (Chakhtoura, Hazra & Spong, 2018). By 2016, the cases of ZIKV had been linked to more than microcephaly, giving rise to both Congenital Zika Syndrome (CZS), which research found included miscarriages and fetal anomalies such as microcephaly, cerebral atrophy, and intracranial calcifications, as well as non-congenital Zika Virus cases (nZIKV). Throughout 2016 and 2017, CZS and nZIKV disease became increasingly common in Brazil and other nations in South America as well as in the United States.

By August of 2018, there had been 4,800 babies born to women in the United States and its territories that had confirmed lab tests showing Zika infection during pregnancy. Of those babies, 1 in 7 displayed health problems associated with Zika, but cases may be underreported, and long-term health problems may arise (CDC "Zika and Pregnancy," 2018). It is also significant that there are multiple strains of Zika which produce different outcomes, and little if any research has been conducted to determine how strains interact or if mutations may be possible (Hackett, 2019). According to a report from CNN, the state of Rajasthan, India, began tracking cases in September of 2018 when a resident of the region tested positive for the virus, but by October another 94 cases had been confirmed, including 22 cases in pregnant women, and out of 200,000 mosquito breeding sites tested, in India, 74,483 were infected with the virus (Gupta, 2018). At the same time, cases were also on the rise in Angola in Africa with several confirmed infections of an Asian strain of the Virus, and 72 Angolan babies born with Zika-related microcephaly over the course of a year (Eisenhammer & Steenhuysen, 2018). Reported numbers like these are grim reminders that the threat is far from over, and the effects will linger long after in every new generation that develops that herd immunity, and experts in both nations have stated the need for improved outreach to combat future waves of Zika infection as well as

outbreaks of other diseases carried by the Aedes mosquito (Grupta, 2018; Eisenhammer & Steenhuysen, 2018). Of course, prolific mosquitos aren't the only means of possible transmission of the Zika virus.

Evidence surfaced in 2008 showing that Zika posed a new and unexpected threat in that it could now be sexually transmitted as well. According to a study published in July of 2018, while other flaviviruses have not shown sufficient evidence of sexual transmission potential, West Nile and yellow fever viruses have been found in human semen (Counotte et al, 2018). So far, however, Zika seems to be the only one confirmed as sexually transmittable. A multinational study authored by Counotte et. al (2018) found evidence that while the virus can be passed from females to male partners, it's considered rare. Transmission from males to female partners, however, is significantly more common than other non-vector and non-fetal transmission paths--blood donation, laboratory exposure, and person-to-person via unknown route. As yet there also isn't enough evidence to confirm the commonality of transmission from males to male partners as only one case has been reported (Counotte et. al, 2018), but it stands to reason that it could be equally high. Unfortunately, all rates of sexual transmission between humans have thus far been based entirely on symptomatic travel-related cases of couples in which one partner contracted the virus in an outbreak zone, and their partner who had not been exposed to the vector contracted it soon after the traveler's return home. For couples whose partners are both in outbreak zones, there is no way to verify the route of transmission. This means that the rate of sexual transmission could be much higher than is currently known, and, since the vast majority of infections will be asymptomatic regardless of transmission route, established statistics have been little more than educated guesses. In fact, some studies discussed in Chapter 2 have shown that estimates of viral infections during outbreaks can be wildly inaccurate, with post-outbreak

seroepidemiological prevalence studies revealing much higher infection rates than previously recognized.

Currently, health and safety workers around the world are relying solely on developed herd immunity to slow or halt the spread, and the very fact that herd immunity can be so effective just shows how rapidly the pathogen proliferates within host communities. As noted by obstetrician Carlos Reinaldo following the waning peak of Brazil's outbreak, "'there was no immunity against Zika . . . and practically the entire population was contaminated.' Because of this, it created a herd immunity, and the outbreak then dwindled" (Welch, 2019). Since herd immunity only ever acts as short-term protection, eventually, more and more children will be born having never been exposed to the virus, and, as we've seen with the resurgence of measles in the United States, the herd immunity protecting a nation's or region's children can be broken in the space of a single generation. Furthermore, some who have been previously infected may not be immune for life, and they may not be immune to different strains of the virus either (Poland & Jacobson, 2012; Hamblin, 2019; Jacobs, 2019; Welch, 2019). Taken together, this means that, when we think about, talk about, and take action against Zika, we must continue to do so through narrative frames of risk.

Rhetorical Construction of Risk

Understandings of threats to health and safety and resulting communication patterns during epidemics are formulated through frames of risk, so it is vital that we recognize what risk is and how it relates to other terminology used during periods of uncertainty and times of crisis. During such times, it is not uncommon for the terms risk, hazard, and threat to be treated as interchangeable since all three will have different meanings depending upon context as all three function as linguistic signifiers that are socially constructed and experiential. Contextually

dependent terminology becomes increasingly problematic when it is relied on to safeguard diverse populations. While discussing the linguistic nature of risk communication in his 2012 article, "Ethics and Risk Communication," Paul Thompson, who specializes in agrarian ethics, posits that confusion in terminology can "undermine effective communication at the outset" (p. 623). This is because it creates barriers in understanding and impedes appropriate reactions, meaning it is important that communicators set clear definitions for these terms before threats can escalate. All three terms and what they represent are also central to my work in this dissertation, so to ensure that they become neither conflated or confused, I offer my interpretations of them as follows.

What is Risk? It Depends on Who is Asked

Across disciplines, risk is often quantified, and that quantification is data based and data driven. Once quantified, risk can reveal probabilities of events, actions, and outcomes, and those revelations of probabilities can then influence every decision made from that point forward, including communication protocols and allocation of resources when threats surface. Data used to conceptualize risk in this way, however, can never be separated from the rhetoric that both describes it and gives it functional value. In fact, in *The Rhetoric of Risk: Technical Documentation in Hazardous Environments* (2003), Beverly Sauer, contends that it is the term "probability" which forges the necessary connections between data and rhetoric, and it is the uncertainty attached to probability that generates rhetorical tension, noting in Aristotelian fashion that "we do not argue about things that are certain" (p. 99). Paul Slovic, a psychology professor who studies decision making under conditions of risk, furthers the validity of such assertions through his own claim that "whoever controls the definition of risk controls the rational solution to the problem at hand" (1999). Defining risk is thus an exercise of power, and that power is

almost always expressed rhetorically. In situations where resources are commonly disproportionate due to institutionalized systems of disenfranchisement, rhetoric and professional writing scholars Jeff Grabill and Michele Simmons argue that power dynamics must be equalized, and those considered "at risk" given an equal voice in determining how those risks are best defined (1998). Anytime a socio-economically, educationally, or linguistically diverse community faces threats to residents' general health and wellbeing, power dynamics will become a factor in resource distribution, awareness, trust, and sense of agency. On top of that, the power dynamics at play between those considered experts and those commonly classified as the public could be further complicated if both groups have different conceptions of what the threat is and how associated risks are understood.

Working in the interstices of public and expert representation to generate more fluid communication is a critical role since, as further discussed in chapter 2, the term "risk" is itself defined quite differently by laypersons and experts. For example, professional educators and risk analysts Derby and Keeney define risk as "the possibility of consequences involving mortality, morbidity, or injury" (Derby & Keeney, 1981), and author and acclaimed risk perception consultant David Ropeik posits that the "average person" defines risk as "the probability of something bad happening" (as quoted in Brown, 2014), that risk communication by experts and expert-led practitioners doesn't "always account for the subjectivity of the 'something bad'," and that differences in perception may actually add to those risks already present (Brown, 2014, p. A277). As such, members of the public will see the possibility of threat and the associated negative outcomes of encountering that threat and think, what are the odds of that outcome happening to me.

With Zika, the negative outcome or "something bad" may hinge primarily on what popular media has focused on, microcephaly, even if individuals have been exposed to quality information delivered by experts that includes risks of Guillain-Barre syndrome and "flu-like" symptoms. The public may not really understand what is meant by "flu-like," realize they have never met anyone with Guillain-Barre syndrome or seen its representation on Zika related media coverage. If this is the case, they may choose to disregard any sense of risk connected with the first two "something bad" outcomes, and they aren't pregnant or living with anyone who is, then they are not going to see themselves as personally at risk for the "something bad" of microcephaly. Their perceptions are thus shaped by limited knowledge and experience—or lack of experience—tinged with emotion.

For public health experts, contracting Zika in the first place is likely to be the primary and most problematic "something bad" because someone who has Zika may easily and quickly become a threat to others who had thus far avoided infection. This is because many expert definitions of risk are often far more mathematically and linguistically complex, allowing for more complete conceptualizations of risks as attached to probability so an expert's more complete understanding of Zika as a public health hazard shapes more objective perceptions while a layperson's perceptions are limited by more subjectivity.

My own conception of risk is aligned with a layperson's in that I see risk as the "something bad," but not with the "what are the odds" query attached. This is because, unlike with definitions conceived of with "risk" as a standalone term, I believe conceptualizing "risk" as a term most often requires linguistic framing for those who are not risk scholars. It is rare to find risk as a standalone term in the public sphere, and there can be significant differences in cognitive associations when risk is offered as "at-risk," "risky," "risk-averse," "a risk," "the

risk," "high-risk," "low-risk," etc., and there remains a distinct separation between risk and probability even for experts. For my research and this dissertation, I choose to define risk in a simple and limited way without necessary assumptions of perception. *Risks are specific negative outcomes which can occur when one is threatened by a specific hazard in their environment*. As this definition suggests, this means that I also very intentionally differentiate between threats and hazards, as explained in the next section.

Hazard as Separate from Risk

Unlike most layman definitions of risk, expert definitions are often tied to the term "hazard." "Hazard" becomes a key term because, as noted by Grabill and Simmons in their article, "Toward a Critical Rhetoric of Risk Communication: Producing Citizens and the Role of Technical Communicators," risk is tied to perception and power, but hazards are not (1998). Grabill and Simmons' conception of hazard as separate from risk is also common among data-crunching analysts and front-line practitioners, though few true definitions of hazard are spelled out, and despite the term's frequent use, it seems generally taken for granted that audiences understand it in the same way as those initiating communications utilizing it. For instance, renowned risk analyst Peter Sandman uses the equation "Risk = Hazard + Outrage" in which all terms are clearly separated with hazard defined as how much harm a thing will cause, outrage defined as how "upset" people would be about the outcome, and risk defined as the compilation effect (2012), suggesting Sandman may view hazard as a calculation of physical damage. This is similar to statements about the use of "hazard rate ratios" as discussed by epidemiologist Miguel Hernan. In a 2010 article, Hernan posits that "the hazard ratio (HR) is the main, and often the only, effect measure reported in many epidemiologic studies," and that "for all practical purposes, hazards can be thought of as incidence rates" (p. 13) though what classifies as a hazard

or incidence is implied more than defined. Researcher and psychology professor Mark Horswill (2016) refers to hazards more as "dangerous situations," echoing Hernan's seeming use of "incidence," and researchers Baoyin Liu, Yim Ling Siu, and Gordon Mitchell specifically list hazards such as earthquakes, draughts, and tropical cyclones in their research on "multi-hazard risk assessment" rather than providing a single definition for the term (Liu, Siu, & Mitchell, 2016). The Liu, Siu, and Mitchell method of defining the term aligns well with the CDC-based Agency for Toxic Substances and Disease Registry's more static definition of hazard as "a source of potential harm from past, current, or future exposures" (ATSDR, 2009).

For the purposes of my research and this dissertation, I employ medical and scientific research journalist Valerie Brown's definition of hazard as *"an activity or phenomenon that poses potential harm or other undesirable consequence"* (Brown, 2014). This means that, when I refer to Zika as a hazard, I am referring only to the pathogen's existence, not the probability of infection or negative outcomes related to infection. Those probabilities are, instead, tied to the term "threat."

Threats and Threat Levels

Threat, similar to risk, can be data driven, but is always necessarily tethered to perception. While threat has, at times, been defined much like hazard, using the term in that way presents unnecessary complications when utilizing theoretical models for risk analysis and resulting risk communication, such as the Extended Parallel Process Model (EPPM). The EPPM is used in understanding the effects and effectiveness of fear appeals in generating behavior change and employs the term "perceived threat" as a standard for calculation. According to a 2011 article re-examining the effectiveness of the EPPM since its inception in 1992 (Maloney, Lapinsky, & Witte, 2011), the original EPPM defined the word "threat" in the same vein as I

have defined “hazard,” as “a danger or harm that exists in the environment whether we know it or not,’’ however, the authors then explain that EPPM does not measure the danger or harm itself, “but rather people’s perception of the threat”—read hazard—“that motivates them to action” (p. 207). This was termed “perceived threat,” which the authors posit is the result of the combined effects of perceived severity and perceived susceptibility (p. 207). As the EPPM will be used in the context of research and discussion in this dissertation, I believe it best to delineate by using the term “threat” only as the conception of “perceived threat.”

Because threats are necessarily linked to perception, concepts like “threat levels” are able to be developed as tools of public communication. Threat levels are communicated statements used in systems employed by governments and similarly highly structured entities to name and describe potential exposure to specific hazards. The most familiar iterations of “threat levels” in the United States are used by the US Forest Service and Homeland Security. In the case of the first example, the US Forest Service used a color-coded system dubbed the National Fire Danger Rating System to express the potential for imminent exposure to the hazard of wildfires based on how dry the natural environment of a region has become due to current climate conditions. Threat level determination for the Fire Danger Rating System is made by relevant land-managers using both quantitative and qualitative data from previous experiences with region specific accidental ignition (Forest Service, ND). Homeland Security, the second example, conducts data analysis of communications and actions that suggest how likely terrorists (hazard) are to launch an attack against the nation or any part of the nation in order to determine threat levels, but I have been unable to find specifics about how threat levels are actually determined within the Homeland Security Advisory System.

Biothreat levels, a particularly relevant topic for this project, would, similar to the previous two examples, be based on the potential for exposure to hazards of viruses and bacteria resulting in negative outcomes, and are also monitored to some degree by Homeland Security though I could not locate details on any current threat communication system. This may be because no system has officially been created at this point. In 2017, the Department of Homeland Security Science and Technology Directorate created a competition to develop such systems and chose a finalist and runner-up who presented the most viable system designs. However, an article released by Homeland Security after the contest suggest that both systems are still in stages of development rather than implementation (DHS: S&T, 2018), which means there may not be any nationally accepted metrics to cover biothreat level communication to the public on the same scale as the National Fire Danger Rating System and the Homeland Security Advisory System.

There are tools available for measuring and responding to measures associated with some pandemic hazards, such as the Influenza Risk Assessment Tool (IRAT) used by the CDC for flu outbreaks. The IRAT is used by the CDC to make recommendations for resource allocation, new research studies, vaccine development and distribution, possibility of pandemic status, and policy decisions (CDC, 2016). However, nothing at that level has been put in place for Zika or other flaviviruses in the United States yet, and this may result in some ongoing difficulty in expressing threat levels of pathogens like Zika to the public nationally or regionally despite the potential simplicity of implementing such a method of communication.

Who Controls the Definition of Risk

By creating standardized and singular definitions of hazard and threat in terms of health and safety communication with the public, we can begin to examine and address problems with expressing risk more effectively not only to members of the public, but those in government,

private, and professional sectors as well. While I contend that the definition for risk, as a term, must be simplified, I fully recognize the need for complex risk assessment equations, and I understand the concepts of risk as employed by risk experts like Paul Slovic and Peter Sandman are actually equations used for assessment. When these men talk about the definition of risk, it is from a decidedly economic and political perspective that demands quantification. Because the United States at government and corporate levels operates resource allocation and "risk" resolution based primarily on economic models, I fully agree with Paul Slovic's assertion that "whoever controls the definition of risk controls the rational solution to the problem at hand" (1999). Those "rational solutions" are the basis for public health and safety campaigns, so it is important to ask who should have the right or privilege to define what risk is? Should it be those who can make the most fiscally responsible sense of the numbers, should it be the data alchemists who generate those numbers, or should it be those most realistically likely to suffer the greatest negative outcomes aided by analysts with data interpretation? What level of education or experience should be required when determining the expertise necessary to wield the power of definition?

I believe that, when the accepted definition of a single term so directly impacts public welfare, the definition of that term as understood by the greatest share of individuals in that public should carry the greatest weight in the rhetorical design and implementation of public risk communication. Beverly Sauer (2003) argues, for risk communication with a public to be rhetorically effective, it must be built on top of the knowledge and experience the public already possesses. In other words, it must fit into the public's previously existing, socially constructed terministic screens. In the case of Zika, the first step in crafting risk communication for a public should be determining what knowledge and experiences the public already possesses in reference

to pathogens, and, more specifically, viruses of all varieties. As communication scholars Plough and Krimsky put it in "The Emergence of Risk Communication Studies: Social and Political Context," "the lay people bring many more factors into risk than scientists do," so having them actively take part in defining the risks for their communities will make that definition more effective (1987, p. 229). If the public defines risk most commonly simply as "the probability of something bad happening, then this means risk could be defined by the public alone as the perceived odds of suffering specific negative outcomes, or Risk = Perception **(**Odds x Outcome**)**

This is a good starting point, but little more than that, and those working with the public will need to develop and refine the public's definition or risk assessment equation in ways that communicate a more complete picture of events and more relevant Zika narrative. Meaning, if Zika is a hazard to everyone in a community exposed to infected mosquitoes as the vector, and the common definition for risk within that community is, "the probability of something bad happening," then work in Zika awareness, prevention, outbreak, crisis, and recovery communication scenarios should begin with risk understood as the "probability of something bad happening," and then experts and campaign designers can work with the affected community to:

- best define what forms of "bad things" are most relevant to which portions of the community.
- effectively explain probability rates to community members in ways that lead to the most accurate understandings of threat levels.
- best express Zika infection alone as a primary risk with a high threat level to those most likely to believe they fall into a low or no-risk group.
- frame communication around the values that shape community responses to hazards, threats, and risks.

Narratives of Risk and Redefinition as Technical Communication

The Society for Technical Communication asserts that a text qualifies as technical communication if it meets one or more of the following criteria: communicates technical or specialized information, uses digital technology to convey information, and/or provides instruction for doing something (About STC, 2019). Risk communication, regardless of topic, audience, genre, mode, or medium is necessarily technical communication since it is always designed to convey some level of specialized—and often technical—information with the goal of instructing or guiding end users. Risk communication texts with the public serving as primary end users, may not utilize technical terminology or complex phrasing, but the narratives of risk they create are intended to include accessible information, and often instructions on how to minimize a threat and its associated risks. Zika campaign texts do exactly this. They provide the public with information intended to be accessible by most in a population and explain what the hazard is, what some of the associated risks are, how to recognize the hazard, how to avoid it, and what steps to take if avoiding it proves unsuccessful. More heavily mediated texts, such as news stories, also discuss current scientific knowledge about Zika and its spread across space and time. The narrative of Zika as technical communication will be discussed in more detail in subsequent chapters but understanding the basics of Zika texts as technical communication texts suggest that rhetorically savvy technical communicators can help communities redefine Zika as a hazard to public welfare with an often invisibly high threat level for a variety of health risks. This redefinition of risk can more effectively foster efficacy and resilience in communities with high-risk groups because it can enhance the visibility of those risks and increase perceived threat levels enough to encourage increased proactive behaviors.

The overwhelming majority of people who contract the Zika virus will never even know they had it. In some ways, this is a good thing, since those infected contribute to the development of herd immunity without personal suffering. However, this also means that the majority of those infected become hazards to others in their communities, though they will likely remain invisible as hazards since Zika is typically mediated as a hazard spread by mosquitoes, not humans. As such, it is imperative that we not only make sure that the public understands Zika associated risks beyond specific negative outcomes for individuals from infection such as encephalitis, Guillain-Barre Syndrome, microcephaly, or flu-like symptoms, but also or even especially as the potential to become an asymptomatic carrier. An asymptomatic carrier is a person who contracts the disease but shows mild symptoms if any at all. Either way, the infection is likely to remain unnoticed, and so too often, a person who doesn't fit into a "vulnerable population" for the most noted negative effects (microcephaly) may believe Zika poses little if any threat to them at all. As far as their individual health goes, they probably wouldn't be wrong, but development of such beliefs could reduce the odds of that person engaging in any preventive measures since they won't perceive themselves as being at-risk. However, this ignores the fact that they will pose a serious threat to vulnerable populations if they are infected, since the rates of infection for vulnerable populations will depend heavily on the rates of infection for all, especially asymptomatic carriers. To some degree, the disease spreading mechanism of asymptomatic vector-borne pathogen carrying is specialized information that requires technical communication skills and a high level of rhetorical awareness to express effectively in public communication documents like fliers, pamphlets, and public notices.

By working with local medical and healthcare staff, rhetoricians that specialize in technical communication can help transform the community's more simplistic equation of Risk =

Perception (Odds x Outcome) into a more complete equation that can still be translated easily across audiences with varying degrees of education, language proficiency, and economic stability. Risk = Perception (Odds x Outcome) leaves gaps in information that the public will need to assess their own threat levels of risks and their individual contribution to community threat levels. For example, threat levels will alter based on exposure frequency, or how often they may be subjected to local mosquito activity. A person who enjoys spending time outside associating with other members of their community, working or relaxing in a garden, swimming, or hiking will be exposed to mosquitoes more often and for longer periods of time than a person who prefers to spend time inside air conditioned or properly screened in areas. Those who make their livings working in agriculture or horticulture may be exposed to mosquitoes most days of the week for ten or more hours per day, leaving them with especially high exposure rates. Thus, frequency of exposure to mosquitoes then becomes an important part of risk assessment for individuals, and their community.

A second factor that individuals would need to consider when faced with the hazard of Zika is what the consequences of infection might mean for them. One of the seemingly overlooked risks associated with Zika infection is flu-like symptoms that may last a week or more. For an individual who works outside harvesting crops all day most days of the week in order to support a family, developing flu-like symptoms might greatly reduce their productivity or prevent them from doing their job at all for days. This would mean loss of income and reduced economic stability resulting in increased stress levels which can depress immune systems even further. For a pregnant woman, partner of a pregnant woman, or family and close friends of a pregnant woman, the realized risk of microcephaly brings numerous consequences that are life altering and especially long lasting at both individual and community levels

Taken together, exposure and consequences become significant factors that the public should be encouraged to consider when determining threat levels and making personal decisions about preventive actions and behaviors. As such the equation that works best for the public might look more like: Risk = Perception **[(**Exposure **x** Hazard**) + (**Consequence **x** Duration**)]** rather than the previous simplified version. So, as noted above, for most individuals, Zika and the mosquitoes that transmit it should become understood as the primary hazard, and flu-like symptoms might be understood as the most relevant, and therefore primary risk which could bring about several negative consequences. A risk-specified equation for this scenario would then be: Risk = assumed likelihood **[(**of how often they encounter **x** mosquitoes**) + (**that could give them the flu **x** for a number of days or weeks**)]**. This also suggests that risk equations for pathogenic threats shouldn't be entirely standardized across audiences but alter based on the population the communication is intended for and what aspects of hazard, threat, and risk are being considered.

As technical communicators moving towards specialization in public risk communication working in conjunction with more traditional experts during pandemic threats, one may also be called on to craft communications for a variety of audiences. These audiences may include members of the general public, city councils, local health departments and care providers, state and other governmental entities, and practitioners from numerous relevant disciplines. When risk discourse opportunities arise among or across these audiences, multiple scenario-specific definitions or risk equations may streamline processes like local resource allocations. For instance, the following equations for political risk, public risk, and personal risk, though redesignated to form more actionable and self-explanatory definitions, are all pulled from the

works of risk assessment specialists Peter Sandman (2012), Valerie Brown (2014), and Stephen Derby and Ralph Keeney (as cited by de Rhodes, 1994).

Political Risk = (Hazard x Outrage)

Public Risk = (Hazard x Exposure = Consequence)

Personal Risk = Perception [(Exposure x Hazard) + (Consequence x Duration)]

These definitions all serve different purposes for different audiences at different times and allow for the narratives of risk to become necessarily nuanced. Political risk functions as an equation that provides narratives geared toward politicians and other government agencies and entities that may be more willing to offer aid as needed if they are worried that public outrage might translate into political unrest or distrust. The equation for public risk would be useful for public healthcare workers' discourse about threat levels to specific populations or communities they serve, such as farm workers or field hands. Finally, the equation for personal risk would be more useful for individuals whose personal actions will largely determine wide-scale outcomes.

There are, of course, other equations out there, including several complex mathematical models that have been created to map the "importation risk" of Zika and effectiveness of intervention strategies in various parts of the world. One study conducted by researchers in Thailand compared the five most utilized models to explain how useful each model is before and during outbreaks (Wiratsudakul, Parinya, & Modchang, 2018). While these models are great tools for determining very specific resource allocation, often with budgetary concerns firmly attached, they lack usability for communicating risk to non-scientific or non-specialist audiences, or when trying to determine local distributions of time and manpower more than money.

Mediating and Marketing Threat Levels and Risk Solutions

When pathogenic outbreaks occur, various media outlets also serve as professional and technical communicators who become responsible for wide-spread, rapid dissemination of some of the most relevant information. This is true even when their coverage proves inaccurate or otherwise problematic. While possibly less common, commercial entities can also serve a purpose in communicating accurate information, and any messages and materials (or the lack of these things) produced and displayed by them could have significant impacts on public perceptions of risk, as well as reception and implementation of effective preventative strategies for individuals and their communities. This is, unfortunately, also true of false marketing campaigns, which can be detrimental to public trust and welfare (Robbins, 2016). A 2016 article by journalist Jessica Dye was published in Reuters addressing the cease-and-desist letters sent by "New York state's top prosecutor" to seven "absolutely shameless" marketers who promoted Zika prevention merchandise that either wasn't backed by science, or had been previously debunked by researchers (Dye, 2016). Those were not the only instances of false marketing, and, since a lot of prevention with vector borne diseases revolves around products like repellents, netting, and clothing options, marketing matters.

Even when marketing is fair and truthful to specific circumstances, choices made by marketing agents and the companies/products represented can influence perceived threat levels and responses. Whereas journalistic media can increase fear to the point of overreaction or acceptance of an ill-fate or overwhelm audiences to the point of desensitization or unplanned rebellion (see chapter 2), marketing can centralize protective action by focusing audience attention solely on efficacy. It can also increase threat level perceptions for individuals and communities through prevalence of hazard reminders and promotion of signal words and phrases attached to the hazard. In one study, researchers found that information processing was context-

dependent, which meant warning signals carried the greatest weight in individual responses to risk information (Williams & Noyes, 2007). Warning signals are functionally akin to linguistic signifiers of information that mandate specific reactions.

Understanding which warning signals are most effective for a target audience is useful, but invisible training of target population to recognize signal words associated with hazards may prove equally useful. Marketing of reputable, CDC backed prevention products using set signal phrases can lead to greater public recognition of associations between pathogenic hazards and self-selected prevention measures. Warning signals are also inherently perceptual, and perception cannot be separated from rhetoric or risk communication. After all, our species is hardwired to react when threatened, and, since our experiences are expressed through language, we come to understand many threats as they have been attached to linguistic signifiers as warning signals. For instance, some research completed by Valerie Brown showed that the mere mention of the word "chemicals" was enough to provoke a fear response in study participants (2014). A study by multidisciplinary researchers, Oosterwijk, Topper, Rotteveel, and Fischer, tested embodied reactions to fear using combinations of neutral or fear inducing content with "fear sentences." Participants in their study showed significant increases in embodied fear responses, like changes in heart rate, reactionary body language, and even skin chemistry, when shown fear inducing content in conjunction with scrambled "fear sentences," like "death snake can poisonous cause bites" (2010). In this "fear sentence" example, the warning signals of death and poisonous combine with a symbolic representation of both that likely triggers visualization of a snake bite. Such warning signals work in both vocal and alphabetic text forms to generate fear responses and attract audience attention. When the mediatization and/or marketing of hazards, threats, and risks is delivered to audiences visually, such as with just the image of a cobra, the results should

prove similar. For this reason, multimodal texts heavy on visual components may prove more effective in conveying relevant information in publicly accessible ways.

Many public health and safety campaigns around the world rely on multimodal compositions to convey information to the public considered "at risk." The information offered can vary in degree of scientific language and accuracy, and intent plays a key part in design. Over time, some campaigns prove more effective than others, and the better the designers and contributors understand their audience and the intricacies of the "problem" as their audience faces it, the more positive and cooperative the response to those campaigns. In 2015, critical discourse analysts Jukka Torronen and Kalle Tryggvesson examined two public health campaigns targeting pregnant women in Sweden. In the resulting article, "Alcohol, Health, and Reproduction," they determine that the prevention campaigns functioned by weaving scientific truths and images of fetal development with a negative outcomes narrative featuring the fetus as the main character. The overall design seemed quite effective though ethically problematic in large part because of the visuals used (Torronen & Tryggyesson 2015). Like the previous campaign, a campaign developed in the U.K. intended to raise awareness of Type II Diabetes used a fear inducing, negative outcomes narrative with a heavy reliance on visual images to target consumers who are encouraged to bear responsibility for their individual health, and the welfare of their families. The campaign seemed to have been effective thanks to the inclusion of images as focal points or characters in the constructed narratives though, as seems common in fear campaigns, the design itself proved ethically problematic (Brookes & Harvey, 2014). Similar results have been found in analysis of numerous anti-smoking campaigns that utilize visuals, and William and Noyes (2007) work showed that attaching color and surrounding shapes to warning signals were effective in altering risk perception and response, furthering the idea that

the multimodality of materials crafted for prevention messages and preventatives marketing is a significant factor in designing and remediating public health and safety campaigns.

In Sum

Psychologists, sociologists, ecologists, biologists, medical and healthcare professionals, communication professionals, and others are already engaged in public health and safety campaign work against Zika, but few technical communicators and rhetoric scholars have become invested in that work so far. If we are waiting to be invited to the table by professionals in other disciplines, we should be aware that such an invitation may never come, but that does not mean we have nothing to offer. One advantage I believe we can offer those already working on Zika campaigns is our belief that the public are stakeholders whose voices matter, our understanding of risk being socially constructed, and, as Grabill and Simmons noted, our knowledge that any failure to see risk in that light can lead to unethical and oppressive practices because it allows/encourages the removal of the public from decision making processes (1998). We have also been trained to view informational materials and the narratives they create and influence as forms of technical communication used by the public in decision making processes. We also often have experience working with multidisciplinary and cross disciplinary research to understand and solve complex problems, and we value all of the extensive research completed by scholars from a wide variety of disciplines for what their work contributes to knowledge, theory, and practical applications.

In the next chapter, I examine a wide variety of research about what does and doesn't seem to work when communicating with general and specific publics about threats to their individual and collective health and safety. This is a necessary step in analyzing the effectiveness

of current Zika campaign materials and strategies, and in determining best methods and practices when working toward remediation of the campaign.

Chapter 2: Responding to Public Health and Safety Threats

"If you concentrate on the spaces around the knowledge, if you focus on what you don't know, on ignorance, you may do a better job of knowing" (Stocking, 1998, p. 176).

This chapter offers a literature review of published work examining hazard, risk, and crisis communication studies that focus on responses to public health and safety campaigns before, during, and after crisis events as well as studies of communication campaigns for ongoing public health and safety hazards such as tobacco use, dietary concerns, influenza and more. While most expert participants directly involved in risk communication scenarios tend to be pulled from traditionally scientific fields, risk-influenced research reflects high levels of multidisciplinary interest and engagement that has provided numerous points of focus and allowed for the creation of dozens of theories. Unfortunately, very little of that work has thus far been produced by rhetoricians or technical communicators, and experts in our fields are rarely consulted before, during, or even after crisis events. In fact, most research on public health and safety campaigns to date has been conducted by biologists, psychologists, sociologists, economists, and general communication experts, and discourse has been disciplinarily limited based on whose contributions are seen as scientifically valuable without any direct links to rhetorical studies or awareness of public risk communication as technical communication. This assertion is, of course, not meant to imply that members of our field have never done this kind of work, but rather to suggest that we all have a civic responsibility to do more of this work than we have been. Rhetoricians and technical communicators like Jeff Grabill, Michelle Simmons, Erin Frost, Huiling Ding, Blake Scott, Lisa Keranen, Beverly Sauer, and Donna Kain have all demonstrated how our work in public health and safety realms can increase collective

understandings of risk communication in general, and of the effectiveness of health and safety campaigns more specifically.

Rhetoric and Technical and Professional Communication

Rhetoric and technical and professional communication cover a lot of ground, so it isn't at all surprising that most of us have yet to fully invest our resources in risk communication research. It's also important to note that risk communication has always existed in practice, but as a field of scholarly study, it is still relatively new. In fact, according to field frontrunners Alonzo Plough and Sheldon Krimsky (1987), "prior to 1986 there were only a few essays in the scholarly and policy literature with 'risk communication' in their titles" (p. 4). This revelation led to my own recent academic database search to learn more about the origins of the topic. My search returned no listings for scholarly texts using the singular term "risk communication" in their titles at all before January of 1986 and revealed only four texts with that term had even been published over the course of that year. More than 2,500 have been published since then thanks in large part to the 1981 creation of *Risk Analysis: An International Journal*, a publication designed to support the foundation of the Society for Risk Analysis in 1980 (About the Society for Risk Analysis, 2018). Thus far, unlike with many other sudden rises in research interest, the multidisciplinary interest in risk communication continues to grow with fifty-one scholarly texts published across thirty-six different journals in just the last six months.[1]

In their article, "Toward a Critical Rhetoric of Risk Communication: Producing Citizens and the Role of Technical Communicators," Jeffrey Grabill (1998) and Michele Simmons (see Grabill & Simmons, 1998) cite Plough and Krimsky in their own discussion of the rise of risk communication noting that it was the conflict between traditional quantitative risk assessment and public risk perception that seemed to give rise to the field of risk communication (Grabill &

Simmons, 1998, p. 416). My own preliminary research in our field suggests risk communication may have followed naturally on the heels of surging interest in social constructionism/constructivism as a method of discussing problems that traditional quantitative risk assessments would have ignored (Andrews, 2012; Conrad & Barker, 2010; Dombrowski, 1992; Keller, 2011, Social Constructionism, n.d.; Weiss, 1992). Risk is certainly socially constructed, and, as Grabill and Simmons (1998) contend, the methods undertaken by the primary investigators of the time, almost exclusively "communication, cognitive psychology, and risk assessment scholars," ignored the socially constructed nature of risk (p. 416). Their proposed solution was the introduction of "a critical rhetoric of risk communication," which essentially positions technical communicators as ideal experts for constructing and communicating risk among various publics (p.417). Among rhetoricians and technical communicators who have engaged in risk communication research, most have approached it from post-crisis perspectives, but always with an acute awareness of risk as socially constructed and contextually dependent and with documented recognition of power structures in-play and resulting socio-cultural dynamics.

Among the small but important ranks of rhetoricians and technical communicators involved in risk communication work, *Risky Rhetoric: AIDS and the Cultural Practices of HIV Testing* (2014) author Blake Scott has been a foundational voice. Scott's research on the problematic rhetoric associated with HIV testing and AIDS/HIV public and policy risk communication utilizes aspects of a critical rhetoric of risk communication, showcasing how the rhetoric attached to various risk communication campaigns functioned to reinforce pre-existing power structures rather than challenging them or delving into the complex social dynamics that shaped the realities of those "at-risk." His work champions necessary evaluation and remediation

of communication techniques and materials to not only address specific issues of social justice, but also to improve the outcomes of those campaigns in real world scenarios by suggesting moving away from rhetoric that sets up the us-versus-them mentality that often projects risk onto socially-vulnerable bodies rather than framing illness as a wider issue that everyone can work to prevent and protect themselves and others from (Scott, 2014). Scott's work is, therefore, particularly valuable when considering the rhetorical potential of mediated risk messaging on communities that are interwoven with at-risk populations. As I stated in Chapter 1, the very nature of vector-borne pathogen transmission results in complex webs of hazard and associated risks, so Scott's understanding of how mediated messaging of the era functioned to project risk onto specific bodies and reinforce problematic power dynamics can help with analysis and remediation of Zika campaigns.

Likewise, work by Erin Frost has focused in part on invisible at-risk populations using apparent feminism to promote social, ecological, and environmental justice through explorations of power and how communities assess and communicate risk from insider's perspectives while monitoring and remediating technical texts promoting narrow visions of public health and safety communication initiated by expert outsiders. Huiling Ding (2014) has published articles as well as a book length text of her research on risk communication throughout the SARS epidemic. Ding's multi-national work examines power structures and transcultural communication at all media levels as the narratives of the SARS epidemic developed and expanded well beyond the borders of at-risk communities. Her investigations reveal often unrecognized cultural and national distinctions in how risks are understood and defined, unethical narrative constructions of risk and safety perpetuated by news media and governmental agencies, and the need for richer engagement with emerging health crises by technical and professional communicators (Ding,

2014). Beverly Sauer, author of *The Rhetoric of Risk: Technical Documentation in Hazardous Environments* (2003), has conducted multinational research to better understand how risk is constructed by experts and laypeople in mining industries. Her work examines multiple modes of risk communication, translation across audiences and modes, and both proactive and reactive mediation as culturally dependent technical documentation (Sauer, 1996, 2003).

The research produced by these and other rhetoric and technical communication scholars should have proven invaluable in the field of risk communication, especially in terms of campaign design and remediation, but the data and generalizable knowledge generated through their work has been rarely referenced by researchers in other disciplines. This lack of references suggests that we have yet to secure our place in the field of risk communication in general and risk prevention specifically. Our general omission from the field is especially unfortunate as scholars in our discipline tend to be quite adept in working with and producing new interdisciplinary knowledge. Rhetorical savvy and skills and knowledge of technical communication alone would prove inadequate in completing the kind of work I am undertaking with this dissertation. Likewise, skills and knowledge in health and medicine, mediated messaging, socio-cultural psychodynamics, risk assessment, economics, or public risk politics would always prove inadequate on their own in crafting effective health and safety campaigns. Work in risk communication should always be as interdisciplinary as possible and multidisciplinary whenever circumstances allow.

To ensure sufficient multidisciplinarity and thus avoid unproductive, knowledge-limiting siloing, I have done my best to pull relevant research from several other disciplines. I organize this research into three areas for discussion: outreach and preparedness campaigns, failures of outreach campaigns, and recent research. I have selected each text included in this chapter for the

comprehensive quality of its study history presented in context to the hazard, risk, and crisis communication research undertaken by its authors. All studies explored herein were designed by their authors to better understand specific communication successes, stagnations, and failures, and increase effectiveness of strategies employed in campaign responses to specific public health and safety hazards. I end this chapter with an overview of two recent studies of public responses to the threat of Zika and its associated risks. Both studies were conducted and written by prominent researchers spanning different fields and areas of interest, further solidifying the necessity and value of interdisciplinary and multidisciplinary research. My own original research was designed to respond in part to the authors' recommendations for future studies and to build on the new knowledge generated by their studies.

Emerging Diseases: Outreach and Preparedness Campaigns

According to Matthew Seeger (2006), "risk communication has typically been associated with health communication and efforts to warn the public about the risks associated with particular behaviors," while crisis communication "is more typically associated with public relations and the need for organizations to repair damaged images after a crisis or disaster" (p. 234). Seeger further notes that effort to merge the two as part of developing more effective public communication strategies recognizes that "a larger acknowledgment of the developmental features of risks and crisis, and recognition that effective communication must be an integrated and ongoing process" (p. 234). To make the process itself as universal as possible means utilizing interdisciplinary research in conjunction with stakeholder interactions. So far, insufficient research[2] across disciplines in public response to emerging diseases, especially

[2] It is worth noting that a significant amount of research regarding infectious disease across disciplines has emerged as the ongoing COVID-19 pandemic has rapidly progressed, but that research was unavailable while I was working on the bulk of this study as rapid publication releases around these topics did not begin until mid 2020.

vector-borne threats, has severely limited our knowledge of how relevant outreach and preparedness campaigns function and fuel public interests. Few studies have emerged showing whether many previous campaigns were truly successful, and, while there has been some particularly useful work completed studying communication effects during outbreaks, most have only considered reactive rather than proactive outreach campaigning. Putting together a more complete picture of what research across disciplines has shown does and doesn't work in public health and safety campaigns can help improve rates of positive public response to future campaigns increasing the odds of vulnerable populations taking protective recommendations seriously and engaging in proactive behaviors before threats turn into crises events. That kind of work requires examining, learning from, modifying, and implementing improved versions of the strategies discussed in the realms of biology, medicine, psychology, sociology, mass communications, visual rhetorics, document design, and behavioral economics.

Encouraging proactive prevention behaviors requires preemptive proactive campaigning. In her 2008 article, "Communicating about emerging infectious disease: The importance of research," health and risk communications expert Bev Holmes argued "a change in attitude from emergency responsiveness to preventive preparedness is needed, with effective communication regarding crises and emergencies beginning long before an event erupts and continuing after the immediate threat has subsided" (p. 357). Prevention is one area where most communication plans continue to fail. Plans often don't prescribe preventative measures until outbreaks surface, and they don't follow up once immediate crises seem to be over. Seroepidemiological prevalence studies in previous outbreak zones reveal how ineffective our campaigns against vector-borne outbreaks have been over the years. This ineffectiveness can too often be linked to failures in communication during and after the outbreaks, but especially before them. For instance, one

seroepidemiological prevalence study conducted in French Guiana after the 2014-2015 Chikungunya outbreak showed that 25% of the adult population had been infected during the outbreak (as cited in Raude et al., 2019), and a seroepidemiological prevalence study conducted in Brownsville, Texas, after the 2004 outbreak of Dengue Fever showed that there had been an estimated 3,231 undocumented cases in Brownsville, and an astonishing 27,581 infections in the neighboring Mexican city of Matamoros (Brunkard et al., 2007, p. 1480-1481). In both the Chikungunya and Dengue Fever outbreaks, the possibility of outbreak was known before the outbreaks began, and as noted in Chapter 1, both viruses are carried by the same mosquito vectors as Yellow Fever, West Nile Virus, Eastern Equine Encephalitis, and Zika. While outbreaks can be somewhat unpredictable, knowing the hazard is prevalent should suggest we work diligently to improve public uptake of prevention strategies when it may matter most. That means that, while crafters of public health campaigns have traditionally relied more on triage rhetoric, which is reactive rather than proactive, what they should be relying on is proactive rhetoric and better management of mediated resources. That's one area where campaign designers are failing at-risk populations and looking more closely at campaign failings may be the best place to begin reanalyzing approaches to health and safety communication.

Why Seemingly Good Campaigns Strike Out

In her article, Holmes (2008) cited numerous studies that all suggest a mixture of three major failings in communication before, during, and after outbreaks: ignoring lived realities, discounting social structures, and grossly undervaluing trust. These are failings that are often replicated by way of the research presentation used in part as the basis for initial campaign designs and even campaign redesigns. Researchers who fail to ask the right questions will almost always get the wrong answers, and an inability to recognize flaws in research design or biases in

data representation and interpretation can easily lead to asking the wrong questions or, more tragically, overlooking the right answers. A quick overview of the three main failings followed by a more thorough explanation of tethered complications and potential remediations will aid in recognizing and understanding flaws in current design of Zika prevention campaigns while hinting at methods of redesign that may make future campaigns more rhetorically effective.

The first major failing, ignoring lived realities, begins with many stakeholders assuming members of the public to be "rational" when faced with potential threats to their health and safety. Scientists, medical personnel, public outreach workers, national and local health authorities, policy makers, and other upper-level stakeholders seem to believe that once the public has been presented with all the facts and figures, they will actively consider what is in their own best interest, adopt the same priorities that those stakeholders believe they should have, and then comply with expert recommendations based on those newly adopted priorities. This assumption ignores the lived realities of those individuals whose priorities, worries, experiences, resources, and goals may not mesh with the information they've just been given, the resources at their disposal, or the responses now expected of them. In his article, "Best Practices in Public Health Risk and Crisis," Vincent Covello (2003) noted that health communication campaign designers must "find out what people know, think, or want done about risks" at the onset (p. 5). By listening to and understanding the concerns of those likely to be most affected by a hazard, communicators can better adjust messages to meet those concerns first and thus have a stronger foundation to encourage people to adopt new, recommended priorities.

The second major failing, discounting social structures, happens because almost all patterns of health and safety communication operate on ultimately false premises of individuality, ignoring the social realities of most health and safety threats, especially

transmittable diseases. Upper-level stakeholders either do not engage at a community level or wait far too long to do so, and as stated by Holmes, the "threat of an emerging infectious disease will require everyone's cooperation; therefore communications will not only need to inform individuals, but will need to help create an atmosphere of mutual trust and solidarity, addressing individuals as members of the wider community" (p. 356-357). Part of recognizing community hinges on recognizing shared culture within those communities. Airhihenbuwa et al. (2020) define culture as "as a collective sense of consciousness that influences and conditions perception, behaviors, and power and how these are shared and communicated" and while American culture often revolves around individuality and thus risk to self as reflected my most health and safety messaging, there are many who will still alter behaviors to reduce risk to their community, thus it is important to avoid binary messaging.

The third major failing, grossly undervaluing trust, stems from a lack of transparency and disconnected relationship-building necessary for trust. The public is often overloaded with information that may be conflicting, uninformative, incorrect, inaccurate, incomplete, fear inducing, and generally questionable, and, when confronted with questionable information, the public is offered few, if any, opportunities to voice their concerns to or engage with those providing accurate information, resources, and options. Proliferation of alternative information sources available online and through more traditional media provides greater access to potentially false narratives and conspiracy theories. As posited by Michael Siegrist and Alexandra Zingg (2014), trust in government and health and safety experts is especially important during times of crisis, such as pandemics, and if the public distrusts those who should be true experts, they will begin seeking information from other sources, increasing the chances of them encountering false narratives and conspiracy theories. This means experts and their

representatives must be proactive and transparent in their interactions with the public. Emerging infectious disease cases can be unpredictable, and they always come with some degree of novelty, but those who have taken on the responsibility for safeguarding the public when infectious diseases threaten need to be honest and open about what they do and don't know, which options may be best based on a variety of personal circumstances, and what exactly is transpiring at different points in time.

I contend that Bev Holmes' (2008) discussion of these three failings provides a strong starting point for understanding what is going wrong in campaigns, but to understand what these failings look like in practice, it is important to dig deeper into a representative variety of available studies on public health and safety campaigns.

Embracing Lived Realities.

One of the most critical deficiencies in crafting health and safety campaigns is the general lack of acknowledgment of the lived realities of the public. Members of the public (contextually dependent non-experts) are frequently depicted in research and public and private discussion as irrational, non-compliant, and/or apathetic when it comes to caring for their personal wellbeing and avoiding unnecessary risks (Averett, Neuberger, Hansen, & Fox, 2005; Bissell, May & Noyce, 2004; Davis et al, 2014; Elliott, Loeb, Harrington & Eyles, 2008; Fischer et al., 1991; Heifferon, 2008; Herrera, Moncada & Defey, 2017; Roter et al., 1998). However, as discussed in Chapter 1, risk can be subjective, and what an epidemiologist considers a serious risk may have never even crossed a non-expert's mind. Two simultaneous studies appearing in the 1991 issue of *Risk Analysis* exemplify this problem by discussing research designed to better understand how lay people interpret and respond to "worry" in general (MacGregor, 1991) and to risks roughly defined as variably preventable negative occurrences (Fischer et al., 1991).

MacGregor's (1991) two-part study was conducted once before and then again following the highly publicized partial meltdown of a nuclear reactor in the Three Mile Island Nuclear Generating Station. In both parts of his study, he asked respondents about their top five worries over the course of the previous week, and then had them complete a questionnaire rating their degree of "worry" over 37 items that researchers believed the public should be concerned about. Results of MacGregor's pre and post Three Mile Island accident studies showed that his respondents had been most "worried" about simply meeting their goals for the week, followed by being "worried" about personal finances and maintaining interpersonal relationships. In fact, on MacGregor's scale of 1-37 with 1 being the thing of most concern and 37 being that of the least concern, most health concerns listed were ranked between 30 and 36 with fear of a car accident as number 30. Concerns over personal safety were similarly ranked. Thus, the results of MacGregor's study suggest that the threats and associated risks deemed significant enough to warrant the creation of public health and safety campaigns in the 90s remained of little concern in their target audiences' day to day lives, even after public awareness of some threats increased as with the highly publicized Three Mile Island meltdown.

Meanwhile, the authors of the Fischer et al. (1991) article introduce their research by noting that "risk professionals frequently complain that laypeople are preoccupied with minor risks, while ignoring other risks that pose significant threats to health and safety" (p. 303), seemingly echoing MacGregor's conclusions while not clearly defining their terms of "risks" and "threats." In their two-part study, Fischer et al. used an open-ended questionnaire asking participants first to "make a list, in whatever order they come to mind, of the risks which most concern you now" (p. 305). The researchers did not define the term "risks" for their participants, leaving it entirely open to interpretation as the participants worked. Each participant then chose

the top five risks they were most concerned about from their first self-generated list and responded to standardized questions using each of those risks in turn. The questions asked them to quantify their degree of concern about each risk, and then expand on that response by noting how much they would be willing to pay to reduce or avoid the risk. To gauge senses of efficacy, the respondents were questioned about how much they believed they could influence the outcome with each risk. Then they were asked how much they had already actively done to influence the outcome with each risk, who they believed was responsible for protecting them from each risk, and finally how much information they had been "given" about each risk.

Results of the first version of the Fischer et al. questionnaire stood in stark contrast to MacGregor's results with around 50% of the 229 unique risks generated connected to issues of health and safety. However, with only 50% of the participants concerns involving health and safety at all, and 37% of total concerns being specifically about accidents, the results also suggests that social and financial concerns still represented most what participants viewed as significant risks in their day to day lives (p. 305-309). Having received so many unique risks attached to social and financial rather than health and safety concerns led the team to revise their questionnaire and run the study again, this time asking more specifically about health, safety, and environmental risks (p. 306).

Both studies show that risk and worry are rhetorically constructed and contextually driven, and the results of both the MacGregor and Fischer et al. studies reveal significant information about how lay people interpret the terms "risk" and "worry." While discussing the results of both studies, Fischer et al. note significant differences between the terms themselves, and stated that "many people interpret the word risk as referring to potential threats whose likelihood depends on the decision-maker's own actions, whereas people often worry about

things that they cannot influence" (p. 305), and that "people generally interpret the word risk as referring to a negative event that might occur, not as referring to a negative state of affairs that already exists" (p. 304). With these noted differences in interpretation of the terms "risk" and "worry," it may be important to ask which term typically dominates in the lived realities of affected publics. If risk, perceived as possible negative events that can be altered by personal actions, dominates people's capacity for concern, then campaigns promoting high efficacy proactive responses to threats could prove particularly useful. However, if worry, perceived as negative events beyond individual control, dominates people's capacity for concern, then campaigns promoting only doom, gloom, and fear could prove entirely counterproductive, but if stakeholders can find effective methods of helping the public see beyond their perceived lack of control, then they can promote new behaviors as small steps toward gaining a greater sense of self-efficacy. Along with limits to financial, physical, and opportunity resources, there are also mental and emotional limits to prioritization of concerns to personal welfare.

As discussed in Chapter 1, definitions of terms associated with the concepts of risk, hazard, and crisis have long been and continue to be lost in translation from one sphere to the next. So, depending on what sphere a problem is approached from—public, private, expert, political, etc.—priorities are going to differ from the outset, and the focus of any health and safety campaign may become just another stressor for those in the public sphere, never making it anywhere near individuals' lists of priorities at all. This means that for any health and safety campaign to be effective in generating positive behavioral change within a specific sphere, campaign designers must first convince the members of that sphere that the focus of their campaign is not only something in an individual's power to alter without extreme measures, but that it should also be considered a top priority in their immediate lives. When that sphere is the

public, campaign designers must effectively work to convince them to reevaluate their individual and collective values, and designers must avoid any assumption that members of the public are acting irrationally or apathetically when those members are hesitant to commit to an alteration of their values or ready acceptance of a new prioritization of their lives. After all, to act irrationally means to act without reason; yet, human reason is present in all but the most biologically involuntary human actions, and apathy is not a personality trait, but is generated by specific sets of circumstances. In many cases, the public may even believe that it's the campaign designers and others attached to the creation and enactment of the campaign that are being irrational by creating expectations that they should already know the public can't or won't meet.

The concept of an irrational public putting themselves at risk has a long and problematic history but may be more currently based on the promotion of Rational Choice theory (Samson, 2014), a theory often used in behavioral sciences which assumes that a person will weigh their options and choose the one likely to best serve them at any given moment in time. This theory has been proven wrong often, especially since it started being included in political science research and analyses (Lakoff, 2014). Numerous studies have shown that the public frequently chooses options that are not really in their best interest, but that's not to say that they are actively going against what they know to be in their best interest for no reason. Rather, there are various psychological, physical, social, and cultural complications that significantly influence public reactions to threats. Cognitive overload and confusion, health threat fatigue, boomerang effects, normalization, use of master narratives, proliferation of false information, inadequate information, hyper-mediatization, linguistic and/or financial barriers, timing failures, lack of agency, and skepticism all filter into the decision-making process at one point or another, and ultimately lead to arguably rational or irrational actions and/or complete inaction.

Ir/rational Actions: Cognitive Overload and Confusion.

One of the biggest problems with creating effective public health and safety campaigns is dealing with cognitive overload generated by increasingly easy access to too much information that creates unnecessary stress and, at times, results in complete inaction. In her work on documentation and communication of hazards to workers in the mining industry, Beverly Sauer noted that, "in situations of risk, knowledge is uncertain," and those who find themselves in danger "must negotiate among many competing representations" (p. 227). This uncertainty can generate or increase confusion, feelings of vulnerability, fear, and distrust in both domestic and industry domains. While humans may be the most intelligent species on Earth, psychology professors at the University of Bristol studying decision making for improved design of risk communication found that our species' cognitive capacity remains far too limited to be able to process information that is excessive, fragmented, offered from too many sources, or left in any way inaccessible (Williams & Noyes, 2007). In other words, our brains are frequently subjected to cognitive overloads that may inhibit quality decision making.

Cognitive overload contributed to the confusion surrounding the veracity of claims made by authorities and experts leading up to the L'Aquila earthquake disaster of 2009 in Italy. Residents of L'Aquila were offered too much conflicting information using too much jargon by too many experts and other upper-level stakeholders with too many differing agendas, and the resulting confusion ultimately resulted in the preventable deaths of 309 residents as well as unprecedented manslaughter convictions for the city's vice director and all the scientists who had been consulted (Herovich, Sellnow, & Anthony, 2014). In the L'Aquila case, the information presented to residents had all the markers for generating cognitive overload, including using specialist language and terminology that was largely inaccessible to those for whom it mattered

most. Those with a lot at stake included city officials not well versed in geology who sought only the answers they wanted to hear and pressured the experts to concede those answers as concrete predictions. When reported to the public, their answers left residents unsure of who to trust or how to proceed, so, for many, inaction followed from false assurances of safety hovering over a confusing mass of uncertainties and arguably applicable facts.

In another case, cognitive overload led to varied responses regarding the SARS and H1N1 pandemics. According to the article, "The more the better? A comparison of the information sources used by the public during two infectious disease outbreaks," studies conducted in Canada during and after the 2003 SARS and 2009 H1N1 outbreaks showed residents had been confused by the information circulated through various public risk communication channels. The patterns of protective behaviors then practiced by those residents proved to be significantly different depending on which information sources respondents had been relying on at the time. Respondents who actively sought information via the internet suffered high levels of cognitive overload as they tried to process the volume, variety, and veracity of information available. Among residents in Alberta, Canada, the sources deemed most useful weren't often the ones residents believed to be the most credible. Importantly, residents who reported using the services of professional healthcare representatives--doctors, hotlines, etc.--generally believed those sources to be the most credible but did not report finding them useful. The study also confirmed that people tended to consult multiple sources for fragments of information they could use to piece together what they perceived as a more complete understanding of the situation, their options, and best courses of action. The article authors, Jardine, Boerner, Boyd, and Driedger (2015) recommended that healthcare workers actively seek more effective ways to communicate with the public through as many channels as possible to

improve their perceived usefulness as credible resources when outbreaks and other health and safety issues arise. If the public views their primary, local health authorities as the best and most helpful possible sources of information, then it may well reduce the cognitive overload and confusion that comes with further inquiry through mediums like the internet.

In yet another study, researchers Janssen, Landry, and Warner (2006) used focus groups composed of 39 healthcare professionals and 97 lay people at one of four testing locations in August of 2005 to test and assess informational documents about pandemic influenza. The researchers found that perceived contradictions, unpredictability, and negative language appearing in the texts exacerbated stress reactions, and confusion often resulted as their participants tried to process the unfamiliar terminology offered in the documents. During speak-aloud protocols, participants also requested more specific information about seemingly ambiguous symptom descriptions such as "flu-like" (Janssen, Landry, & Warner, 2006). Based on participant responses to their study, it seems that the inaccessibility of language and concepts used in the documents, even terms like *pandemic*, had generated cognitive overload. Unsurprisingly, participants in the lay groups also took the presentation of the pandemic information to their focus groups as warnings of an impending problem not yet made public. The healthcare professionals who participated, however, were more reluctant to view the study conducted as an ill omen, noting instead that they would worry about new pandemics when they became immediate threats, but had no time to consider future pandemics while engaged with the more pressing concerns of their jobs' day-to-day demands. Individuals in both healthcare professional and lay participant groups stated that they would use Google to find more information if needed (Janssen, Landry, & Warner, 2006). Such responses, unfortunately, feed back into the inherent problems of information seeking via the internet.

Googling a disease could easily lead to more questions than answers and is guaranteed to produce cognitive overload when users begin seeking out numerous sources to corroborate or refute the information they already have. In fact, a study published as the article, “Infoxication in Health: Health Information Overload on the Internet and the Risk of Important Information Becoming Invisible” (D’Agostino et al, 2018), averaged how long it would take a person to review all of the digital information available in May of 2016 for each of four diseases starting with Ebola, and including three spread by Aedes mosquitoes: Dengue, Zika, and Chikungunya. They concluded that it would take “50 years without sleeping to consult everything that is published online” (D’Agostino et al, 2018). Such an ever-present abundance of information, much of it false or simply outdated, can also move information seekers beyond mere cognitive overloads and confusion into a state of exhaustion recently coined “health threat fatigue.”

Ir/rational actions: Health Threat Fatigue.

Health threat fatigue, a more representationally expansive designation influenced by psychology professor Helene Joffe’s “Emerging Infectious Disease (EID) Fatigue” (Joffe, 2011), is a fairly new term coined by a team of medical sociologists in their article, “‘We Became Sceptics’: Fear and Media Hype in General Public Narrative on the Advent of Pandemic Influenza” (Davis, Lohm, Flowers, Waller, & Stevenson, 2014). Health threat fatigue, like EID Fatigue, is presented by Davis, Lohm, Flowers, Waller, and Stevenson (2014) as similar to the concepts of emotional exhaustion and compassion fatigue—“negative reactions to excessive demands” (Hanson et al., 2018) that can lead to the public becoming “desensitized or numb to events that would typically invoke compassion or empathy” even for oneself (Kinnick, Krugman & Cameron, 1996). Health threat fatigue is a largely unrecognized problem within many prominent health and safety campaigns and occurs primarily when the at-risk public is subjected

to frequent reminders of specific negative outcomes or threats to their health such as with lung cancer reminders in anti-smoking campaigns and type 2 diabetes reminders in anti-obesity campaigns. These campaigns typically reach high saturation points as their messages end up everywhere from televisions and smart phones to bus benches and product packaging. Research published in an article on the negative effects of health communication campaigns shows that such oversaturation can ultimately result in communication failures that induce backlash (Cho & Salmon, 2007). While oversaturation may seem like an obvious and unavoidable endpoint for extensive long-term campaigns, it is important to remember that oversaturation can occur far more rapidly too and be achieved without any direct interaction between health-care community workers and the publics targeted in many health and safety campaigns.

The phenomenon of health threat fatigue can be seen in burst campaigns such as the infrequent but heavily mediated campaigns against the spread of new strains of pandemic influenza as presented during the onset of some "flu seasons." The previously noted Davis, Lohm, Flowers, Waller, and Stevenson (2014) study examined how members of the public in the UK and Australia made sense of and responded to messages of pandemic influenza during the 2009 H1N1 scare. Their results suggested that health threat fatigue was not only commonly experienced by participants but was also likely responsible for what was viewed by experts as outright public complacency in the face of a serious threat to personal welfare. Such criticisms, however, fail to account for the fact that so many threats to health initially framed by experts and media as severe are often proven negligible over time. As posited by Helene Joffe, those who were once depended upon for safeguarding public health are now more commonly accused of provoking unjustified fear, and perceived fearmongering tied to oversaturation leads to generalized skepticism and burnout for targeted publics (Joffe, 2011). Of course, using fear

appeals in preventive campaigns has proven at least simi-effective in motivating the public most of the time, but there are limits to how much the public can or will tolerate before their behaviors shift away from prevention practices and toward the panic, distrust, or disinterest that quickly and completely demotivates or, even worse, leads to boomerang effects (Davis, Flowers, Waller, & Stevenson, 2014). Recognizing and managing those public tolerance limits while avoiding oversaturation altogether may be necessary to render burst and long-term prevention campaigns more effective, and this may mean limiting national outreach campaigns, and focusing more prominently on localized, community framed campaigns instead.

Ir/rational Actions: Boomerang Effects.

Oversaturation of health and safety related messages tends to produce what is known across disciplines as the "boomerang effect," but boomerang effects can occur with or without recognizable inundations of messaging. The boomerang effect is what happens when interventions create unintended negative effects. Boomerang effects have been discovered in a vast variety of health and safety campaigns from pro-flossing to anti-violence, and discussions of related consequences appear frequently as researchers try to figure out why so many campaigns are proving far less effective than anticipated. In a study examining children's reactions to an anti-violence intervention in which children were exposed to violent clips from PG-rated movies while being taught a lesson on the discrepancies between violence in movies and violence in real life, the researchers found that the children exposed to the violent movie clips showed significantly more aggression in their responses to questions about committing violent acts than the control groups, and that they also deemed specific types of violence as being more socially and morally acceptable than the control groups had (Byrne, Linz, & Potter, 2009). In their brief discussion of how to prevent such boomerang effects, the study researchers Byrne, Linz, and

Potter make surprisingly few recommendations, and even those come with caveats rather than replicable solutions (2009). However, they do at least acknowledge psychological reactance and social priming as possible primary catalysts for the boomerang effects produced during the study (Byrne, Linz, & Potter, 2009, p. 242), and understanding the functions of reactance and priming can suggest ways of limiting the potential for boomerang effects in other campaigns.

According to Daniel Moldon (2014), social priming suggests that "particular social situations or relationships can subtly influence people's responses even when they do not deliberately connect these cues to their current thoughts and actions" (p. 7). For instance, in a study of the polarizing effects of gun control campaigns, Seung Mo Jang (2019) used terror management theory to examine reactions during a three-part study that began with exposure to mass shooting info as a form of social priming referred to as mortality priming. Terror management theory is particularly useful in examining mortality priming because it suggests that most humans have an innate fear of death, and that it is their belief in the "validity of cultural worldviews" combined with their belief that they are "valuable member(s) within that cultural scheme" that allows them to manage their fear (Jang, 2019, p. 309). Many health and safety campaigns intentionally or inadvertently leverage that innate fear of death to try to encourage behavioral change. In the first part of Seung Mo Jang's study (2019), bringing mass shootings to the center of participants attention by exposing them to news coverage about one of two recent mass shootings was shown to have sufficiently primed participants to react by increasing their number of death related thoughts as compared to the control group. The second part of the study showed that of those not in the control groups, participants who self-identified as Republicans were far more likely than self-identified Democrats or Independents to support a less gun-control and more open-carry policy after mortality priming. The final part of the study "demonstrated

that these unexpected relationships occurred due to death-related thoughts that were inadvertently heightened by the exposure to mass shooting stories" (Jang, 2019, p. 313). Jang's results show that the most common strategy employed by gun-control advocates, revelations and reminders of firearm murder rates and mass shootings, is having an acute boomerang effect by effectively increasing the vehemence and reactivity of those they are trying to get on their side while having little real effect on those who are already on their side. In effect, Jang's study suggests that interventions employing fear appeals as their primary means of encouraging behavioral change may be turning their audiences against their campaign's messages, inadvertently reinforcing the very behaviors that render them at-risk to begin with.

There are other studies that have also shown the potential for generating boomerang effects through social priming in health and safety campaigns. A Werle and Cuny study (2012) examined the effects of health messages included in luxury food displays and advertising with results suggesting that feelings of guilt induced by social priming related to acquisition of luxury goods for oneself (Lu, Liu & Fang, 2016) could easily trigger automatic responses of justification and rationalization. This behavior ultimately led to increases in purchase and consumption of the food used in the study, the McDonald's Big Mac (Werle & Cuny, 2012). As shown in other studies (Koskan, Foster, Karlis, Rose, & Tanner, 2012; Richter, Thøgersen, & Klöckner, 2018; Wolburg, 2006), such justification and rationalization, especially when combined with oversaturation, can lead to normalization of negative behaviors and related attitudes.

Ir/rational Actions: Normalization.

When behaviors, even or especially negative behaviors, are perceived as common among peers or icons, they can be perceived as normal and acceptable or even expected. Kinnich,

Krugman, and Cameron, whose previously discussed study examined the negative effects of mediated health information saturation, note normalization as a common byproduct of the pervasive nature of media and the tendency of media models especially to sensationalize, omit context, and provide problems sans solutions in coverage of "bad news" (p. 690). However, not all normalization or social norming is negative; as a process of behavior modification, it has been used in health and safety campaigns to, as psychology researchers Schultz, Nolan, Cialdini, Goldstein, and Griskevicius posit, "reduce the occurrence of deleterious behaviors by correcting targets' misperceptions regarding the behaviors' prevalence" (2007, p. 429). Often, social norming is accomplished through presenting target audiences with statistical information about the behavior in question, so rather than over or underestimating the prevalence of a behavior, audiences can compare the prevalence of their behaviors with theoretically scientifically derived and factual numbers representing prevalence among peers or icons. This variety of normalization is considered descriptive as it is designed to correct misconceptions of how others behave.

While descriptive normalization is typically considered one of the more effective methods of altering behavior, numerous studies have revealed the presence of boomerang effects in target audience subsets, and Shultz et al. contend that by providing prevalence data that suggests an individual is either above or below the average, it may encourage alterations in behavior that place the individual closer to the data-constructed norm (2007). Such changes in behavior have a decidedly adverse effect in campaigns that are trying to produce specific results of reducing or increasing a behavior. For instance, if a campaign promoting increased use of mosquito repellent sprays alerts its target audience to the low prevalence of repellent use, those individuals who already use it more often than the norm are unlikely to increase usage and may reduce their usage to become more closely aligned with what is "normal."

A statistically promising method of avoiding the potential boomerang effects that come with using descriptive norming while still retaining the benefits of intentional normalization practices in general is employing what Schultz et al. refer to as injunctive norming (2007, p. 430). Injunctive norming uses similar data sets to convey moral and ethical perceptions of acceptability of behaviors rather than prevalence of behaviors. So, rather than just informing individuals about how often mosquito repellant is used, individuals are also or only offered data on how often peers and icons believe it should be used or wish they used it. Similar studies cited by Blanton, Köblitz, and McCaul (2008) have documented boomerang effects resulting from numerous two-phase norming campaigns used on university campuses to alter misconceptions about student alcohol consumption and illicit drug use. They note that the first phase of the campaigns is typically a survey phase that collects data on both perceived and actual rates, that the first phase rarely collected data on moral or ethical assessments from students, and that students' perceptions of consumption and usage rates are socially bound, and the rates are skewed by the localized rather than globalized awareness of students surveyed. As such the second phase, the communication phase, is where problems really surface since the campaigns can easily end up taking on the role of conforming reluctant students to an unintended norm that increases unhealthy or unsafe behaviors. Rather, the researchers suggest providing descriptive norming data with injunctive norming data to communicate more effectively that even if 20% of their peer groups heavily consume alcohol or use illicit drugs, 98% of their peer groups don't want to engage in those behaviors or believe that those behaviors are acceptable. In effect, Blanton, Köblitz, and McCaul (2008) recommend fueling resistance to perceived norms through injunctive norming instead of encouraging conformity through purely descriptive norming which could unintentionally craft master narratives of acceptable negative health and safety behaviors.

Ir/rational Actions: Use of Master Narratives.

According to researchers, K. C. McLean and M. Syed (2019), a master narrative "is a culturally shared story that informs thoughts, beliefs, values, and behaviors. Master narratives are distinct from personal narratives in that they are not the stories of individuals' lives, but rather are frameworks that guide the construction of individuals' life stories." This means that master narratives can shape our healthcare beliefs and resulting behaviors. While there are myriad ways for master narratives to be formed, modern media is often a primary tool for the rhetorical construction of culturally shared stories.

News sources and other media play a critical role in influencing perception before, during, and after risk and crisis events. In *Communication, Public Discourse, and Road Safety Campaigns: Persuading the public to be safer*, Nurit Guttman (2014) examines the history of rhetoric employed in road safety campaigns beginning with media use in those campaigns. In it, Guttman discusses the influence news and entertainment media have on creating "frames of reference" that directly affect public response, and manipulation of information that shapes how the public conceptualizes "the problem." In these campaigns as with other health and safety campaigns, it is critical that workers try to dismantle master narratives as they form rather than allowing them to become the standard in thinking about and discussing public health and safety threats.

The crafting of master narratives can have far-reaching and long-lasting impacts on human knowledge and behavior, and they can be crafted both intentionally and unintentionally in problematic ways. As noted by participants in a study of cardiovascular disease risk perception in several African American communities in Arizona, "if health messages (about cardiovascular and other diseases) only contained statistics about other races or images of people from other

races, African Americans might believe the illness does not apply to them" (Der Ananian, Winham, Thompson, & Tisue, 2018, p. 12). By media focusing so much on the effects of Zika infections in pregnant women, it became less likely that men and women not of childbearing age or intent would see themselves as "at risk." Even worse, because the media focused heavily on circulating images of Hispanic women who had been infected while pregnant, and their infants later born with microcephaly, they effectively painted Zika as a problem predominantly for Hispanic and pregnant women. After local Zika transmission was detected in Miami, the public reaction spurred by this arguably unintentional master narrative led to residents of one predominantly Latino community blaming "foreign visitors to the arts district for bringing the Zika virus" despite the mosquito-breeding presence of "lots of standing water" in the neighborhood (Belluck, 2016). Likewise, during the SARS outbreak in 2003, the virus's origination, spread in and then beyond China, and subsequent media coverage focusing on China and Asian immigrants allowed for the creation of a master narrative of SARS as a risk not only faced but posed specifically by those who appeared to be Asian. Extensive research by Huiling Ding (2014) around the rhetorical construction of SARS showed that internet trolls and fear mongers quickly took advantage of the virus's media-constructed Asian face to engage in "medicalized nativism" in the United States and Canada, spreading rumors and fake news "warning people to 'stay away from Chinatown and other predominantly Asian neighborhoods'," (p. 149).

Ir/rational Actions: Proliferation of False Information.

As revealed above, proliferation of false information can be entirely intentional, but it can also be the result of unintentionally malicious conjecture. Unintentional sharing of false information is what occurred on February 14th, 2016, when cultural icon, George Takei, the

much loved Lieutenant Hikaru Kato Sulu of the original Star Trek series and long-time activist, posted a link on Facebook to a Second Nexus article discussing the then recent publication of a "scientific report" theorizing that the Zika-related cases of microcephaly had actually been caused by a larvicide used to control mosquito populations, and that Zika was little more than a cover story (Lacapria, 2016). According to the unsubstantiated report put out by a group who called themselves "Physicians in Crop-Sprayed Villages," the internationally unpopular agricultural group, Monsanto, was ultimately responsible for the microcephaly outbreaks the Brazillian government had blamed on Zika (Production Team REDUAS, 2016). The group's claims spread rapidly across social media and the internet buzzed for months about how Monsanto had caused Zika and/or microcephaly. The "news" was continually featured by numerous social media content producers including @Zika_News with their December 2016 tweet: "#Monsanto: Brain Deformities Caused by Monsanto's larvicide & not Zika Virus." Unfortunately, the proliferation of false information further fuels problems associated with cognitive overload, and, as researchers working through a summer research fellowship provided by the Annenberg School of Communication and the USC Graduate School posited in a published study on science communication, the belief in and spread of false information in the public domain is not solely or even mostly linked to any lack of education or ignorance of information. Instead, it "seems to increase with greater levels education, science literacy, and issue-specific knowledge . . . suggesting that holding incorrect beliefs reflects acceptance of alternative information rather than an outright deficit of knowledge or ability" (Walter, Ball-Rokeach, Xu, & Broad, 2018). This means that those actively seeking information about Zika were not only faced with such false information about the virus, but that they were also helping

to spread the misinformation further, and it certainly would not have helped that researchers were still in the process of trying to produce an accurate picture of the threat.

Ir/rational Actions: Inadequate Information.

When new threats to public and personal health and safety arise, curious or concerned proactive information seekers may come across dozens, hundreds, or even thousands of sources to pull from. Some of those sources are likely to strike the seeker as questionable or outright incorrect. After a while, some information seekers may simply build a health and safety narrative around the sources that seem most credible and walk away from their search, however, some others may be spurred further down the research rabbit hole after encountering questionable or incorrect information. They continue their search based on their need for adequate information about the threat, but their quest for specifics becomes problematic when scientific research is still underway, and even the world's most trusted experts, like the WHO and CDC, have few answers to offer. The less health and safety experts are able and willing to tell the curious and concerned, the more likely information seekers may be to turn to non-expert sources such as social media.

Ir/rational Actions: Hyper-mediatization.

Unlike learning new information from traditional print or televised news and information outlets, modern media affords information seekers virtually unlimited clickable options for continued seeking. Those endless hyperlinks act as gateways into hyper-mediation. According to international academic publisher IGI Global, hyper-mediatization is "the chain of uses, communicational hybridization and contamination inherent to the social-interactive environment, that emerges with the uses of new forms of configuration that expands the limits of culture and media" (IGI Global Dictionary, n.d.). While links to more information embedded in reliable sites, like the CDC website, can provide seekers with further health and safety information based

on the best available science, links on other sites, including most links posted on social media sites, can lead to fake news with no scientific backing, misinformation based on cherry picking of scientific data, or misinterpretations of newly published scientific studies. Thus far, there seems to be no way of preventing a glut of incorrect information from surfacing on the internet, especially since profiteers will use fear mongering to craft headlines as clickbait. Because the hyper-mediated nature of the internet allows for such problems with information seeking with numerous links automatically provided for associated sponsored and popular content, there is, as previously suggested, considerable need for health and safety campaign workers to position themselves effectively in public spaces and utilize culturally appropriate social connections during times of risk and crisis.

Ir/rational Actions: Literacy, Linguistic, and/or Financial Barriers.

One study that highlights many of the flaws in risk and crisis communication is the study on cardiovascular disease risk perception among African Americans I mentioned briefly in the section on master narratives. In that study, researchers constructed an active partnership between the Cultural Health Initiative of the AHA and Black barbershops in Phoenix, AZ, to create "a health intervention for the elimination of hypertension" (Davis, 2014, p. 182), dubbed the "Barbershop Initiative." According to the study's author, Olga Idriss Davis, 50% of the African American population may be "functionally illiterate," reading below a fifth-grade level while most health information available for public consumption is written closer to a tenth-grade level (Davis, 2014, p. 177-178). When the public is offered health information that they have difficulty reading and understanding, they can't effectively use that information to improve their health and safety.

On top of problems with general written literacy, various linguistic barriers are likely to present significant problems with developing community awareness and increasing compliance with recommended behavior changes. In a study evaluating Kansas' 2003 West Nile Virus public education campaign, researchers Averett, Nuberger, Hanson and Fox (2005) revealed health information and awareness disparities between linguistic communities, with primarily Spanish-speaking communities remaining poorly informed compared to primarily English-speaking communities. Even when the information is verbally presented in one's native language, potentially bypassing some written literacy issues, auditory comprehension rates can significantly limit understanding, which may be a particular concern when communicating with older individuals.

Financial limitations can also be an important element in encouraging positive behavior changes. Even when people understand health messaging, they may believe themselves to be financially incapable of making recommended changes regardless of what the negative outcomes may be. For instance, pregnant women living in areas with high mosquito populations would find their Zika prevention options limited based on their ability to afford measures like mosquito repellants, replacing window and door screens, or acquiring recommended protective clothing.

Ir/rational Actions: Timing Failures.

Message timing is also critical. In their article, "Evaluation of West Nile Virus education campaign," researchers Averett, Nuberger, Hanson and Fox (2005) discuss their investigation and evaluation of Kansas' 2003 West Nile Virus public education campaign. Like other such studies, results of the campaign showed high awareness generated among most residents, but low compliance with protective behavior recommendations. Using telephone surveying to generate data from 534 respondents, the researchers discovered that of the 97% of participants who were

aware of the existence of West Nile Virus, less than 60% were able to name the most effective methods of prevention (Averett, Nuberger, Hanson, & Fox, 2005). More critically, those who had adequate knowledge of the virus and prevention strategies did not alter their previous behaviors.

According to the researchers, despite the campaign efforts of the Kansas Department of Health and Environment (KDHE) that included materials for broadcast media, mailed print materials, and website PSAs, most respondents cited mass media and word of mouth as the sources of their West Nile Virus information. Upon further investigation, the researchers learned that only the mailed print materials may have ever been received by target audiences since nearly all media sources had failed to broadcast any of the materials sent to them by the KDHE. Averett, Nuberger, Hanson and Fox (2005) speculated that the poor public communication results may have been due to message timing failures, noting that the materials the KDHE sent in the spring may have been less relevant to audiences, and so were unlikely to have been used, stored, or even remembered. They also noted that, when West Nile Cases began making news in the summer, broadcast media outlets actively sought information from KDHE, furthering the likelihood that timing was a primary point of failure.

Based on their evaluation of the educational campaign, Averett, Nuberger, Hanson and Fox (2005) recommend improving timing of materials saturation through media outlets, taking steps to ensure that word-of-mouth is a reliable and ready source of information among diverse populations, and actively purchasing or otherwise securing broadcast time through various forms of media to ensure priming of the public consciousness before mosquito seasons begin. Following these recommendations will increase the effectiveness of mediated messaging and will offer communities reached by participating media outlets a greater sense of control over

potential problems through community initiatives such as debris and trash cleanup and water supply monitoring.

Ir/rational Actions: Lack of Agency.

When individuals believe they have the power to change their own lives or, even better, improve the lives of others, they may be more inclined to alter their behaviors. In the Fischer et al. (1991) study that showed participants tended to worry about things beyond their control but considered the term "risk" to apply primarily to things within their personal control, participants were also asked questions that gauged what conditions rendered risks higher priorities and increased how willing participants would be to engage in actions that could reduce their risks. Their results suggest that individuals "attach the greatest priority and are most likely to act on risks where they feel efficacious and responsible and have the information needed to take effective action" (Fischer et al., 1991, p. 314). Likewise, the research conducted by Cho and Salmon (2007) found that individuals who wish to change their behaviors but don't believe they have the necessary resources, skills, or social support system to do so will experience increased stress that may lead them to give up pursuit of positive behavioral change. These findings suggest that campaigns promoting a strong sense of personal agency can be significantly more effective in the public domain. When trusted members of the black communities involved in the "Barbershop Initiative" were able to teach their fellow community members and patrons about how they could monitor their health, converse with their physicians, and protect themselves and their loved ones from heart disease, heart attacks, and strokes, they were able to give them a sense of agency regarding their health and wellbeing that many may not have had before. According to Davis (2011), "the [previous] lack of *agency* among African American men has contributed to the demise of their health. That is, unlearning a culture of silence that is designed

to teach men *not* to question physicians and providers is essential to transforming Black men's agency by articulating the importance of critical consciousness and dialogic communication as a process of understanding the social contexts of health beliefs and actions" (Davis, p. 179). Placing individuals in charge of their own wellbeing and giving their communities improved cultural cohesion and shared purpose empowers them to become active participants of health and safety campaigns, so it is vital that campaign designers craft messages and materials capable of generating greater agency, allaying unnecessary fear, and prompting confidence in answer seeking ability when skepticism and/or distrust may prevent compliance with scientifically supported recommendations.

Ir/rational Actions: Skepticism.

Skepticism can be healthy when wading through an abundance of often conflicting health and safety messaging. It has become far too common for reports to surface in the public domain one day saying something, like processed meat or DEET is unhealthy or unsafe, and then a new report surfacing the next day claiming the opposite is true. While this is sometimes the result of evolving scientific understandings, it can also be the result of privately funded research that falls apart under scrutiny. Then there are all the pharmaceuticals that may kill you as easily as cure you. There are all the unregulated supplements, reports of autism linked to vaccination, thalidomide resulting in "flipper-babies," bee pollen for curing cancer, Fen-phen curing obesity one day and then banned the next, unethical, and illegal medical studies, and the list goes on and on. It seems only natural that the public would eventually approach "expert" information and the "science" that backs it with more than a hint of skepticism.

In their article, "'We became sceptics': Fear and media hype in general public narrative on the advent of pandemic influenza," researchers Davis, Lohm, Flowers, Waller, and Stevenson

(2014) used interviews and focus groups with 116 participants selected for a diverse range of characteristics from the UK and Australia to determine how members of the public make sense of and respond to messages of pandemic influenza. They soon found that skepticism played a significant role in determining active responses. In general, participant responses displayed clear transmediation, and even specific mentions of popular media outbreak narratives. Participants also displayed instances of anxiety in trying to determine if the pandemic was a legitimate threat to them, at what point they would need to mobilize in response, what measures they may need to take, and they sought out other sources to corroborate the impressions they had regarding the veracity and degree of threat. Often responses suggested or flatly stated that the media had been "hyping" the entire situation, and that media sources would even take pleasure in escalation of the pandemic threat. Because they did not trust mass media, the respondents noted that the responsibility for dissemination of truth should fall to the government, especially locally, and health organizations like the WHO. They also expressed extreme distrust of the pharmaceutical industry. As reported in the article, the results of their study suggested, "respondents to surveys done at the time of the 2009 pandemic who did not see the virus as serious – an evident majority – may not lack motivation and be complacent. Rather, they may have been skeptical," (Davis, Lohm, Flowers, Waller, & Stevenson, 2014, p. 514).

Thus far, there are few viable remedies for many of the problems that come from the supposedly irrational actions and inaction of the public. While Rational Choice theory seems logical, there are numerous psychological, physical, social, and cultural factors such theories fail to take into consideration. Cognitive overload and confusion, health threat fatigue, boomerang effects, normalization, use of master narratives, proliferation of false information, inadequate information, hyper-mediatization, linguistic and/or financial barriers, timing failures, lack of

agency, and skepticism may play individual or compounding roles in the decision-making process when threats to health and safety arise. One of the most promising and frequent recommendations for campaign remediation is recognizing the enormous influence community and culture have on people's day-to-day lives and the decisions they make. Effective responses to threats should consider the value of community in crafting hazard, threat, and risk prevention narratives.

Recognizing that Community Matters

Community and culture are always important factors in public responses to health and safety concerns and communication. Understanding the cyclical nature of community and culture and how they influence perception, belief, and performance can help campaign designers improve messaging and increase outreach. Too often, health and safety workers and campaign designers employ a "one size fits all or most mentality" without venturing into local communities to learn more about their needs and motivations. For instance, in the "Barbershop Initiative" (Davis, 2011), understanding the cultural significance of barbershops in African American communities allowed researchers and local health authorities to create valuable partnerships with influential members of Black communities in what Davis (2011) refers to as a "performance space of initiation—a constructed community that initiates young men into the ways of Black masculinity and honors elder men by 'provid[ing] a safe place for the soul and body to affirm life over death'," (Davis, 2011, p.180). It was also important that the "Barbershop Initiative" campaign designers recognized culturally embedded traditional African American foods as a necessary though underused part of the health and wellness conversation as it tends to contribute much to the high rates of hypertension, diabetes, and heart disease African American men suffer from. Overall, Davis's (2011) work suggests that understanding culture can explain problems

with campaign uptake and offer avenues for viable solutions to those problems through culturally appropriate community engagement.

In another study showing the positive effects of community engagement, Australian researchers from Western Sydney and Monash Universities noted that "disadvantaged groups often experience health inequalities and bear a disproportionate burden of disease as a result of structural, social, and cultural barriers," including language and financial barriers (Cyril, Smith, Possamai-Inesedy, & Renzaho, 2015). Their systematic review of twenty-four studies examined effectiveness gaps in health promotion campaigns involving community engagement on Native American reservations and found that only eight reported improvements in health behaviors, and only six reported positive health outcomes (Cyril, Smith, Possamai-Inesedy, & Renzaho, 2015, p. 6). Of the eight that found improved health behaviors, only four reported changes at the community level, but all eight utilized community-based participatory research involving a combination of community partnerships, training of community health workers, community empowerment, cultural adaptation of health messaging, and engagement of community partners in all research intervention stages (Cyril, Smith, Possamai-Inesedy, & Renzaho, 2015, p. 6-8).

Nurit Guttman (2014) also recognized the roles of community and culture in her discussion of the reciprocal nature of risk communication, how mediated communication shapes road safety campaigns, and how resulting campaigns shape related discourse as well as the concept of safety and risk in general, noting throughout sections of her text that the deeply encoded social component of drinking often influences how receptive individuals are likely to be toward interventions. Similarly, in 2015, critical discourse analysts Jukka Torronen and Kalle Tryggvesson examined two public health campaigns targeting pregnant women in Sweden. In the resulting article, "Alcohol, Health, and Reproduction," they determine that the prevention

campaigns functioned by weaving scientific truths and images of fetal development with a negative outcomes narrative featuring the fetus as the main character, placing responsibility for its health solely on the mother, and promoting abstaining from alcohol as the only positive health response despite the reality of ongoing debates in the scientific community about the benefits/consequences of alcohol consumption during pregnancy (Torronen & Tryggyesson, 2015). The overall design seemed quite effective though ethically problematic in large part because of the visuals used. Like most campaigns, informational material focused on individual responsibility, and "bypass[ed] the responsibility of communities and the wider social institutions in which the lives of mothers are embedded" (Torronen & Tryggyesson, 2015, p. 72). There was no representation of community support, and no recommendations for garnering such support., While the brochures succeeded in getting the message about risk related to drinking while pregnant across to their target audience using visuals that created stronger reactions than the narrative alone could have, they also effectively created an us versus them mentality. Ignoring or undervaluing culture and community erodes public trust and increases previously discussed problems with skepticism among those at-risk.

Like the previous campaign, a campaign developed in the U.K. intended to raise awareness of Type II Diabetes used a fear inducing, negative outcomes narrative targeted to consumers who are encouraged to bear sole responsibility for their individual health, and the health of their families (Brookes & Harvey, 2014). Even though the program was considered community outreach, it had no real community focus at all. A 2011 critique of public health campaigns against obesity found similar results across numerous studies, suggesting that even localized, culturally specific focuses on individual responsibility to alter un-healthy behaviors were ineffective (Walls, Peeters, Prioetto & McNeil, 2011). One study of the effectiveness of

folic acid campaigns between 1976 and 2010 showed that specific barriers, like access and exposure barriers, had greatly reduced the effectiveness of the campaigns and data suggested that cooperation with campaign initiatives was linked to demographics and even prior awareness of the existence of folic acid in ways that were not being accounted for in subsequent campaigns (Rofail et al, 2012). The researchers involved in the folic acid study recommended new societal, culturally attentive, and communal outreach in conjunction with continued and extended outreach to individuals (Rofail et al, 2012).

Outreach campaigns often default to narratives of responsibility for illness, and it is rare for narratives to hold entire communities responsible rather than individuals or non-human entities like corporations or nature. According to research conducted by communication professors William Kirkwood and Dan Brown (1995), "attributions of responsibility are strategies for influencing the attitudes and behavior of various audiences" (p. 62). In conjunction with rhetorics of responsibility, fear appeals have proven effective in many campaigns that offer prevention and mitigation strategies framed as high-efficacy (Witte & Allen, 2000). When a threat to one is framed as a threat to one's community, and strategies are employed which assign responsibility to all members of a community, it should be possible to generate behavior changes at the community level. For instance, two ways of assigning responsibility for the spread of vector-borne diseases would be to blame individuals who contract them for inadequate self-care (not using mosquito repellant) or to blame the community for their collective lack of sufficient preventative measures (providing breeding grounds for the vectors). Community prevention may seem futile when the public understands how easy it is for mosquitoes to find sufficient breeding grounds, and little work may be done by risk communicators to increase the publics' sense of self-efficacy in prevention strategies that include active reduction of potential breeding grounds.

However, research has shown consistently negative public responses to withholding new knowledge, exaggerating outcomes, and refusing to acknowledge the limits of current research. Therefore, campaign designers and workers must share new knowledge as it becomes available and exercise transparency even when it seems counter-intuitive.

Exercising Transparency and Building Trust

Part of building public trust is by exercising transparency when threats to public welfare arise. According to Valerie Brown (2114), effective risk communication means understanding your target audience well enough to use language that can help them connect their own instincts with verifiable evidence. In her article, "Risk perception: It's personal," Brown discusses lessons learned from the Elk River chemical spill that contaminated the drinking water of 300,000 West Virginia citizens in January of 2014. At the time, little research on the chemical released existed to show what the risks were, and new information was slow in coming. While those affected were justifiably angry and worried, being honest with citizens about the limits of officials' knowledge and delivering new information as it became available kept the public's trust of officials, those dealing with cleanup, and emergency aid workers high (Brown, 2014). Keeping the public's trust is especially important for those working in the field with risk communication and crisis response. Trust can be built through perception management, but researchers must understand what the audience perceives in connection with events first.

Another study by U.K.-based health science and business researchers Juanchich, Sirota, and Butler showed that participants, regardless of demographic and cultural differences, believed that risk messages including risk quantifiers and qualifiers were less trustworthy because they believed the communicators were intentionally hedging to avoid blame. Language that connected probability with quantifiers and qualifiers like may, might, could, shouldn't, likely, chance, and

possibility, was perceived as particularly manipulative (2012). This means that they can comprehend, and with limited, if any hedging language. It is also important that campaign designers employ a "boots on the ground" approach whenever possible, ensuring that those authorities considered the most reliable, such as doctors, nurses, aid workers, and community workers, have the early resources and training necessary to be as useful to the public as they are reliable.

As professional technical communicators with training in rhetoric and writing, I believe we should actively consider the role we can play in working with the public and private sectors involved in assessing and improving public health and safety campaigns. We can help maintain transparency in risk and crisis events, making sure that the public understands what is known and what isn't. In creating policies to handle threats to public safety, "transparency needs to be defined in a practical manner as a desired communication goal and outcome" which will help strengthen public trust (O'Malley, Rainford & Thompson, 2009).

Transparency during events involving vector-borne threats to public welfare before, during, and after outbreaks is a practice that should be prioritized to ensure the public are not relegated to passive positions. Robert Johnson asserts that "the problems risk communicators face often stem from the fact that the public resists their separation from the process of risk assessment and their passive role in these processes, and their resistance takes the only form available, rejection of risk communication and communicators" (Johnson, 1998, p. 425). To work more effectively with the public during threats posed by vectors, we should monitor transparency practices and resist the creation and dissemination of master narratives of illness, pandemic, and vulnerability that shape public response. As previously noted, the Zika threat might be over in the US for now, but the fact that it existed at all means we should work as our

resources and abilities allow to increase the effectiveness of threat and outbreak responses and the communication of appropriate framing narratives.

With an improved understanding of why seemingly good health and safety campaigns falter or outright fail, we can begin a more detailed analysis of how recent Zika prevention campaigns were designed and how best to remediate those campaigns to avoid the major failings Beverly Holmes warned against. While what works in one scenario may prove less effective in another, it is especially important that we understand what strategies in communication most frequently fail at generating positive behavior change. Responding to pathogenic threats to public welfare requires professionals working across disciplinary boundaries and with the public to understand their relevant values and concerns, what narratives they have or are still forming around the diseases and vectors they are exposed to, and how different modes of communication function both separate from and in conjunction with each other. Because it is always important to determine where one's research fits into what we already know, what needs further validation, and what we're still trying to figure out, my own research detailed in the next two chapters initially built on two recently published studies of public communication campaigns targeting Zika. As discussed, having multidisciplinary research helps to fill in knowledge gaps that can lead to much better outcomes when pathogens resurface, and new outbreaks begin. Right now, we have lots of research data that gives us a much clearer picture of Zika from a medical perspective, but we are still limited in Zika research from a public risk communication response angle. As we have collectively discovered in other cases of outbreaks, epidemics, and pandemics, studies of effective communication during outbreaks can drastically improve our ability to reduce impacts in future cases. Research into communication during Ebola outbreaks has made fighting the spread of Ebola easier because it has given those on the ground in outbreak

zones new tools to work with. While there is little published research about communication during Zika outbreaks currently available, a body of such work is steadily building.

Building on Ongoing Research

Two of the most recent studies published were conducted and written by prominent researchers spanning different fields and areas of interest, further revealing the necessity and value of multidisciplinary research. It is within the range of their studies that I believe my own work best fits. In their study, Winneg et al. show that the tools for awareness and prevention of Zika currently in use produce only mediocre results even in currently at-risk populations, but its scope and nature leave out consideration of what techniques, tools, and materials have been specifically rhetorically effective and ineffective, and can, therefor, offer only limited recommendations for improvement in Zika communications. Published in *Cogent Environmental Science*, the article, "Reframing Communication about Zika and Mosquitoes to Increase Disease Prevention Behavior," by Sorenson, Jordan, and LaDeau is the first to offer consideration of the rhetorical effectiveness of publicly available Zika communication materials. However, their research only utilized informational materials from public health and government organizations, and their entire population sample came from West Baltimore. While West Baltimore is oddly plagued by native and invasive species of mosquitoes (Dybas & Quillen, 2018; Little et al, 2017; Montgomery County Government, nd), it is possible that far removal from publicized Zika outbreak zones like Brazil may have reduced perception of risk of negative outcomes related to Zika.

Winneg et al.

The article, "Differences between Florida and the rest of the United States in response to local transmission of the Zika virus: Implications for future communication campaigns," was

published in the journal, *Risk Analysis*, on May 8, 2018. Its authors are Kenneth Winneg, who is in charge of all survey research with the Annenberg Public Policy Center, Jo Ellen Stryker, who heads the Prevention Communication Branch of the CDC as a division of HIV/AIDS Prevention, Dan Romer, who is an Annenburg School and Policy Center researcher primarily focusing on media and social influences on adolescent health, and Kathleen Jamieson, who is a professor of communication at the Annenberg School for Communication and a director of the Annenberg Public Policy Center.

The study tested multiple hypotheses relying solely on survey data and using two classes of models, individual and communal. The first model utilized protection motivation theory and the health belief model, which seems to offer something akin to risk assessment models. My interpretation of the theory in conjunction with the model would be a process (perceived susceptibility x perceived severity = perceived threat) and, if a threat is established, then changes in behavior would come down to (protective benefits – barriers = potential for behavior modification). The second model was a social consensus model which examines communal behavior change based on requisite action by more than the at-risk population to reduce limited action by the at-risk population. The team conducted dual-language phone surveys from August 8 to October 3, 2016, in all fifty states, oversampling Floridians for the second to last week, and only Floridians during the last week of the study. This method netted 12, 236 respondents. The respondents were coded as Floridians and non-Floridians to determine how those closer to the 2016 U.S. outbreak zones of Miami-Dade and Broward counties would differ from the rest of the nation in terms of Zika awareness, knowledge, and preventive action.

The results showed that news media familiarity declined over time outside of Florida, awareness was about the same everywhere, but Floridians were more likely to know accurate

information about severity. Households with pregnant women or women trying to conceive were more likely to know that Zika can be sexually transmitted and knew more about the possibility of microcephaly. Those households were also more likely to actively seek more information, discuss it with others, and engage in some protective measures. They were not more likely to agree with spraying or releasing genetically modified mosquitoes. Floridians overall were more likely to act regardless of whether they believed they were at risk, but over half still took no precautions at all, and those at risk still did not support new or enhanced mosquito control strategies.

The Winneg et al. study produced several results that stood out, but the design of the study didn't provide direct explanations for why, and this meant that the researchers had to make assumptions about behavior. For instance, there were no significant differences in taking preventative measures between those who knew themselves to be more at-risk and those less at-risk, but the researchers can only guess about the reasons why. The researchers also acknowledge that they were uncertain about the possibility of heightened awareness among Floridians before announcement of local transmission cases, they didn't have a way to determine whether respondents were "partners in at-risk couples," they had no 'direct measures of perceived severity," and "did not measure perceived efficacy" of preventative actions (p. 12). They recommend that future research address these limitations, and state that:

> Future efforts to combat outbreaks of the virus may require enhancing perceptions of severity by highlighting the potential for Zika to cause Guillain–Barré syndrome or microcephaly. Increasing the understanding that Zika can be transmitted sexually may also elevate perceived threat sufficiently to generate greater preventive action.

> In the future, an effective message frame could also focus on the benefits to others in the community for taking protective action. That is, even if residents did not see themselves at personal risk, they could come to recognize their role in preventing the spread of the virus to others at risk. (p. 13).

The work of Sorenson, Jordan, and LaDeau accomplished some of the work of reframing the Zika narrative to generate greater community support and action. Interestingly, their work was published in November of the previous year, and it seems that both teams were working on their respective research at the same time.

Sorenson, Jordan, and LaDeau

Published in *Cogent Environmental Science*, the article, "Reframing Communication about Zika and Mosquitoes to Increase Disease Prevention Behavior," by Sorenson, Jordan, and LaDeau is the first to offer consideration of the rhetorical effectiveness of publicly available Zika communication materials. Researcher and head author of the study, Amanda Sorenson, is a postdoctoral research associate at the University of Nebraska researching human ecology. Rebecca Jordan is an associate professor of environmental education and citizen science at Rutgers University, and Shannon LaDeau is a disease ecologist at the Cary Institute of Ecosystem Studies who specializes in biodiversity, arboviruses, urban ecology, and mosquitoes.

Their study utilized Frame Theory to evaluate Zika information designed for a general audience and distributed in the spring of 2016 by public health and government organizations in West Baltimore, Maryland. They used content analysis on eight documents to determine what behaviors were being encouraged. The "dominant frame valance" used in the collected documents was personal safety/individual action. Their next step was to use opportunistic sampling in local parks to conduct surveys to establish community perceptions under the frame

offered by public health and government organizations at the time, and across the socioeconomic spectrum.

Based on the sixty surveys completed, more than half of respondents believed that Zika was a particularly serious illness, but more than three quarters also believed that their risk was minimal, and had absolutely no idea what the symptoms were, or that most infected show no symptoms at all. About half of respondents claimed they intended to take preventative measures, but the measures they specifically noted are, realistically, useless. Most took insufficient action to protect themselves, and they did nothing to protect the community.

After determining the baseline, the researchers reframed the narrative to move it away from a focus on personal safety/individual action to collective action that could specifically better protect pregnant members of the community. To test whether the new framing would alter behavior, the researchers recruited 26 residents who had verified they had seen the Zika information materials being offered in West Baltimore at the time, with 12 coming from "local, multi-year mosquito citizen science program, and the remaining 14 coming being recruited at parks. The researchers started by conducting a pre-survey, then offering the newly framed narrative, and, finally, conducting a post-interview with each respondent. Most were not engaging in any preventative measures, but most stated they "were going to take action" after being offered the newly framed narrative. About half were able to link their own action to benefiting others in their community after hearing the new narrative, but the other half still only emphasized "self-protection."

The researchers determined that their study showed that preventative behavior could be positively influenced through reframing of current information. However, they also note some pretty serious limitations. They noted that "complexities between behavioral intent and actual

behavior warrants further research into behavioral intent and actual behavior in the context of mosquito control" (p. 8). While most said they "were going to take action," there was no follow up to find out if they did. Findings of their study "may only be relevant to similar urban communities" (p. 8). They also noted that personally engaging with community members to relate Zika information may be part of what made the reframing effective.

I would also argue that because their pre-survey didn't assess degree or accuracy of Zika knowledge based on the materials respondents said they had been exposed to, the narrative may not have had the impact they believe it did. It is also especially important to point out that most respondents during the initial frame analysis had no clear idea of what Zika was or why it was a threat despite the availability of informational materials in the area. Therefore, while framing is certainly a topic of high value in epidemic studies, the bigger problem in West Baltimore seems to be a complete lack of community engagement with available information.

As I've tried to show, both studies, while certainly useful, are limited, and leave numerous gaps that future research will need to fill. I intend to fill some of those gaps with the primary research I have completed and a detailed analysis and discussion of my findings. In the next chapter, I detail the methods and methodology I used to collect and organize data generated through my research in Harlingen, Texas, provide analysis of that data, and offer a discussion of the results as they pertain to my remediation of campaign materials and communication strategies.

Chapter 3: Harlingenian's Remembrance Of and Reaction To Zika Mediatization

In Chapter 2, I discussed the three major failings in communication before, during, and after outbreaks, and highlighted numerous studies that exemplify the failures themselves and the negative outcomes produced. I also included some details of the recommendations made by many researchers and study authors to help avoid specific problems stemming from ignoring lived realities, discounting social structures, and undervaluing public trust. I ended the chapter by recounting two studies published in 2018 examining public responses to Zika as a hazard.

My own research was completed in two distinct stages, and, in this chapter, I first detail the methods and methodology I used in Stage 1 to craft my thirty-one-question survey and to collect survey data through primary research I conducted in Harlingen, Texas, in May of 2019. I then offer detailed analyses of the data collected through surveying. I conclude this chapter by offering a discussion of the results of Stage 1, especially as they pertain to my remediation of previously utilized Zika protection/prevention campaign materials and communication strategies in Stage 2.

Site Selection

I began this stage of my research by choosing a research location. I chose Harlingen, Texas, because it is a small border town situated conveniently between two previous outbreak locations, Hidalgo and Brownsville. I wanted to begin collecting artifacts and data from people and places that had already been impacted by Zika because I believed they might be more likely to have relevant documents posted and available, and the residents would likely have had more exposure to information from sources other than news media and digital social networks. By the time I began my research, Zika had been downgraded as a threat to the United States, and therefore would have been significantly less of a concern to residents and public health

authorities and service providers of locations that had never experienced any direct local-borne transmission.

I tried to learn as much as I could about the location in advance so I would be able to determine which sites would be best for collecting readily available artifacts designed to function as public outreach materials. Between Google Maps, the Texas Department of State Health Services website, and the official City of Harlingen website, I was able to narrow down my artifact and data collection sites. I intended to collect artifacts from the Valley Baptist Healthy Women's Center, The Pregnancy Resource Centers of the RGV—Rio Grande Valley, Planned Parenthood, the Harlingen City Health Department, the Valley Baptist Medical Center, the Harlingen Medical Center, state and county-maintained Rest Areas, and various pharmacies. After checking public park reviews and monitoring day and time popularity using the "Live" function on Google Maps "Popular Times" widget, I chose the Harlingen Rotary Bark Park, a local dog park, McKelvey Park, popular with walkers, bicyclists, yoga practitioners, and families accessing the playgrounds, open lawn areas, and Arroyo River trails, and the Hugh Ramsey Nature Park, popular with hikers, joggers, and birders, as sites for collecting data through surveys.

Survey Construction

I spent several weeks working on the survey I would be using with the goal of collecting data from forty respondents living in Harlingen. I based the survey in part on questions used in the Winneg at al. (2018) and the Sorenson, Jordan, and LaDeau (2017) studies, trying to frame new questions to fill in some of the gaps in their research. My survey was also based in part on the seventy-two-question *Knowledge, Attitudes and Practice Surveys: Zika Virus Disease and Potential Complications* (WHO, 2016) available through the World Health Organization's

website. I wanted my survey to keep respondents anonymous while still collecting as much relevant data as possible about their demographics, to be easily accessible by Spanish-speaking respondents, and to take no more than 15 minutes to complete. To reach these goals, I asked six fellow graduate students to take the English-language version of the survey and let me know if the questions were unclear, difficult to answer, or too time consuming if open-ended. With their help, I was able to streamline the survey, taking it from a 20+ minute endeavor down to 15 minutes or less, and removing or limiting any redundant, confusing, or leading questions. The final product had thirty-one questions, including seven open-ended questions, and ten multiple choice questions with fill-in-the-blank options listed as "other." Finally, between my dissertation chair, Erin Frost, and the spouse of a fellow graduate student, I was able to get the finalized English version translated accurately into Spanish so the survey would be more accessible to any members of Harlingen's Spanish-speaking community.

Surveying

My research assistant and I were able to survey forty residents over the course of three days. We used convenience sampling primarily at three sites each day, the Harlingen Rotary Bark Park, McKelvey Park, and the Hugh Ramsey Nature Park to collect data on public perceptions and awareness of the Zika threat and related risks. Prior to arriving in Harlingen, I had put together a small packet to give respondents that consisted of an individually wrapped OFF! Deep Woods insect repellent towelette and black and white copies of the dual-language brochure, *Stop Mosquito Bites. Don't Stop Outdoor Activities* (see Figure 4). I had selected the brochure from available documents on the CDC website based on the outdoor sites I had chosen for surveying. However, after looking through the materials provided during our visit to the Harlingen City Health Department, I modified the remaining packets to include the towelette, the

brochure, and three new dual-language, full color fliers: *Zika Prevention Takes a Community. Do Your Part.* (see Figure 5); *Work Outdoors? Protect Yourself from Zika*. (see Figure 6); *Protect Yourself from Zika* (see Figure 7). When handing the respondents their compensation and materials packets, my assistant and I always asked if they had any questions and if they would please share the information in the packets with friends and family. On the last two days of surveying, we also began offering the info packets to anyone we had approached for the survey, even if they had declined the survey itself. One of the documents offered us several bundles of was a dual-language coloring book, *Vector/Vaquero Fights the Bite* (see Figure 8), which we offered to people with children at each park.

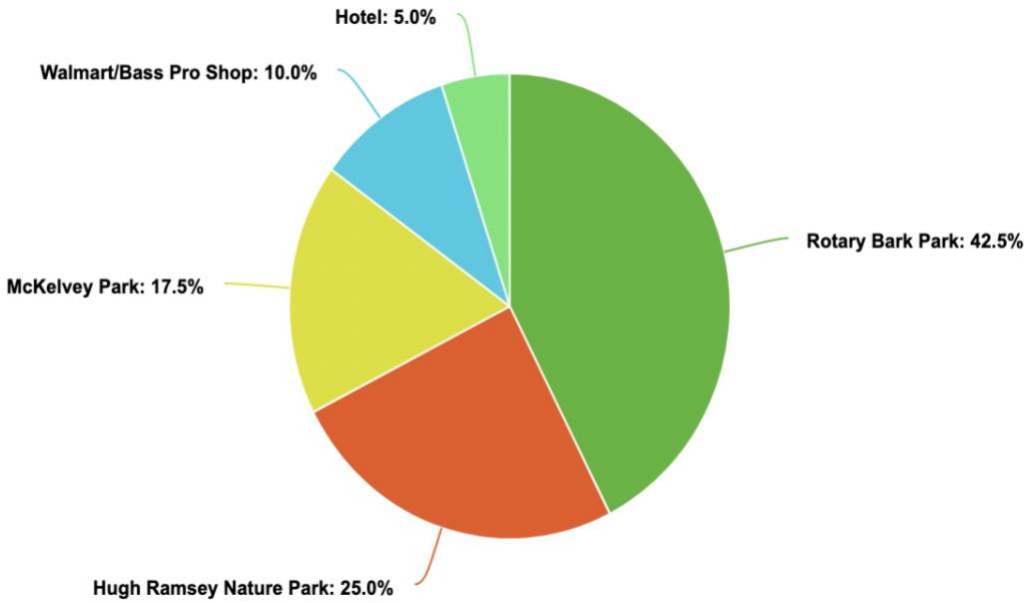
Because of daily high heat conditions in Harlingen, parks are typically open until at least 10pm and residents do not tend to visit parks until after 6pm, my assistant and I attempted to survey shoppers at Bass Pro Shop and the Walmart Supercenter during the first day. Very few shoppers showed up over the course of two hours at each location, and, between the two locations, we were only able to conduct four surveys. Several of the shoppers we approached said they simply didn't have the 15 minutes to spare, and a few others said they were just stopping to pick up things on their way to nearby South Padre Island, so they weren't residents of the city. We asked the staff at our hotel that evening if it was normal to see so few people out during the day and were told that most of the locals who go out during the day are only out because they are working or heading to or from work. The limited availability of accessible residents meant my research assistant and I were limited to around three hours of quality surveying time each evening, and we decided we would have greater luck if we stuck to the three primary locations during the busier evening hours.

As compensation for their time, we offered each of the forty respondents five dollars in cash and one info packet once they had completed the survey. We collected a total of seventeen surveys from dog walkers at the Harlingen Rotary Bark Park. Two of those seventeen respondents refused the cash compensation stating that they were "just doing their part." Only fourteen accepted the info packets, but all seventeen respondents asked for the OFF! Deep Woods insect repellent towelettes.

Our time at the Hugh Ramsey Nature Park yielded ten surveys, including the one Spanish version we collected. This time, only seven of the ten respondents accepted the cash, eight accepted and kept the info packets, and all ten kept the towelettes with most who had just arrived opening and using them immediately, suggesting that completing the survey may have triggered a more personally protective response guiding immediate decisions. Of course, it could have also just been a matter of convenience.

We were only able to successfully conduct seven surveys at McKelvey Park even though it was usually much busier. Most of the people we approached in McKelvey said they didn't

Figure 1. Survey Distribution in Harlingen, Texas



have time, a few just said, “no thanks,” and some said they didn’t know anything about Zika and weren’t interested. All seven of the people who completed the survey accepted the cash and info packets.

Many of the people we approached who declined the survey did accept the info packets even when we ran out of ones with the towelettes. Some were glad to accept an individual document, *Stop Mosquito Bites. Don’t Stop Outdoor Activities* (see Figure 4), which we had pre-folded into a more convenient and traditional “trifold brochure” ahead of time, in lieu of the full info packet. After wandering the park near our survey site, we found three info packets, but no individual documents left behind. Most people who had told us they would pick up the info packets on “the way back” did so and left the park with them.

Four surveys were, as noted previously, completed by shoppers at the Walmart superstore and Bass Pro Shop, and the final two surveys were completed by our hotel's night manager and one of the daytime staff.

Primary Survey Data Organization Methods

To analyze the surveys, I first extracted basic data using the non-identifiable participant demographic information, then I placed the thirty-one questions from the “Public Perception of Zika Research Questionnaire” into one or more of twelve categories as shown in the Survey Data Collection Chart (see appendix C). I expanded that into three primary categories with one of the initial twelve categories—"personal practices not specific to Zika”—being redesignated as demographic Information:

- Knowledge of Zika
    - Awareness of Zika as a pathogen (Questions 1, 2, 4, and 7)
    - Knowledge of how Zika is spread (Questions 8, 9, 19, and 26)

    - Knowledge of Zika communication practices (Questions 5 and 6)

- Perceptions of Zika
    - Perception of Zika as a personal threat (Questions 2, 3, 7, and 11)
    - Perception of responsibility (Questions 14, 15, 17, and 23)
    - Perception of Precautions (Questions 16 and 18)
    - Concern about specific risks (Question 10)
    - Interest in becoming more informed about Zika (Question 31)
- Response to threat of Zika
    - Protective measure taken or planned (Questions 12 and 13)
    - Protective measure intentions (Questions 20, 21, 22, 23, and 26)
    - Responding to infection (Questions 27, 28, 29, and 30)

Moved into demographics information:

    - Personal practices not specific to Zika (Questions 24 and 25)

The initial 12 categories were created based on what specific questions could be used in providing recommendations for campaign strategies. For instance, responses to question 11—"can Zika outbreaks be prevented?"—could provide information about both knowledge of how Zika is spread and perception of Zika as a personal threat because a respondent's awareness of how preventable an illness is will impact their decisions on whether to even bother with engaging in recommended prevention measures. If the campaign designers and workers realize that current communication practices are not working to convince the public that viral spread can be halted, then they can alter the campaign to place greater emphasis on individual and community ability to directly impact spread and shut the pandemic down.

I then filtered those 12 categories into three broader but more communication-minded categories: Knowledge, perception, and response. The three communication categories are based on the potential of each category to be promoted singularly or in conjunction in standard and targeted public communication campaigns using specific techniques and strategies. For instance, the communication category for Knowledge contains three subcategories which pull information from twelve questions. The responses to those questions would help designers determine knowledge gaps among the public which designers could then target specifically with new or improved campaign materials. If they also know that perception of risk is too low to promote necessary precautions, then they can enhance the sense of urgency and perception of threat through more rhetorically effective conveyance of Zika facts.

To better visualize potential relationships between data points, I used a simple coding system for any questions that seemed like they could impact other queries. For instance, time spent outside on an average day could be a standalone question, of course, but reveals new connections when considering whether those spend more time outside might also be more likely to engage with their own communities or whether one demographic was more likely to be proactive about preventing or removing environmental contributors to mosquito proliferation.

Survey Data Analysis and Discussion: Demographics

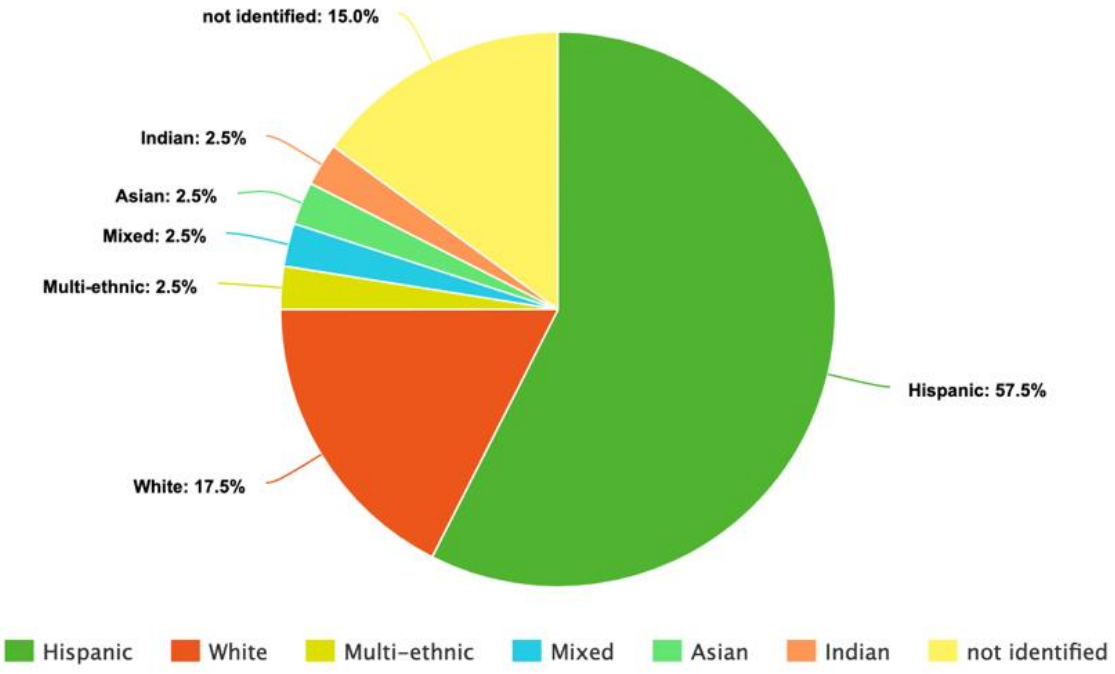


Figure 2. Distribution across race and ethnicity

All 40 survey participants responded to most questions establishing demographic data (see appendix C). Twenty-three classified themselves as females and sixteen self-identified as male. One participant left gender/sex blank but responded to all other demographic questions. Almost half were aged 18-24. Most participants acknowledged having at least one female in their household of reproductive age and three-quarters did not have anyone below 15 years-of-age living in their home. All but six participants provided information about ethnicity with 23 identifying themselves as Latino, Mex-American, or Hispanic, seven as white or Caucasian, one as multi-ethnic, one as mixed, one as Asian, and one as Indian. The six who did not claim any ethnicity all self-identified as females between the ages of 18 and 34. Most had some college education. 65% of Hispanic participants and 91% of non-Hispanic participants were college educated. While this is significantly higher than the national average according to the American Council on Education (ACE, 2021), it is worth noting that there are eight colleges/universities

including two in the Texas A & M system between Hidalgo, Brownsville, and Edinburg counties, all within 50 miles of Harlingen.

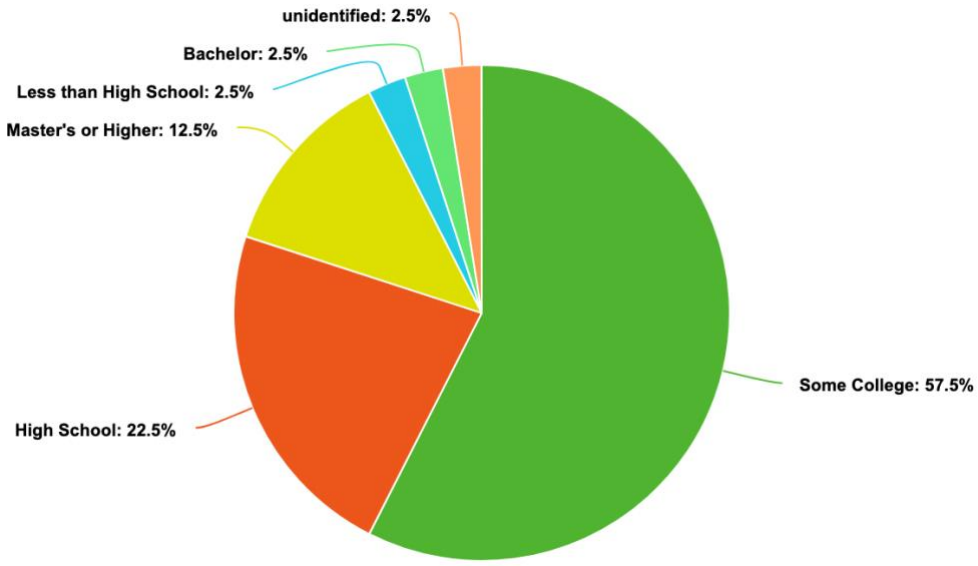


Figure 3: Distribution across levels of education

Survey Data Analysis and Discussion: Knowledge of Zika

Unfortunately, higher-than-average education levels may not contribute to awareness of past regional outbreaks even if recent or retention of knowledge about Zika, risks associated with Zika, or mosquito bite prevention. According to participant responses, all but one had heard of Zika, but only 72% were aware that there had been outbreaks of Zika in Texas. Only one participant had known anyone diagnosed with Zika during the outbreak. I received 34 responses to the open-ended question, "What can you tell me about Zika" (see question 4 in appendix C). Of the 34 responses, 28 were correct[3] with 27 responses specifically motioning spread by mosquitoes, 13 mentioning that Zika is a virus, and 10 mentioning birth defects. Three responses

[3] My determination of "correct" verses "incorrect" responses from stage 1 questionnaire participants is based on whether CDC research and collected data has deemed the information valid. If so, I classify the response as "correct," if not, I classify the response as "incorrect."

used the words “microcephaly,” “head size,” or “encephalitis,” while six used the word “pregnant.” Only one participant included knowledge of sexual transmission in their response.

All participants of stage 1 surveying offered some response to the question of how they first learned about Zika. As shown in figure 4, most first heard about the virus from various news segments on TV. Only five participants remember first learning about the virus through print media. Surprisingly, social media was only the second most cited source of novel information. As a follow-up to the question of where they first learned about the virus, I asked if anyone could name a specifically memorable source of Zika information, and, while 14 had nothing they could offer, 10 remembered specific print documents. Another five noted TV segments and two more noted online sources. Though I could not ask at the time, I wonder now whether those who did not list physical Zika information documents had engaged with any prior to being handed the

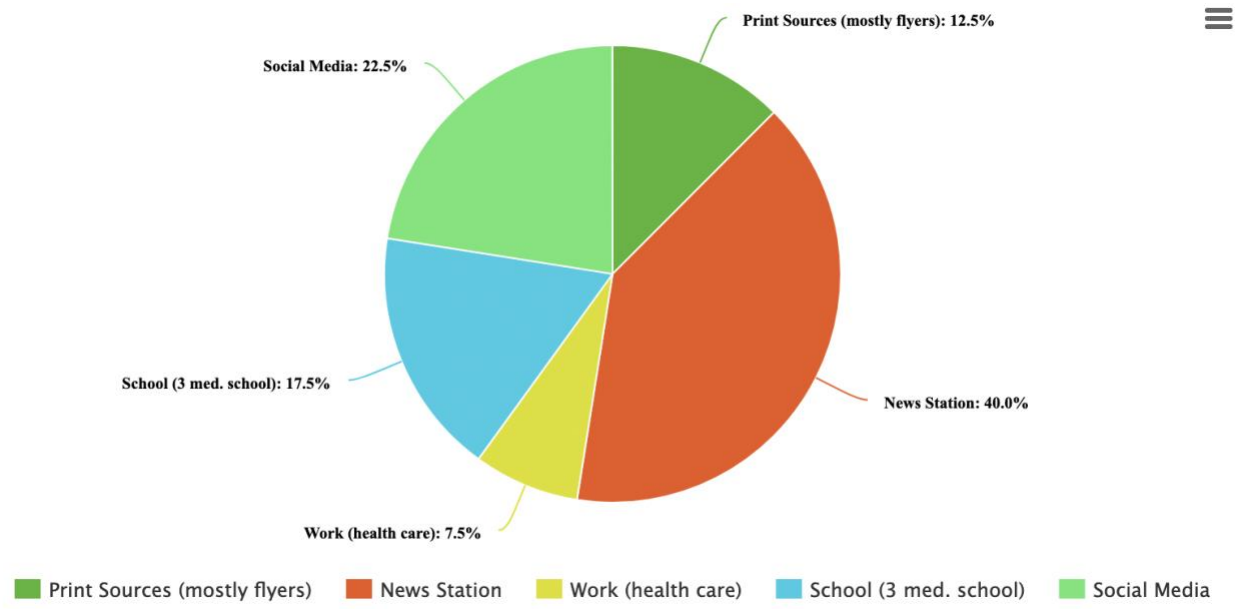


Figure 4. How/where did you first learn about Zika? (see question 5 in appendix C)

packet I offered at the end of each survey. Volumes of studies have been undertaken to better understand if/how memory is affected by combining various other senses with haptic sense, and I have yet to find any conclusive study showing whether long-term recall is truly improved

through the combination of sight and touch in relation to texts like flyers and brochures, but it does strike me as significant that so many were able to remember physical informational texts about Zika.

While knowledge of Zika as a virus is important, so is knowledge about the vector. To determine participant awareness of threat from the vector itself, I inquired about what the residents of Harlingen understood as "mosquito season." Out of 32 respondents, 10 believed Zika posed a threat for only three months a year because that was when they remembered mosquitos being active, whereas nine believed it was a threat for a full 12 months, "especially in South Texas." Of the remaining respondents, six believed Zika could be a threat for six months a year, three believed it was a threat for up to nine months, and two believed it was never a threat. According to the Texas Mosquito Control Association (n.d.), "there are more than 80 kinds of mosquitoes in Texas," and "mosquito season is nearly year-round in many parts of Texas," so those whose answers were within the nine-to-12-month range are correct. Naturally, the threat of being bitten by a Zika infected mosquito is as dependent on time of day as time of year, so I added a question about what time of day people believed they were at the highest risk of infection. Twenty-nine respondents did not know that Zika carrying mosquitoes are primarily daytime biters but three others did (see question 8 in appendix C).

The final method I used to determine knowledge of Zika and its primary vector was to include another open-ended question (see question 19 in appendix C). asking what participants thought were the three most effective ways of preventing Zika. This question also came after two other questions about what steps they would actively take to prevent Zika in which they checked off items in extensive lists of common practices. Thanks to the arrangement of the questions, participants did not have to rely as much on extended recall to respond effectively. The most

common prevention methods they listed were use of mosquito repellents, education, and fumigation. I was pleasantly surprised that so many participants noted education as a primary tool in pandemic prevention. Unfortunately, by not including this question closer to the beginning and providing a similar question near the end of the survey, I cannot say whether there was true acquisition of knowledge resulting from completing prior parts of the survey. This is a problem rectified in stage 2 of my research.

Survey Data Analysis and Discussion: Perceptions of Zika

As previously noted, 39 participants claimed they had heard of Zika, but only 72% were aware that there had been outbreaks of Zika in Texas. As shown in figure 6, this may correlate with the 71% of participants who believed their odds of contracting Zika were low or non-existent, as perception of risk may be linked to their not having known anyone personally who had been diagnosed with the pathogen during the regional outbreak. Only one participant had

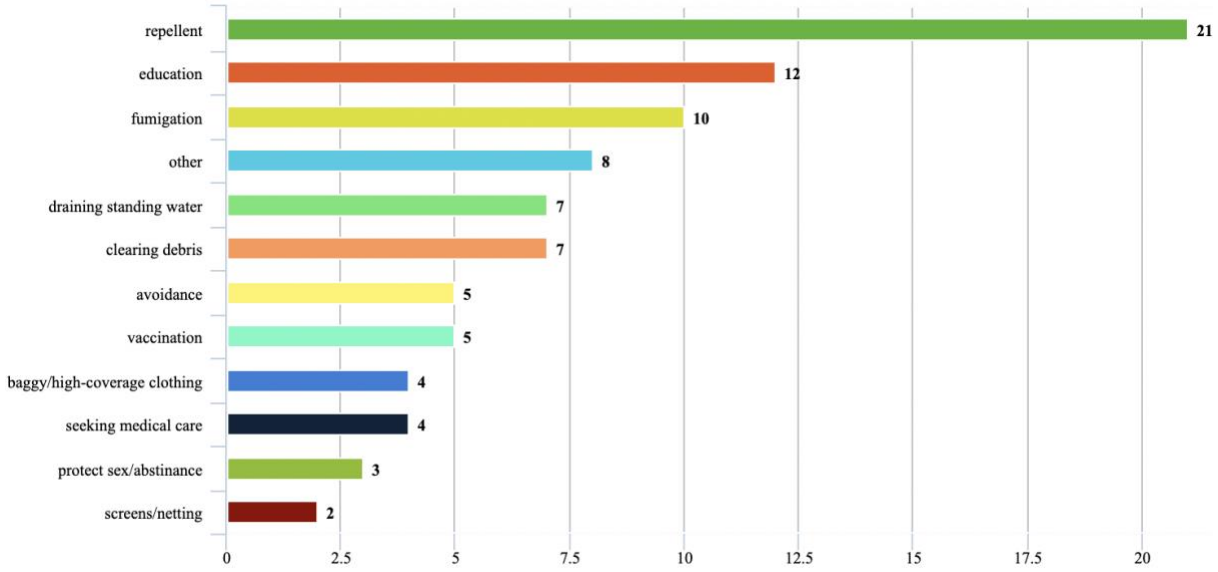


Figure 5. Best methods of prevention according to participants

known anyone diagnosed with Zika during the outbreak. He was a male over 55 whose primary concern with Zika was the risk of potential birth defects and complications if his daughters got it

and he believed his own odds of contracting the disease were low. Education level appears to have limited if any real effect on threat perception. The participants perceptions of danger or threat may also have been shaped in part by the lack of news about Zika in recent media and few easily noticeable visual reminders of the yesteryear Zika threat.

An important aspect of assessing public threat and risk perception is determination of what the public perceives the risks to be. To understand which potential risks of contracting Zika mattered most to residents in Harlingen, I asked participants to select which of four options they would be most worried about and why. The options were: flu-like symptoms, developmental problems of a baby born to a mother infected with Zika, Guillain-Barre syndrome, or "other." I received 55 responses, meaning some respondents selected more than one primary concern. While some did not give a reason for their choices, most were able to explain in 15 words or less why they were worried about a potential risk.

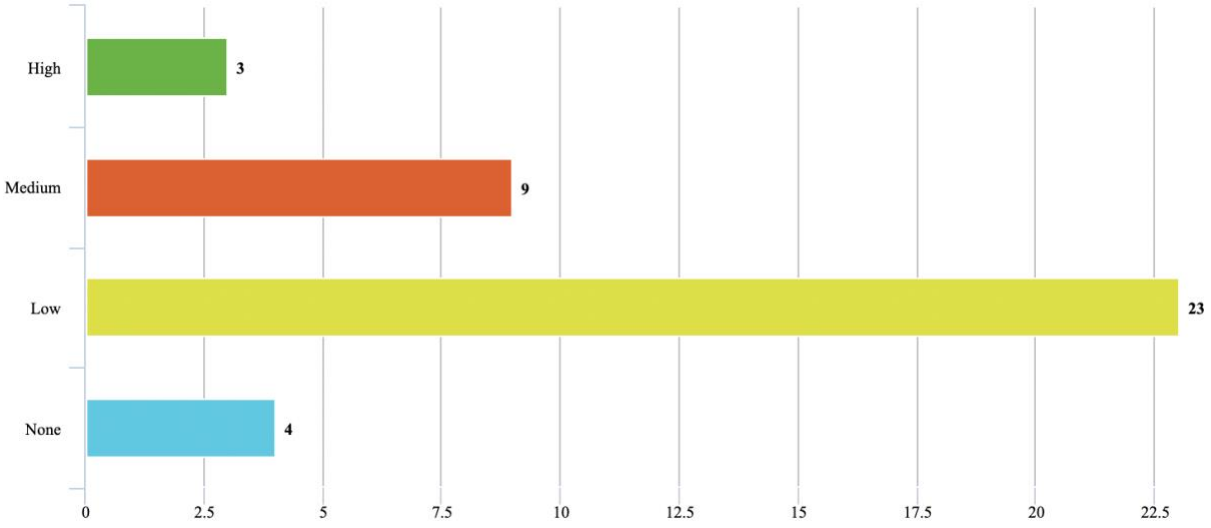


Figure 6. Perceived level of threat

Eighteen participants selected flu-like symptoms as their primary concern. While five gave no explanation for their choice, 13 did. While I do not want to invalidate specific responses, I do want to point out that there are some problems with specific responses, including "fighting

off bacteria" and "it's in the valley."[4] Of the reasons offered (see question 10 responses in appendix C), five reference the potential to write of symptoms as something less severe than Zika, one worried about the potential for greater spread, two were worried about the severity of those symptoms because of their advanced ages, one was worried about becoming dehydrated, and one was worried about their family's "weak immune systems." When designing the question, I had believed many respondents would be worried about the flu-like symptoms because of the potential for missing work or just not feeling well, and I remain shocked that no one responded with such answers.

Of the 55 responses, 24 selected developmental problems for babies born to infected mothers as their primary concern. Because this stage of the study was completed in Texas, I was surprised more had not selected this option. Once again, five were unable to explain their reasons for selecting this option. Of those who were able to offer explanations, two were concerned because of pregnancies in their family, three worried about the child's future health and happiness, six expressed concerns for the health of the mother due to potential complications, three more worried about the potential for birth defects in general, and another six worried of further contagion. One participant response was particularly interesting because their concern was based on encountering the problem associated with their work in healthcare.

Only five participants selected the potential for developing Guillain-Barre syndrome as their primary concern, and one of those five only because they were "unfamiliar with it." Only two of the five provided responses related to understanding what Guillain-Barre is. One wrote that there was a potential for death associated with the syndrome, and the other that their

[4] Referring to the Rio Grande Valley.

grandfather had suffered from it before death. Two participants selected "other" and offered explanations of "more viruses" and lack of insurance.

Participants were divided on whether they believed Zika outbreaks were preventable. While 23 of those who responded to the question believed an outbreak was preventable, the remaining 17 were split between the options for "no" and "maybe." Of those who selected the "maybe, because" option, seven included some rationale for their choice. Five rationales suggested some degree of personal and/or communal responsibility for prevention, such as with

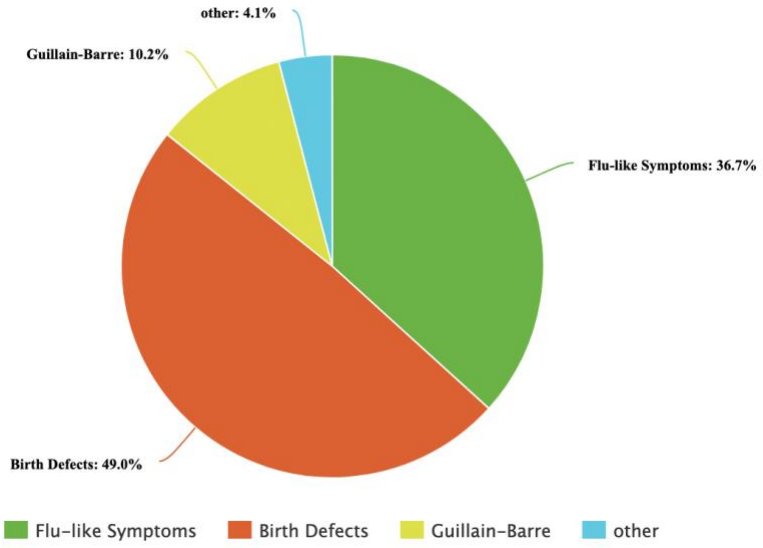


Figure 7. Primary concerns associated with infection

the response, "if people would just keep water out of places that would collect AND if they wear something to protect them." One noted the potential for a vaccine as a determining factor of outbreak prevention, and others noted the need to "be on top of it" and prevention education. Interestingly, there was no consensus about who should be responsible for sharing information about Zika or preventing its community spread? Though 30 believed more actions should be taken to prevent community spread, only 26 believed that prevention was at least partly their

own responsibility, and eight indicated that they would do nothing at all to prevent possible infection.

Questions of perceived responsibility for information sharing and outbreak prevention offered a glance into how individuals not only perceived sense of agency but also community cohesion. According to psychologist James Moore (2016), "agency plays a key role in guiding attributions of responsibility," and our sense of agency is a mental construct that can be easily manipulated, allowing for separation from the "facts of agency." This means that there are several potential factors of Zika awareness that can lead to manipulation of senses of agency, and they can all be separated from the facts of vector-based community spread of pathogens. One such factor is that mosquitoes exist and have proven difficult to eradicate despite decades or more of concerted effort. Some responses from my study participants even suggest that being transmitted by mosquitos makes outbreaks not only unpreventable, but even uncontrollable. If the facts supported the impossibility of vector control and pathogen prevention, then we would have significantly more cases of things like West Nile, Chikungunya, and a host of other illnesses including Malaria every year in the United States, especially Texas which has seen its share of both West Nile and Chikungunya. This perception also largely ignores the existence of insecticides and repellents available even at gas stations and grocery stores. Prevalence, accuracy, and packaging of information about not only Zika, but vector-borne disease spread in general could greatly improve sense of agency through education of broader publics.

This is especially important when it comes to media framing of information in news articles shared online through social media and widely circulated television/radio segments. As already noted, while many found print documents more memorable in general, participants also reported their first exposure to information about Zika being through internet and TV. The too

frequent portrayal of the virus as a disease closely associated with Hispanic and Latin populations has led to sense of agency problems linked to blame of outsiders. For instance, I had a family member comment during the first six months of United States outbreaks of Zika that it was a "Mexican disease," and, when asked "what do you believe are the 3 most effective ways of preventing the spread of Zika," one of my study participants wrote, "border control." Blaming others has a decidedly negative effect on personal agency, and when one's sense of agency declines, so too does their perception of personal responsibility because, if the situation is out of one's control, then that person should not be held responsible for the outcome. More importantly, blaming specific groups leads to stigmatization, isolation, distrust, scapegoating, bullying, and outright violence against those groups. Such immoral and anti-social behaviors directed at marginalized and maligned populations has been well documented during times of crisis, most recently during the SARS pandemic (Ding, 2014; Eichelberger, 2007).[5] As such, it is a relief that only one of my participants seemed to blame Zika on human migrations over Mexico's border.

Of the 40 participants for stage 1, eight indicated that they would do nothing at all to prevent possible infection. Six of those eight also did not believe Zika could be prevented and two believed they were not at risk. Consequently, when asked "who should be responsible for preventing the spread of Zika in your community," nine participants also claimed no personal responsibility for prevention, though I did not check to see if or how many were part of the same group of eight. Thirteen participants believed that the responsibility for sharing information about Zika fell to others, not themselves, their families, or their friends, and amusingly, three participants who did not believe it was their responsibility or the responsibility of their friends or

[5] Violence against Asian and Asian-American populations in the US is ongoing as anger, fear, and political propaganda have led to blaming the COVID-19 pandemic on China specifically and people of Asian appearance more generally.

family to share information or engage in prevention did believe both responsibilities fell to their neighbors. Unfortunately, keeping the survey reasonably short meant leaving out questions of why they believe particular groups bore responsibility, so there is no way to know if they believe their neighbors bear greater responsibility simply because they are health care workers, researchers, local officials, or some other arguably knowledgeable person with greater personal agency. Though eight participants claimed both no responsibility for information sharing and prevention, and that they would do nothing to protect themselves from Zika, only four of them checked the box indicating they would do nothing to protect their community, and no one checked the "not my responsibility" option. These results could indicate that participants who did not select themselves as an option in the responsibility questions do not view themselves as denying personal responsibility without outright choosing "not my responsibility," but rather as individuals lacking agency.

For the question of perceived responsibility for prevention, I provided 13 options (see question 15 in appendix C and Figure 5), and examining the data revealed no clear pattern to selection of responsible entities outside of self, family or friends, and neighbors. Twenty-six participants believed they held at least partial responsibility. Two participants only selected the "self" option, taking sole responsibility for prevention, while only ten checked the box indicating responsibility fell in part or wholly to the CDC or WHO. This is interesting because 17 indicated they believed that the CDC is responsible for sharing information in their community. This suggest that more people may regard the CDC as a research entity rather than a direct health care entity.

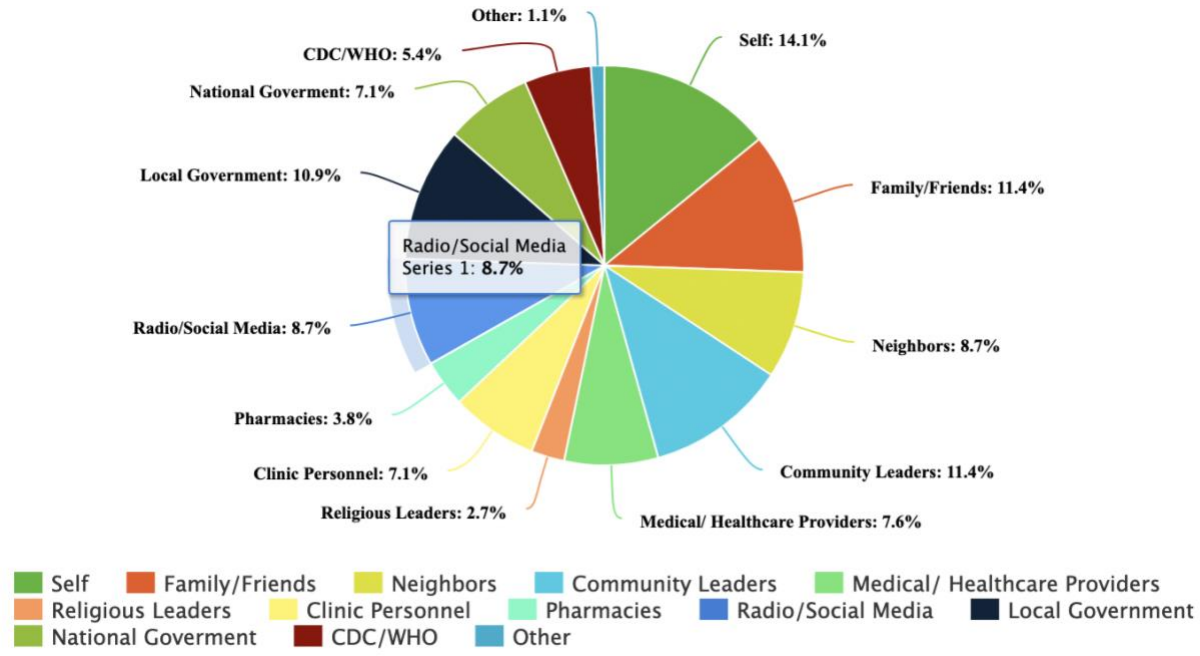


Figure 8. Perception of shared responsibility for prevention of Zika

Overall, it is a good sign that most respondents see prevention as a shared responsibility as evidenced by Figure 5. I had anticipated pharmacies and medical/healthcare providers would bear a higher share of perceived responsibility and remain astonished that so few people believed either should be responsible for active prevention. 65% of respondents see themselves as part of the solution to outbreaks, however, it is also troubling that 35% don't see themselves as part of the solution, meaning up to 35% may lack a sense of agency when it comes to solving vector-borne pandemic problems. It is also important to note that, just as nine participants claimed no personal responsibility at all for community spread prevention, nine participants also claimed only rare engagement with others in their community.

Community engagement is an important factor of outbreak and pandemic prevention and management. Community engagement helps with development and promotion of compassion, pride of place, and social cohesion as suggested by studies highlighted in the community matters section of Chapter 2. When we care about other members of our communities, we are more

willing to practice habits and follow rules that make the community stronger and protect the collective. It is troubling that seven participants admitted to being worried about what might happen if members of their communities found out the participant was diagnosed with Zika. Another four participants were uncertain about whether they would be worried about others finding out. Reasons given for their responses included avoidance by others, others around them being worried about their own health because of those infected, “backlash,” “segregation,” and “because I don't believe others are aware of what Zika is.” These responses are certainly understandable considering other comments left regarding prevention of infection such as, “border control,” “avoiding contact with those affected,” and even the incredibly problematic, “if an outbreak have them wear a necklace or wrist band that indicates they have Zika.”

To better see potential connections between community prevention attitudes and reported behaviors, I began factoring in demographic info and non-Zika specific behaviors. Based on personal experiences with becoming more deeply engaged with my own local community by spending a lot of time outside in the neighborhood and around town, I thought there might be a connection between how much time participants sent outside and how often they reported associating with other members of their communities. Thirty-four of the 40 participants acknowledged spending at least one hour per day outside most days of the week, and only one person spent time outside as part of their job. However, how much time they spent outside seemed to have no noticeable link to community engagement, as only 17 claimed to associate with members of their own communities often, 14 engaged with community sometimes, and nine only rarely. There were also no major differences in time spent outside or community engagement based on age or education, but I did notice that Hispanic males were significantly

more likely to associate with others in their communities than self-identified Hispanic females or non-Hispanic individuals.

Despite the lack of connections between time spent outside and community interaction, those who did report being engaged with their communities sometimes or often were also much more likely to show concern for community members who were diagnosed with Zika, noting that they would not only check on, but might even try to assist anyone who had contracted Zika locally. This sense of social cohesion is likely the result of webs of empathy connecting residents who have come to know one another through interaction as suggested by empathy research and contact theory (Dovidio et al., 2005; Pettigrew, 1998; Zaki, 2021). Only four participants claimed they would avoid anyone that they knew had Zika. Roughly three quarters indicated that they would more actively engage in preventive measures if they learned that Zika had made its way into their community, and everyone would seek medical care if they suspected they had contracted the virus. While it is great to know that an immediate, local outbreak would spur increases in proactive behaviors and expression of community care, the ideal time engage in prevention is prior to outbreaks, as recognized by participants, not during or after outbreaks.

All 40 participants believed it was worth taking action the prevent Zika outbreaks, an interesting discovery since even the eight people who believed outbreaks could not be prevented and would not engage in prevention still believed it was worth trying to prevent them. I feel quite confident in this assessment as the first option for the question “do you believe it is worth taking action to prevent Zika before, during, or after an outbreak is reported,” is that it’s “not worth trying” (see question 16 in appendix C) and no participants selected that option. A full 50% believed it was worth taking action before, during, and following an outbreak, but 98% believed it was at least important to take some action before an outbreak had a chance to occur.

Survey data analysis and discussion: Responding to the threat of Zika

Part of taking action, is seeking out a medical evaluation whenever someone suspects they have become infected with Zika. This is especially true since the method of transmission may make a period of social isolation less reliable as a form of intervention. Two of the questions participants were asked during the Harlingen stage of my study was who they would seek more information from if they were worried about catching Zika and how they would respond to suspected cases of Zika. As indicated in table 1, all the respondents indicated that they would seek medical care at a local emergency room or with their family doctor or health clinic rather than wait to be more certain, treat it from home, or simply go on with their lives as usual. Female participants were twice as likely to seek care at the emergency room rather than wait for an appointment with their family doctor or at a clinic.

Breakdown of Q 28: Responding to suspected infection						
	ER	**DR**	**wait**	**home**	**nothing**	**other**
Hf	**5**	**7**				
Hm	**7**	**8**				
Nf	**3**	**4**				
Nm		**4**				
-F	**5**	**3**				
--		1				
Male VS Female **ER | DR ER | DR** **7 12 13 14**						
ER = Emergency Room | DR = Doctor's Office						

Table 1. Seeking health/medical care

If concerned about but not necessarily suspecting an infection with the virus, participants also indicated that they would seek out more information. To respond to this question (see question 27 in appendix C and table 2), they were asked to check off which sources they seek

information from among the options of family, friends, health care workers, the internet, or "other." Only one participant would consult family, and all other participants only checked that they would consult health care workers and/or the internet. Males were significantly more likely than females to consult the internet for answers and information about Zika. While reliable information about the virus can be found easily on the internet, there is also an abundance of incorrect information, gossip, as well as nationalist, anti-government, and anti-corporation conspiracy theories and fearmongering.

BREAKDOWN OF QUESTION 27: WHO WOULD THEY ASK

	Family	Friends	HCW	Internet	Other
Hf			SSSHHSSHMS	HSH	
Hm	H		HSHSSHSH	SSSHSSSH	
Nf			HMSSS	MMSS	
Nm			S	SMS	
-F			SMSS	SSS	
--					L "Alexa"

Hf = Hispanic Female | **Hm** = Hispanic Male | **Nf** = Non-Hispanic Female | **Nm** = Non-Hispanic Male
-F = Female Unidentified by Race/Ethnicity | **--** = Human w/o further identifiers

L = less than high school H = high school or equivalent S = some college M = Masters +

Age ranges: 18-34 | 35-54 | 55+

Male: 9 HCW | 11 Internet VS Female: 19 HCW | 10 Internet
56% 68% 82% 43%

HCW = Healthcare Workers |

Table 2. Who would respondents turn to for more info or diagnosis?

Of course, the core of this study is to find better ways of encouraging prevention. As the proverb goes, "an ounce of prevention is worth a pound of cure." When asked which methods of Zika prevention they have used to protect themselves from Zika, participants were offered a total of 21 options. Three of the options were easy exits from the list: "not at risk," "nothing," and

"other." While one participant believed they were not at risk, seven others seemed to believe there was some risk attached to Zika but selected "nothing." Only one person chose "other" and wrote "vigilance" in the available blank space. One of the 21 options was intended to be a default option to test whether participants were fully reading the list. I labeled the default "mark this option no matter what," but only five people selected it, so I don't know if I fully trust their degree of focus from that point forward. Five options offered were intentional additions of unproven preventive measures I label as incorrect for assessment purposes based on their not having been approved by the CDC or listed in CDC or WHO guidelines for prevention. Those options were: growing catnip or mint, using fire or smoke, using citronella or other plant derived deterrents, playing loud music, and eating garlic and/or pickles. The final 12 options were all CDC approved methods of Zika prevention and were commonly listed in most CDC print materials. The most frequently selected correct responses were mosquito net with 27 responses, avoiding watering laws or using water features with 22 responses, and abstinence or condom use with a total of 20 responses. The most frequently selected incorrect response was playing loud music which had 17 responses. Unfortunately, the high selection rate of playing loud music makes me further question the validity of results for this question. Figure 9 further reveals the distribution for this question. (see Question 12 in appendix C for further details).

Questions 17 and 13 were geared toward community prevention and protection. Question 17 was an open-ended question asking about preventive measures taken by others to protect the community itself. I placed the total of 27 unique responses into five basic categories: educational outreach with 12 responses, removal or treatment of standing water with three responses, city fumigation with nine responses, solo control through repellent use with four responses, and no actions which ended up with eight responses. Question 13 was a closed question and asked what

the participant had one or would do to protect their community. It featured 20 questions, many repeated from question 12 but without the loud music option, the default question, and the garlic/pickles option. Three of the 20 choices were not selected by anyone, including “not at risk,” not my responsibility,” and “not sure.” The individual who selected “not at risk” for question 12 did not respond to question 13 at all. As mentioned previously in the chapter, everyone who did respond seemed to believe the bore at least some burden of community prevention. The most common responses this time were wearing repellent which had been selected by 21 participants, clearing debris selected by 17 participants, and cleaning gutter and water treatment were each selected by 15 participants.

As revealed by comparing figures 9 and 10, the visual representations of question 12 about self-protection/prevention and question 13 about community protection/prevention, there seems to be odd discrepancies between practices participants claim they will engage in for the community that they apparently would or would not be as likely to engage in for themselves. Once again, the results of these questions, especially as compared make me question the validity of either. This is unfortunate, but the more specific yes, no, and why format of similar questions ranging from questions 20 to 23 shed some light on planned engagement with preventive measures by providing more trustworthy responses.

Question 20 asks if the participant plans to use larvicide, fumigation, or mosquito/larva consuming animals to prevent Zika over the following three to six months. Twenty-four answered yes, 12 answered no, and five stated that they were opposed to using those strategies for environmental or personal reasons.

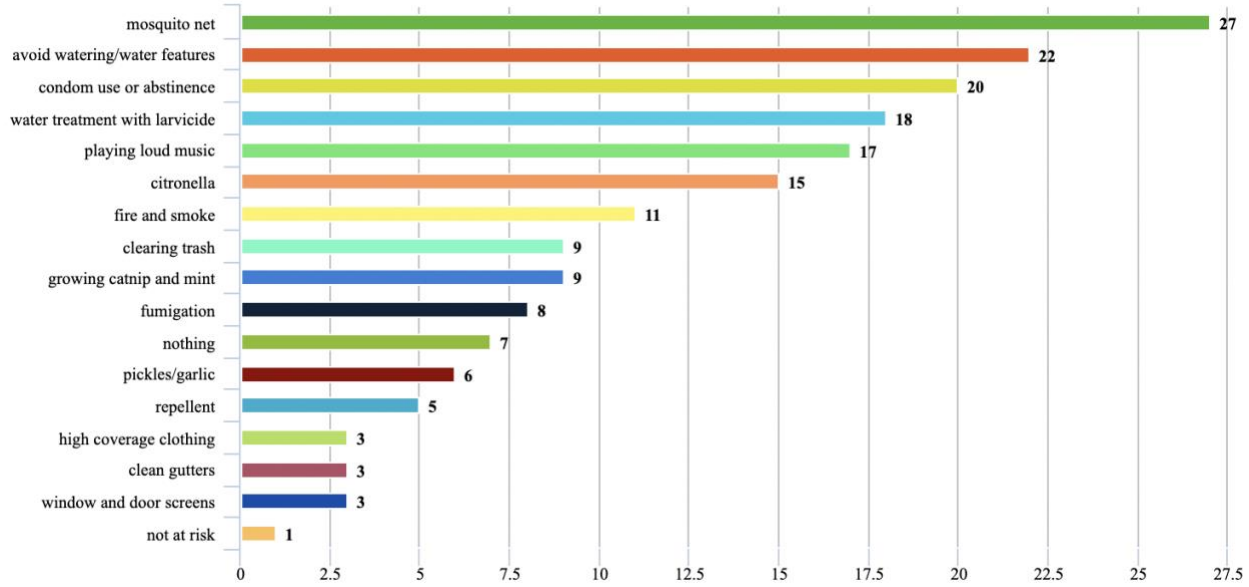


Figure 9. Self-protection strategies planned

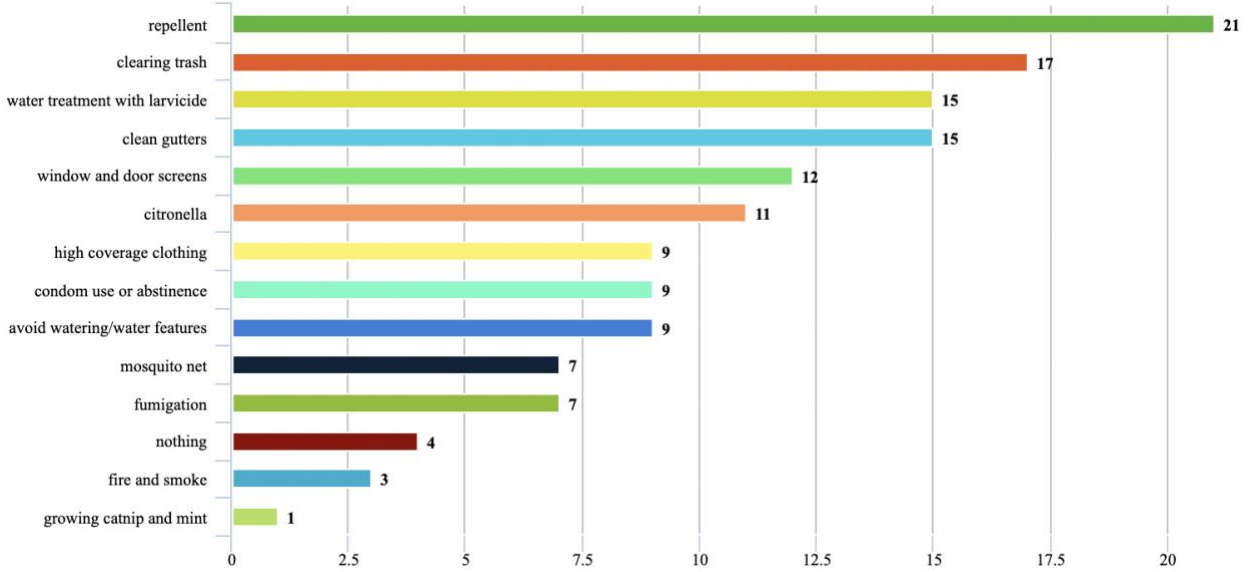


Figure 10. Community protection strategies planned

Question 21 asks about their planned use of mosquito repellent over the next three to six months. Thirty-two said yes and five said no. Those who said no also selected reasons for not using repellent from a list of common reasons. One checked of no because they dislike the way it feels or smells on their skin. Two said they don't like using chemicals on their bodies, while

another said they were allergic to it. Two more said no because they just don't think about it, and one said repellent was too expensive.

Question 22 asks about plans to avoid watering lawns, using water features, cleaning and treating rain barrels, and cleaning gutters. Twenty-four claimed they would do all of those things while 14 said they would not. Of those who did not plan to do those things, five said they didn't have access to any of the things on the list, two said there were rules preventing them from engaging in those strategies, two more said they didn't want to ruin their lawn or detract from the beauty of their yard, one didn't have time, one didn't have tools, and the last three said the simply do not think about/remember those to do things.

Question 23 asks about plans to clean up debris and remove trash that may accumulate water. Thirty-three participants agreed they had plans to do so. The other six checked no. Two respondents wrote in that they couldn't because they are surrounded by fields that often accumulate standing water. One said it's not their responsibility, one didn't want to trespass, and two claimed that community groups already did the job in their neighborhood. (see question 23 in appendix C for the rest of the listed, unselected options).

The final question in the prevention category of responses to the threat of Zika is number 26. It asks about which prevention strategies participants plan to engage in over the following three to six months. By this point in the survey, it seemed like opinions of the most effective strategies had shifted for the better, but responses also showed some still did not fully understand Zika and its transmission. I provided 11 possible selections for this last prevention question and included strategies that to be useful for more common viruses, including cold and flu viruses, but that would have no effect on an arbovirus like Zika. These options included mask and/or gloves,

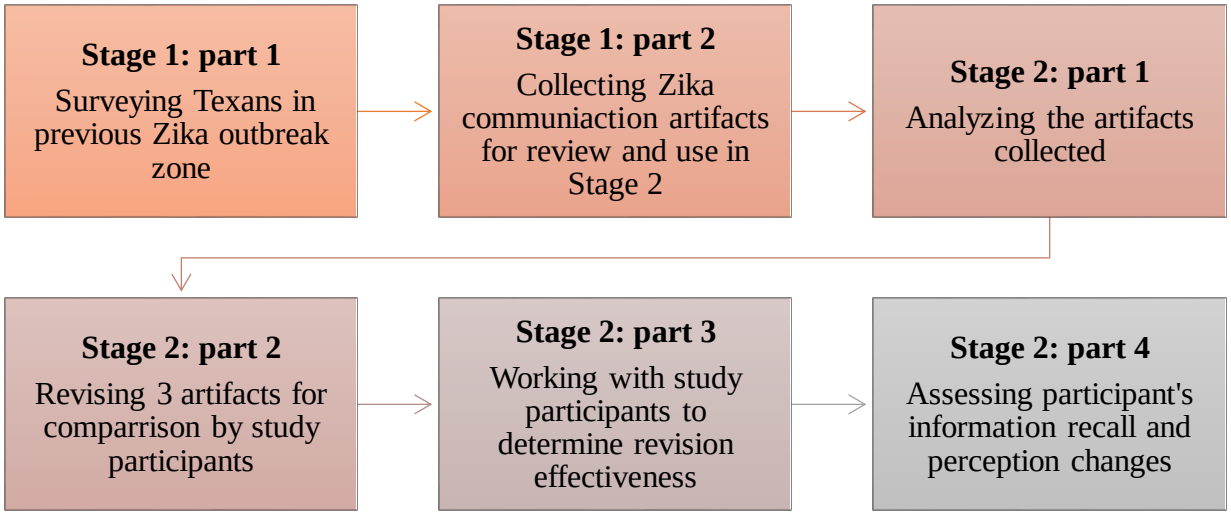
medications, hand sanitizer, and more frequent hand washing.[6] The most common responses this time had low selection rates in previous questions. Where high coverage clothing had rarely been selected before, 23 had selected the option this time. Using windows and door screens was the second most selected of the "correct" options this time with 22 participants checking it off, and mosquito nets came in third with 14 people selecting it. The biggest change from previous, similar list was that I excluded repellent from the list but offered and option for "other" with room to write in a unique response. Nine participants wrote in repellent as their "other" option. While I believe the change in attitudes toward the preventive measure is quite positive, their selections did show I high level of misunderstand how Zika is spread. The most popular option overall was hand sanitizer with 24 checks. Frequent handwashing garnered 14 checks, masks and gloves earned two checks, and medications got four. I sincerely hop those numbers bore out when COVID-19 eventually descended on Harlingen. (see question 26 in appendix C for a complete list and selection rates).

While the surveying of Harlingen residents yielded intriguing results those results would ultimately prove less useful for revision of pre-existing documents than anticipated but would be very beneficial for the construction of new educational/informational materials as discussed in the conclusion

[6] It is interesting that I added the methods of prevention that would become the standard strategies employed against the spread of COVID-19 a year later.

Chapter 4: Analyzing and Remediating Zika Communication Documents to Improve Efficacy and Examining the Effectiveness of Remediation

In chapter 3, I detailed my methods and methodology as related to survey construction, distribution, and data analyses of Stage 1 of my study. I concluded the chapter by offering a discussion of the results of the survey portion of Stage 1, especially as those results pertained to my remediation of previously utilized Zika protection/prevention campaign materials and communication strategies. In this chapter, I first provide information about my Zika public communication artifacts (visual and physical documents) collection methods and then detailed analyses of seven of the artifacts collected. After that, I move into Stage 2 and discuss my document remediation strategies and products. I then provide my methods, methodologies, and results of focus group reviews of original and revised versions of three of the seven artifacts I initially analyzed.



Artifact Collection

After obtaining approval for my research, my research assistant and I traveled by car on route I-10 to Houston and then I-69 to Harlingen, Texas, arriving on May 5th, 2019. To help

determine if Zika was still perceived as a potential threat throughout Texas, we stopped at every state and county provided and maintained Rest Area from the Texas border to Harlingen, checking each for any posted information on Zika or other vector-borne pathogens. We were unable to locate any posted information despite the sites being primarily intended for use by travelers who may be less aware of such risks. The lack of posted material may suggest that Texas authorities believed there was no longer any threat to the state's residents or visitors from Zika. We did, however, pass a single Zika "advisory" billboard next to the interstate sponsored by TexasZika.org, Texas Health and Human Services, and Texas Department of State Health Services. We also stopped and checked several chain pharmacies such as CVS, a few Walmarts, and two H.E.B. grocery stores, but none had any information about Zika posted or available. In Harlingen, we went to all intended artifact collection sites, but only two had any information posted: The Pregnancy Resource Centers of the Rio Grande Valley—listed simply as RGV on the artifact—and the Harlingen City Health Department (see Figure 11).

Despite not locating posted information in eight out of ten sites, I was able to gather several documents from three locations when I asked front-desk workers if they had any Zika information available. The front-desk worker at the Pregnancy Resource Centers of the RGV was able to offer an accordion-style, pocket-size unfolded info card, *Zika Virus Prevention* (see Figure 12), that was provided to the center by the Cameron County Department of Health and human services. The card highlights what Zika is, a few facts about it, mosquito breeding and bite prevention tips, info on what to do "if you have Zika virus," and a segment on "build your own Zika virus prevention kit." The Valley Baptist Healthy Women's Center did not have any materials they handed out to women, but they did offer me an info sheet the nurses were supposed to use for screening patients with flu-like symptoms, the *CDC's Response to Zika: Zika*

Screening Tool for Pregnant Women (see Figure 7). The Harlingen City Health Department had one Zika information document on display in the waiting room (see Figure 1), *Simple Steps for Texans to Prevent Zika*, a dual language info card provided by the Texas Department of State Health Services with six "simple steps to protect yourself and your loved ones from the Zika virus."

Despite a previously failed attempt to contact the Harlingen City Health Department in advance to arrange an interview, on the first full day my research assistant and I were in Harlingen, I stopped by the Health Department office to collect available artifacts and find out if I could speak with anyone about how the threat of Zika and its associated risks were communicated to the public after the initial outbreak, and whether Zika was still considered a threat to local communities. I was able to secure a brief meeting with Ronald D. Tyler Jr., the Zoonosis Control Veterinarian of Health Service Region 11 in Harlingen at 3:30 that day. I returned a bit early and waited in the lobby. This gave me an opportunity to look around for any artifacts on display there. There were pamphlets, info cards, and flyers on the center table in the lobby covering a variety of topics including Zika. Despite not having any newly reported Zika cases in Texas, the staff apparently still believed Zika to be enough of a potential threat that it was worth taking up valuable physical communication space by displaying the "Simple Steps for Texans to Prevent Zika" flyer. Arguably, because the other significantly large

Figure 11. Health, safety, and welfare information available and on display in the Harlingen City Health Department lobby

informational display is about “calming a fussy baby,” a “protecting your family from Zika” flyer may have been more effective in this space. Tyler came through the door into the lobby from the offices right on time and excitedly provided me with three boxes of bulk packaged materials labeled “Zika Stakeholder Toolkit” as well as various other public outreach materials before even greeting me. After telling me a bit about himself and finding out more about my research, Tyler told me he had not been with Cameron County or Hidalgo County when the outbreak occurred and could not tell me much about how information had been communicated then, but that manpower to get information and materials out was often a big problem. In fact, Tyler had hoped I had a larger team working on the surveying so that the Health Department would be able to get more materials out before mosquito season was in full force. He also asked me to pass out some information on Eastern Equine Encephalitis, a vector-borne pathogen that he believed could soon pose a potential threat to Texans, including Harlingen locals. In total, Tyler was able to give me ten different Zika artifacts to work with, but no knowledge of whether any of those materials had been actively placed in the hands of the public before, during, or even shortly after the pandemic.

Artifact Analysis

By rhetorically analyzing and evaluating for the three major failings in communication before, during, and after outbreaks, I can better identify areas for improving the overall efficacy of Zika outbreak prevention campaign documents and thus revise these important tools of public pandemic communication. I begin by analyzing the “Zika Virus Prevention” accordion-style info card from the Pregnancy Resource Center in Harlingen, then “Protect Yourself from Zika” flyer, the “Work Outdoors? Protect Yourself from Zika” flyer, the “Zika Prevention Takes a Community. **Do Your Part**” flyer, and a billboard image displayed along Texas interstates. I

then offer a brief analysis of the "Vector Vaquero" coloring book and examine the language and design of the "Screening Tool" used by nurses at The Valley Baptist Healthy Women's Center.

Artifact Title	Location
"Zika Virus Prevention" accordion-style info card	Pregnancy Resource Center, Harlingen, Tx.
"Protect Yourself from Zika" flyer "Work Outdoors? Protect Yourself from Zika" flyer "Zika Prevention Takes a Community. **Do Your Part**" flyer	Zika Stakeholder Toolkit
"Tell Zika to Buzz Off" billboard	Texas interstates and highways
"Vector Vaquero Fights the Bite" coloring book	Harlingen City Health Department
"Screening Tool"	The Valley Baptist Healthy Women's Center, Harlingen, Tx.

Table 3. Document aquisition

"Zika Virus Prevention" Accordion-style Info Card

The "Zika Virus Prevention" accordion-style info card (see Figure 2) from the Pregnancy Resource Center in Harlingen has eight panels utilizing three main colors, olive, blue, and white, that are easy on the eyes and allow the print to remain clear and easy to read despite its size and the use of lighter toned images behind the text in two panels. The first panel on the front is the title panel and has a caduceus within another logo-like symbol on one half and the words "Zika Virus Prevention" on the other.

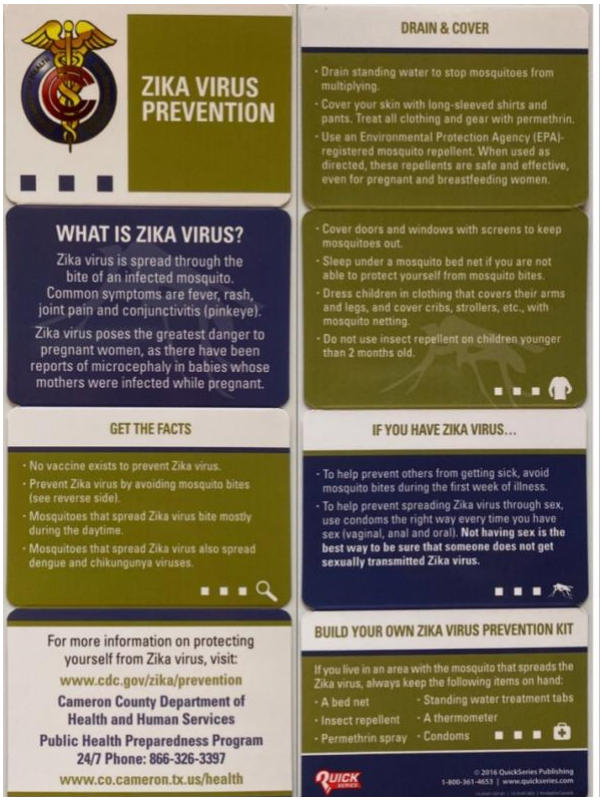


Figure 12. Accordion-style info card from the Pregnancy Resource Centers of the RGV

The second front panel has a blue background with a lighter blue image of a mosquito and white sanserif text reading, "What is Zika virus." This panel explains briefly that Zika is spread by infected mosquitoes, the top four symptoms associated with human infection: fever, rash, joint pain, and pinkeye, and that it "poses the greatest danger to pregnant women" because of the potential for birth defects. Because the info card was available through a pregnancy center, it makes sense that the focus would be on pregnant women, though one might argue that the greatest danger is to "developing fetuses" rather than the mothers, and that the more direct rhetoric of protecting one's "baby" might be more effective than protection of self to the benefit of "baby." The panel also tells the reader that "there have been reports of microcephaly in babies whose mothers were infected while pregnant," thus making an implied connection rather than confirming the link between Zika and microcephaly. This may be because causation had not yet been confirmed. The publication date of the info card is listed simply as 2016, and according to researchers Yan and Rongsheng (2018), it was late 2016 before the link to microcephaly would have been considered verified. If such is the case, then the rhetoric employed in this panel provides transparency and helps instill trust.

The third front panel is titled, “get the facts,” and includes that there is no vaccine for the virus, that readers can prevent Zika “by avoiding mosquito bites,” that Zika bearing mosquitoes are more prevalent during the day, and that the same mosquitoes spread dengue and chikungunya. Some of the language of this panel seems problematic. “Preventing” rather than avoiding would better recognize that there are tools, like repellants and nets, that are most commonly considered preventive rather than avoidance tools. According to Oxford Languages, to prevent means to “keep (something) from happening or arising, whereas to avoid means to “keep away from or stop oneself from doing (something).” So, when you are trying to prevent mosquito bites, you accept that you will find yourself in potential exposure situations as would be natural for anyone in Harlingen venturing out of doors or living without adequate air-conditioning units or undamaged screened windows, whereas avoidance implies avoiding those situations which would be difficult if not impossible. As such, the rhetoric of avoidance falls into one of the three categories of “major communication failings,” ignoring lived realities. The bottom of the panel features three square dot ellipses leading to a very small clipart image of a magnifying glass.

The last panel on the front of the info card provides details about which CDC website readers can go to for more information, that the local contact for resources is the Cameron County Department of Health and Human Services and what its primary web address is, and the 24-hour phone number for the Public Health Preparedness Program.

The back side of the info card also has four panels of information with the first two panels visually linked by a continuous olive colored background with a smaller lighter image of the same mosquito as on the front side. The panels are titled, “drain & cover,” and seven bullet points are provided offering tips on how to prevent bites and reduce mosquito prevalence. These

include draining standing water, wearing long sleeves and pants, treating fabrics with permethrin, using repellent, installing screens on doors and windows, and sleeping under mosquito bed nets and using them on cribs and strollers. Of note in these panels are bullets two, three, six, and seven. Bullet two recommends wearing long-sleeved shirts and pants and bullet six recommends doing the same for children. While this is a recommendation that would prove effective and allow for less repellent applied directly to skin, it is an unrealistic recommendation in hot and humid weather. Indeed, while surveying, we came across very few people wearing anything other than t-shirts or tank tops and shorts. Regardless of age, many males weren't wearing shirts at all if they were jogging or playing sports, and several females in each park wore only shoes, sports bras, and upper-thigh-length shorts if they were jogging or practicing yoga. Again, the rhetoric employed in these two bullet points seems to ignore lived realities. Bullets three and seven are about using repellent. Bullet three specifically states to use EPA registered repellents and that they are "safe and effective, even for pregnant and breastfeeding women." I contend that information conveying both efficacy and safety for particularly vulnerable populations should be at the top of the list rather than buried in the middle. Similarly, the seventh bullet states, "do not use insect repellent on children under 2 months old." While this statement conveys safety information regarding the safety of very young infants, it more importantly conveys that mosquito repellent is both effective and safe for all but the first two months of any human's life when used as directed. This statement should also have been included closer to the top. To further their primary but unrealistic point of wearing full coverage clothing, the document designer ends the section with the three ellipses leading to a clipart image of a long-sleeved crewneck shirt. Perhaps a better option for this section of the info card would have been an image of a spray can mid-spritz.

The third panel on the back of the info card has a blue background, is titled, “If you have Zika virus…,” and has only two bullet points. The first bullet suggests that those already infected can help prevent the spread of the virus by avoiding mosquitoes for the first week. In this case, avoidance is less unrealistic since the individual is ill and may be more likely to stay home. However, it would be useful to add a brief reminder to wear repellent if unable to avoid being around mosquitoes for any reason. This would recognize that some may still need to go to work to support themselves and their families or have obligations to others that require them to leave their home, or that they may need to go out for medication or to seek medical attention. The second bullet is about avoiding spreading Zika through use of condoms every time and in every way the reader may engage in sexual activity. This initially may strike a Texan reader as odd because, while it does acknowledge lived realities of potential readers, Texas is an “abstinence only state” where schools, even public colleges, are legally required to stress sexual abstinence over contraception, usually to the complete exclusion of contraception (Wiley et al., 2020). In fact, teaching sex education at all is optional, and it will remain outright illegal to teach contraception to middle school students until the beginning of the 2022 school year (Waller, 2020). However, following the initial statement about using condoms to prevent the spread of Zika, the designer finishes the panel text by stating, “Not having sex is the best way to ensure that someone does not get sexually transmitted Zika virus,” in bold font. Interestingly, this is the ONLY bold text used in the entire info card outside of titles and contact information and suggests that “not having sex” is particularly vital information. The panel ends with the now standard ellipses and a clipart image of a mosquito.

The last panel on the back side of the info card has instructions for building a “Zika virus prevention kit.” It begins with the confusing recommendation that, “If you live in an area with

the mosquito that spreads the Zika virus, always keep the following items on hand." What makes this confusing for readers is that the info card never mentions which type of mosquitoes spread the virus. The six-item list also includes "standing water treatment tabs" which are also never mentioned elsewhere in the document. This olive background panel ends with ellipse and a clipart image of a basic first aid case.

While there are several aspects of the info card that make it particularly useful during and before Zika outbreaks, there are numerous ways to improve upon the rhetoric employed therein. The info card is one of the documents revised to increase potential efficacy as a communication tool. This document was remediated/revised and utilized for Stage 2 of my research.

"Protect Yourself from Zika" Flyer

The "Protect Yourself from Zika" flyer comes in two sizes, 8.5 x 11 inches on glossy printer paper (see Figure 13) and 4 x 6 inches on cardstock and is put out by the Texas Department of Health Services. The information on the front and back sides is the same, but one side is in English, and the other side is in Spanish. The flyer is simple and uses three main colors, black, brown, and white. The title is white sanserif on an angled background of brown and reads, "Protect Yourself from Zika." Below the title is a list of six short tips in black sanserif capitalized text on a white background, and in place of standard bullet points, there are clipart images which coincide with the tip being offered.

The first tip is "Apply EPA-Approved Insect Repellent" and has an image of a spray can with grey shading representing the spray itself in-use. As the most realistically useful tip for people living in a warmer-than-average climate, it is most fitting that this tip should be listed first. The second tip, "Wear Pants and Long-Sleeve Shirts," is less realistic as a tip, especially during peak Texas mosquito seasons. While it's position in the list does seem most appropriate,

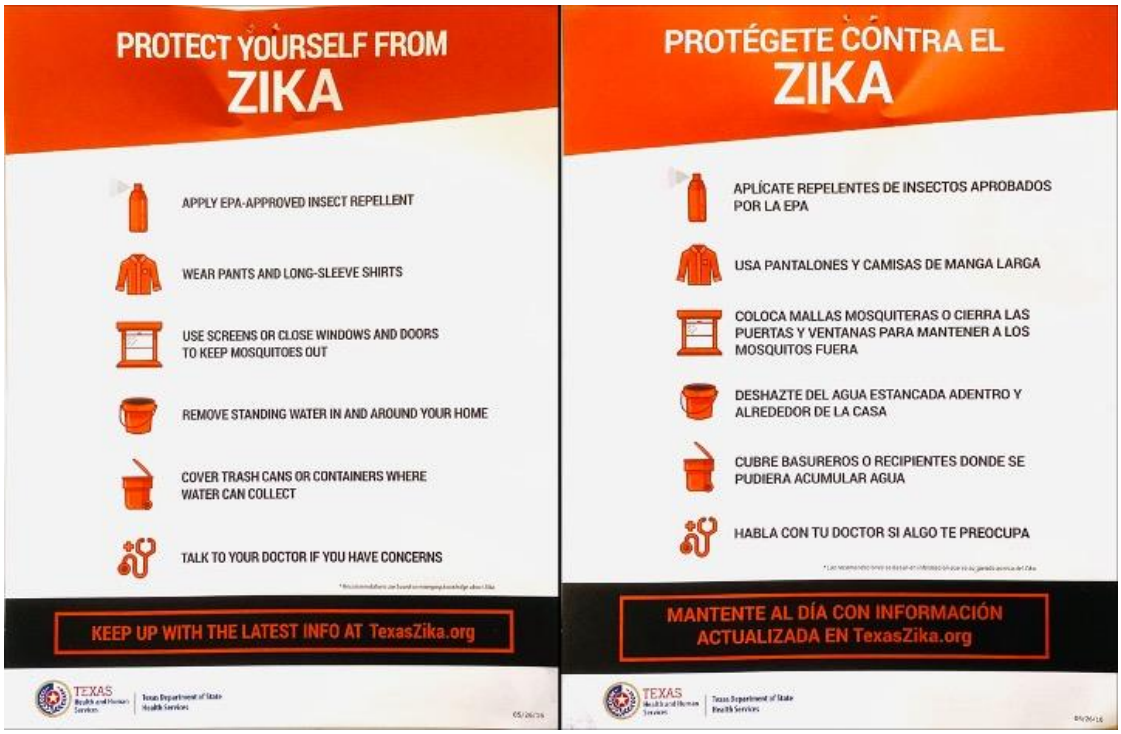


Figure 13. "Protect Yourself from Zika" Texas Department of State Health Services Flyer

it might be more effective to add, "when reasonable" to the end of the statement. This would prevent any potential response of "that's not happening, it's 100 degrees here," rather than a simple response of "okay." The third tip is to "Use Screens or Close Windows and Doors to Keep Mosquitoes Out." The phrasing here stands out as odd because most people who live in climates warm enough for air-conditioning would have their windows and doors closed if the air-conditioner is on, and, if they don't have air-conditioning or aren't using it during mosquito season, it would likely be too hot inside to keep their doors or windows closed. As such, it seems more sensible to suggest using screens or netting on open windows or doors and to leave out the idea of having either closed, thus removing any argumentative or reactionary inner dialogue. This tip features clipart of a screenless open window. Tip four includes clipart of a bucket and reads, "Remove Standing Water in and Around Your Home." This tip is also supported by the CDC and numerous studies as a method of reducing mosquito breeding grounds. It I also something many if not most readers would be able to do within reason, but, as with tip two,

adding “when possible” might reduce inner arguments for those who lack the agency to accomplish this task, such as those living next to fields or bodies of stagnant water, such as the survey respondents who stated there was nothing they could do since the problem isn’t on property they own. The fifth tip is to “Cover Trash Cans or Containers Where Water Can Collect,” and there is an image of a waste management style open-covered and wheeled trash bin. This tip is quite useful since it may not be something many think of as somewhere collecting standing water but could be improved and better divided from the previous tip. The final tip has an image of a stethoscope and small medical cross, and reads, “Talk to Your Doctor if You Have Concerns.” This statement works well on the surface but ignores the reality that so many people may not have a doctor to consult.

Just below the final tip, there is a statement in small black print with an asterisk, “Recommendations are based on emerging knowledge about Zika.” This statement acknowledges that they were still learning about the virus and its outcomes at the time of publication and provides transparency in the process. Below the section of tips, there is a block of black background with brown text inside a thin brown frame reading, “Keep Up with The Latest Info At TexasZika.org.” Like the asterisk defined statement, this further increases transparency of the situation and clinical/scientific knowledge as evolving with time and further research. It also gives the reader a an easily remembered website supported by the TDSHS to go to which carries the .org domain designation, a designation commonly though problematically considered to be reliable and authoritative.

At the bottom of the flyer there is the seal and departmental title of Texas Health and Human Services and the Texas Department of State Health Services in blue text with both titles separated from one another by a short, brown, vertical line. In the lower right corner, the date is

printed in a font distinct from the all the rest, 05/26/16, ensuring readers can be aware that the tips were based on information available before that date. This is important to include in all pandemic communication documents because it assures that readers will be able to distinguish between older and newer health and safety recommendations as situations evolve. This document was also revised for use in Stage 2.

"Work Outdoors? Protect Yourself from Zika" Flyer

The "Work Outdoors? Protect Yourself from Zika" flyer (see Figure 14) is a bit more complex than the "Protect Yourself from Zika" flyer but uses the same color patten and a similar blocking design for information. It also comes in two sizes, but the smaller 4x6 inch size only has the tips. The larger, 8.5 x 11-inch flyer has the slanted brown segment with the title and, below that, slightly more than half a page of information about Zika. The first part is titled, "What is Zika?" It reveals that the virus is spread by mosquitoes and what the four most common symptoms are, as well as that "about 80% of people with Zika do not become ill or have symptoms." While this is true and shows high transparency, it also stands a significant chance of making Zika seem like more media hype than real world hazard and therefore less worth worrying about. The upside of this is that it conveys anti-normalization, showing that illness derived from a Zika infection is neither common nor inevitable, though it does not note at this point that it is also largely preventable. The downside is that this could create boomerang effects with readers justifying not guarding against Zika and perhaps neglecting to even finish reading the document beyond that point. The last sentence in the segment is about the potential for spread through blood transfusions and sex, however, it's not that likely the reader would be very concerned at all by that point.

The next section is titled, “Should I Worry?” Unfortunately, after reading that they only have a 20% chance of feeling any negative effects at all if they do contract Zika, some readers may not have even kept reading the flyer. The first sentence advises readers that spending a lot of time outdoors increases exposure. The next statement notifies them that, “although rare,” the virus may cause Guillain-Barré syndrome and what the illness does to the human body. This inclusion of Guillain-Barré syndrome as a potential effect is refreshing since it is rarely included in lists of effects in these forms of public pandemic technical documents despite the seriousness of it. It does, however, seem odd to include it in the “Should I Worry” section rather than in the “What is Zika” sections with the other side effects, essentially burying the info after notifying the reader from the beginning that they are unlikely to become ill at all. This makes it seem like the document designer is attempting some form of obfuscated transparency.

The last segment in this section explains that the virus can be passed from “mother to child” during pregnancy and that it “has been linked to birth defects such as microcephaly.”

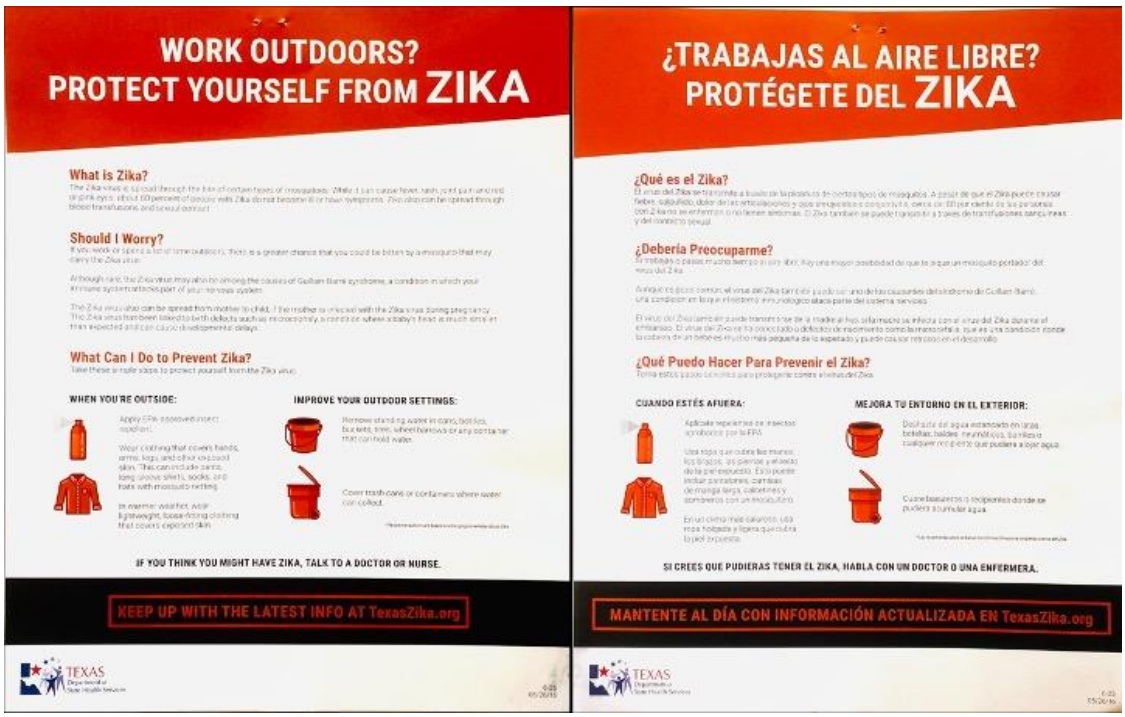


Figure 14. "Work Outdoors? Protect Yourself from Zika" Texas Department of State Health Services flyer for outdoor workers

While not rhetorically interesting on its own outside of the "mother to child" rather than mother to fetus aspect, it does show that the entire "Should I Worry" segment never actually answers the question raised by its title. It is akin to answering "maybe." In fact, I contend that the "about 80% of people with Zika do not become ill or have symptoms" statement from the "What is Zika?" segment answers the question of whether the reader should worry far better than the "Should I Worry" segment does. The overall arrangement of information between the two segments suggests intentional playing down of Zika as a hazard to self or others by rhetorically reducing the perception of threat. This is especially problematic since the "What Can I Do to Prevent Zika?" segment is last and some or even many readers may have already decided before reaching that point in the document that Zika infection is not enough of a threat for them to even worry about actively preventing it.

The third segment is the "What Can I Do to Prevent Zika?" segment. It begins with the line, "Take these simple steps to protect yourself from the Zika virus," and then has recommendations listed using two columns. The first column is labeled, "When You're Outside," and provides two representative clipart images, a spray canister mid-spritz on the top and a long-sleeved, button-up shirt below it. The first recommendation is to apply repellent. The second is to wear clothing that covers all exposed skin, even a "hat with mosquito netting." As I stated before, this seems impractical. They do, however, somewhat amend that recommendation in the next one-sentence paragraph by adding that "In warmer weather, wear lightweight, loose-fitting clothing that covers exposed skin." Unlike the previously discussed flyers, the designer of this document may have realized that using mosquito repellent was a more likely option for most people in places like Texas to choose. It is odd, though, that this flyer went with promoting repellent first since the few people we saw working outside in Harlingen and other areas of

Texas we passed through, such as the pools of day laborers and occasional landscapers and city workers, were wearing long-sleeved shirts, pants, closed shoes, and hats. However, it wasn't yet summer when we went, and it is certainly possible that what we observed those working outside wearing is not the norm. It is also possible that the document designers had different ideas of what advisement readers would find most valuable or reasonable.

The other column in the "What Can I Do to Prevent Zika?" segment is labeled, "Improve Your Outdoor Settings. The two clipart images used in this column are a bucket on top and a waste industry-style trash bin below it. Also unlike the previously discussed flyers, this flyer's designer recommends emptying water from more sources people are unlikely to think of as holding enough water to breed mosquitoes: cans, bottles, and tires. Noting items not typically seen as breeding grounds for vectors is especially useful for most public audiences, and its inclusion in this flyer makes it a more useful document segment than the similar "drain and cover" segment from the accordion-style info card from the Pregnancy Resource Center in Harlingen or the two bullet points about emptying standing water from the very similarly designed "Protect Yourself from Zika" flyer.

The last recommendation in column two is identical to the second bullet points about emptying standing water in "Protect Yourself from Zika" flyer, covering trash cans, etc. This flyer's central section ends with a final recommendation centered beneath the two columns, in bold typeface and reads, "If you think you might have Zika, talk to a doctor or nurse. This is far better than either documents previously discussed as it does not assume the reader has a doctor or nurse they typically see, leaving no reason to use the more typical words "your doctor." Not only does this language recognize a problematic reality for many residents of border towns, not having a "family physician," but it also acknowledges the value of nursing and nurses' medical

knowledge when it comes to pandemic concerns, thereby rhetorically increasing the pool of knowledgeable medical workers suited to pandemic problem solving and advisement. This is far better phrased than the previous flyer's, "Talk to your doctor is you have concerns." The remainder of the page is almost identical to the previous flyer with the only notable difference being a different logo at the bottom next to the Texas Department of State Health Services title and absence of the logo and title for Texas Health and Human Services. The publication date is the same, May 26, 2016.

In all, while this flyer has some of the most useful rhetoric, it remains problematic that their seeming transparency and good use of anti-normalization at the beginning may compel too many readers to stop reading before they get to the most useful portions by suggesting, intentionally or not, that Zika is not that much of a hazard and that the risk is minimal. I do agree with being transparent as much research I discussed in Chapter 3 discussed the problems that come with a lack of transparency with the public, but I also argue that the better place for such transparency is closer to the end of the document rather than at the beginning. That way more readers are likely to read and possibly remember and follow the very well-designed advice on the rest of the page. Perhaps reading about the effects of infection for not only themselves, but others, and then the simple steps to prevent it, would strike readers as easy enough or worthwhile enough to do even after they then discover that their chances of becoming ill are fairly low at only about 20%. This document was revised for use in Stage 2.

"Zika Prevention Takes a Community. Do Your Part." Flyer

The "Zika Prevention Takes a Community. **Do Your Part.**" flyer (see Figure 15), was another document provided in the Zika Stakeholders Toolkit. As with all materials in the kits, I am uncertain about original distribution methods for the materials, and Dr. Tyler was unable to

provide specifics about how the community was expected to acquire the materials. As noted in Chapter 3, nine of the 40 respondents reported remembering flyers, brochures, and pamphlets as sources of Zika information, but outside of schools and doctors' offices, I was unable to ascertain if flyers such as those discussed herein, or any provided in the Tool Kits would have ever reached the hands of many Harlingenians. The "Zika Prevention Takes a Community. **Do Your Part**" flyer seems like it might have been particularly memorable as the only full color flyer in the Kits. This flyer is also dated for November 2, 2016, making the information it contains just over five months newer and arguably more accurate.

Figure 15. "Zika Prevention Takes a Community. Do Your Part" CDC flier for Zika Prevention at the community level

As with all flyers provided in the kit, this one is two-sided with one side in English and the other in Spanish. Unlike the other flyers, this one was also produced by the CDC and bears the CDC logo and title, "**U.S. Department of Health and Human Services** Center for Disease Control and Prevention" at the bottom to the right of the statement, "Learn more about how to

get rid of mosquitoes at www.cdc.gov/zika/prevention." At the top, just above the title, it reads, "CDC's Response to **Zika.**" The title is on a brown background with a vector image moving rightward of circles decreasing in size with a clipart mosquito in the center circle, representing a mosquito on a target. This suggests the content might focus primarily on prevention of the vector itself.

The next segment is an image of pregnant woman with her left hand on her belly. She has light brown skin and black hair and is wearing a pink pullover on top of a white shirt with minimal makeup and lighter pink nails. She is standing at the edge of a gray house on a partly cloudy day with blue sky showing around the clouds and grass and long leafed brush behind and around her. The large area in the center of the image contains a white rectangular speech bubble with the words, "My community is helping protect my pregnancy from Zika by getting rid of mosquitoes in our homes, yard, and neighborhood. How are you helping?" This language and imagery can be particularly useful in areas like Harlingen Texas where significant portions of the population is more likely to identify with the image of the woman and the government sponsored drive to protect pregnancies. For the few who seem to believe Zika to be a primarily Hispanic problem, there could be boomerang effects. This effect could, however, be mitigated by featuring two women of visibly different ethnicities and a simple switch in phrasing to "our" instead of "my." While it is also commendable that this document speaks at a community level, thus accounting well for social structures rather than discounting them, it is also possible that many might view Zika as neither their problem or responsibility if they are not pregnant or connected to someone who is. This could perhaps be mitigated by either framing the narrative more as protecting the future of the unborn child rather than just the mother or the process of pregnancy, or by beginning with the narrative of community members rather than the woman they are

protecting. The second variety of framing could prove useful because more readers are likely to be of the implied protector class than the protected class. Beneath the initial speech bubble statement and in smaller font it reads, “Zika is spread by infected mosquitoes and can cause microcephaly and other serious birth defects.” This explain how getting rid of mosquitoes would help protect her pregnancy.

The next, larger segment features a “neighborhood/community” showing three houses under a cloudy blue sky with tall palm trees, green lawns, closed windows and doors, and identical small potted plants and a tub or empty planter by the entry of each house. It features five neighbors of different ages and ethnicities standing abreast, each with a rectangular speech bubble above them and a small representative illustration in small circles attached to the bubbles.

From left to right, the first neighbor seems to be a teenage male with light brown or tanned skin, short black hair, a short-sleeved blue t-shirt, and white pants. He has his thumbs I his pants pockets, and his head tilts to his right. His speech bubble reads, “Once a week, my family and I dump out items that hold water, like flowerpot saucers, to get rid of places where mosquitoes lay eggs.” The illustration in the small circle attached to his bubble is of a smiling woman with tan skin and shoulder-length brown hair wearing blue jeans and a blue sweater over a yellow shirt pouring out a bucket of water. It is useful that the rhetoric employed in the speech bubble recognizes prevent efforts as a family contribution to both family and, by extension, community welfare. It is also beneficial to include dumping water from areas that many may not think of as mosquito breeding grounds, like the flowerpot saucers, that it should be done weekly—mosquito breeding cycles run 8-10 days—and that it uses the phrase “where mosquitoes lay eggs” rather than saying “where mosquitoes breed,” as this phrasing suggests

something small enough to be unseen by the naked eye, thus avoiding any problem of people not "seeing" mosquitoes or larvae and assuming the water is safe from infestation.

The second neighbor is a middle-aged or older black male with darker brown skin and short black hair with a receding hairline wearing dark gray slacks with a black belt and a buttoned-up, collared, short-sleeved orange shirt over a white undershirt with the four fingers of each hand tucked into his pants pockets. His speech bubble reads, "I used an outdoor insect spray to get rid of mosquitoes in dark, humid places. They like to hang out under my patio furniture and in my carport." The language used here too is well designed to point out preventive measures to use in areas that may go largely ignored by most people when treating yards for mosquitoes. It also helps that is written the way people typically talk, using phrases like "hang out." Oddly, the illustration included in the small circle attached to his speech bubble is of an older white man wearing a wide-brimmed, straw-like hat, yellow short-sleeved shirt, and light gray pants, spraying mosquito spray from a container attached to a green water hose. It seems like the image used as representative of him executing the task should have been a black man at least.

The third neighbor is a younger looking woman with shoulder-length brown hair and tan skin with her arms hanging loosely at her side, wearing a long-sleeved green V-neck shirt tucked into light blue jeans with a tan belt. Her speech bubble reads, I repaired a crack in my septic tank so that mosquitoes can't get in." Again, the designer chose to include an area that many may not think about as places mosquitoes breed, though it seems odd to have a crack in a septic tank. The illustration in the small circle attached to her bubble, however, shows a plastic, screw-on extraction/cleanout pipe cover, and suggest that this was likely the part cracked. The choice to speak of septic tanks also suggests that the "community" featured in the flyer is a rural

community rather than an urban one. This makes it more likely that the residents would not have the city taking on the responsibility of large-scale spraying for mosquitoes, and therefore more necessary for the community to engage in a concerted effort to prevent mosquitoes.

The fourth neighbor is an adult male with deeply tanned or light brown skin, short brown hair, strong jawline, and muscular arms crossed wearing a short-sleeved, yellow shirt with three buttons running up the top third to the collar, and dark blue jeans. His speech bubble reads, "I've noticed mosquitoes in my gutters, so I used a larvicide to kill them." Again, the language used is very natural for spoken phrasing and well-suited to the design and purpose of the flyer. The odd thing about this statement is that it seems more useful to clean out one's gutters, so the water drains freely rather than rely on a larvicide, especially since the one pictured in the small circle attached to this speech bubble is a "dunk" style wheel half submerged in water and better suited to rain barrels, downspouts, and small ponds. The larvicide in the gutters may, however, be more realistic an option for those lacking the time or drive to thoroughly clean out and possibly repair their gutters.

The fifth neighbor is an older white woman with paler skin than the rest, wrinkled, and a whitish gray bob haircut wearing a long-sleeved purple sweater over a light pink, collared shirt, and a tan skirt. Her speech bubble reads, "We make sure our lawn is mowed regularly and that weeds are cut down near our house." The illustration in the small circle attached to her bubble is of a red gas-powered push mower with a bagger cutting down tall grass. The image and statement both serve to remind readers of the role lawns with tall grass and weedy areas play in mosquito breeding. This could also remind readers that they may need or want to also tend to overgrow areas outside of their own yards to reduce mosquito prevalence in their community.

While city dwellers would certainly be able to engage effectively with this flyer, it is more likely to resonate with and thus be especially useful for those outside of cities. Overall, the design of this flyer would work well with most audiences in sub-urban and rural areas or city areas where many residents have yards to tend. I still contend that the first segment with the pregnant woman could be improved, and so this document will also be revised for use in Stage 2 of my research.

"Tell Zika to Buzz Off" Billboard

The "Tell Zika to Buzz Off" billboard image (see Figure 16) was displayed along Texas interstates in 2016 and some were still in place during my research trip to Harlingen. It has a black background with two gray clipart images of a mosquito, one large one occupying a bit more than a third of the image on the left, and a smaller one in the center-right third. There is a large oval cutout in occupying most of the right third, highlighted by an orange ring around the cutout. In the cutout, there is a full color side-view image of a person in blue jean shorts, long-

Figure 16. "Tell Zika to Buzz Off billboard sponsored by Texas Health and Human Services

sleeved plaid shirt, and a thin black bracelet centered with both knees slightly bent and right knee raised and tilted, as if standing on tiptoe. The person's left hand seems to hang loosely as the right hand holds a blue spray canister with a reddish orang lid, spraying a mist of supposed

repellent along their right calf. In the background, there is an orange and gray tent, set up in a verdant forested clearing. The use of the black background with the cutout allows the driver or passenger to focus first on the brightly colored image of the person camping using repellent, conveying in a glance the importance and value of mosquito repellents when engaging in outside activities. The inclusion of the clipart mosquito silhouettes helps make the connection between the words and the image in the cutout.

After their eyes refocus to take in more of the whole image, the driver or passenger will read the five-word phrase stretches across the middle of the first two thirds of the billboard: "TELL ZIKA TO BUZZ OFF." The letters of Zika are easily thrice the size of the rest and are in orange whereas the rest are in white. This clever design should serve to deliver a complete message even if the viewer only has time to take in the three most noticeable aspects of the image, the act of spraying repellent, the mosquitoes, and the word Zika: prevent Zika by using mosquito repellent.

Beneath the words are the Texas government sponsored web address for those seeking more information, texaszika.org, and the logo and name of the sponsoring authority, Texas Health and Human Services, a division of the Department of State Health Services. This ensures that a closer inspection or more lingering eye would regard the information as both relevant and reliable.

"Vector Vaquero Fights the Bite" Coloring Book

The "Vector Vaquero Fights the Bite" coloring book is written in both English and Spanish with artwork by Tony Pennock and designed to teach children about preventing mosquitoes through games, puzzles, and the narrative of "vector vaqueros" or vector cowboys who work hard to test and eliminate mosquito infestations using things that kill mosquitoes but

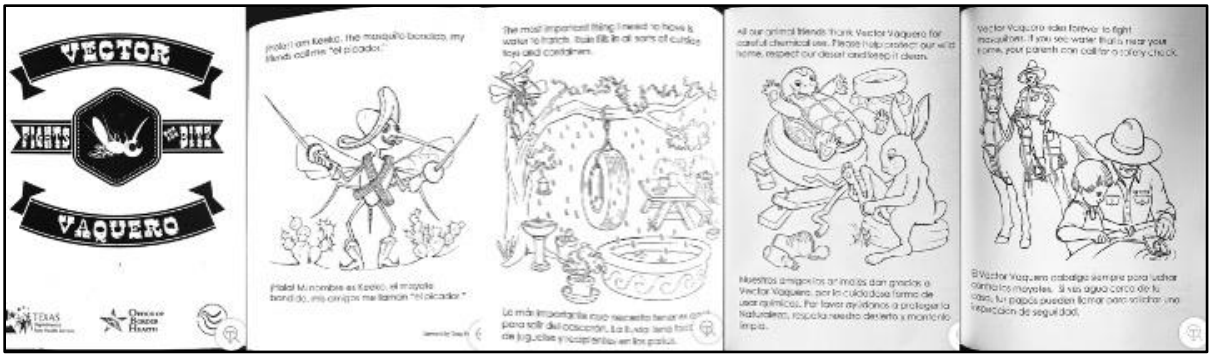


Figure 17. Pages from the "Vector Vaquero Fights the Bite" coloring book sponsored by the Texas Department of State Health Services, the Office of Border Health, and the Unites States-Mexico Border Health Commission with artwork by Tony Pennock

keep other animals safe. No author is listed for the book, but it is sponsored by Texas Department of State Health Services, the Office of Border Health, and the United States-Mexico Border Health Commission. While the text never mentions Zika, it was included in the materials allotted by the government of Texas for the county's Zika Campaign. The book gives children a sense of agency in mosquito prevention by including phrasing such as, "How can you fight the bite and stop mosquitoes at your home?" The text then provides images and narratives of how to prevent or reduce mosquito breeding around their home and in their yards beginning with physical actions they can take, such as scrubbing out bird baths before filling them with fresh water, and then including having their parents "call for a safety check" of standing water. It also recommends using insect repellent. By getting this book in the hands of children during the Zika pandemic, health authorities were able to enlist the help of some children in fighting Zika through mosquito prevention and the potential of those children reminding their parents to take preventive actions as well. I include a basic analysis of this coloring book because of its usefulness in imparting prevention strategies to children and the seeming uniqueness of it in painting vector control specialists as heroic figures.

The Valley Baptist Healthy Women's Center "Screening Tool"

The last artifact I analyzed was the "Screening Tool" (see Figure 18) used by nurses at The Valley Baptist Healthy Women's Center to determine whether a patient might have Zika and require further testing. The tool was crafted by the CDC and has two sides, one with the tool "to be administered by nurse, check-in receptionist, or other health care provider," as stated in bold italics in parentheses at the top of the paper, just below the title segment. Below that are basic instruction for when to use the tool and on whom, and then there is a "note" reminding the screener that any woman requesting more information about testing, she should be directed to the CDC website. This introductory segment is divided from the screening segment by a thin long horizontal line.

The assessment is divided into two sections side by side with the first section occupying two thirds of the page from left to right and the second section occupying the last third. The header of the first side reads, "Assess for possible exposure to Zika virus infection." After the word, "exposure," there is a superscript number 1, directing users to the first reference in the references segment at the bottom of the page. This reference explains the three criteria for "possible exposure," living in, traveling to, or having sex or sharing sex toys with someone who lives or has traveled to Zika hotspots. The reference itself seems a bit redundant since the questions to be asked of the patient mirror the same criteria. There are three questions on this side of the paper, each followed by a "yes | no" response area with the words, "Circle response" above them, suggesting that the tool should be physically completed and added to the patient's file with each visit. The first question is, "do you live in or do you frequently travel (daily or weekly) to an area with active Zika virus transmission?" After the word, "transmission," there is another noted reference to check the CDC website to confirm current or recent hotspots. Presumably this is in part because the patient may not be aware if their travel destination was in

an outbreak zone. The second question reads, “Have you traveled to an area with Zika during pregnancy or just before you became pregnant [8 weeks before conception or 6 weeks before your last menstrual period]?” This question seems to make the first redundant because it covers a longer span of time than the previous question and a single response of “Yes” to any of the three questions necessitates symptomatic assessment and possible testing. Answering yes to more than one does not change the next steps in the process. It seems like I might make more sense to simply ask the patient where she has traveled in the last however many months since all three questions also have the asker verifying the information using the provided CDC webpage.

The final question on the left side is, “Have you had sex (vaginal, anal, or oral sex) without a condom or shared sex toys with a partner(s) who lives in or has traveled to an area with Zika?” One must assume that the question is asking about the same time frame as question two since the virus could have been sexually transmitted over the same period and would pose just as much of a threat to fetal development had it been contracted in another way. It seems a bit remiss that the document did not note a specified time frame for question three. Below the final question on this side of the document, there is a small black circle with a white arrow in it pointing to the right. Next to the symbol, it tells the asker that a patient answering no to all three questions means she is considered “low risk.”

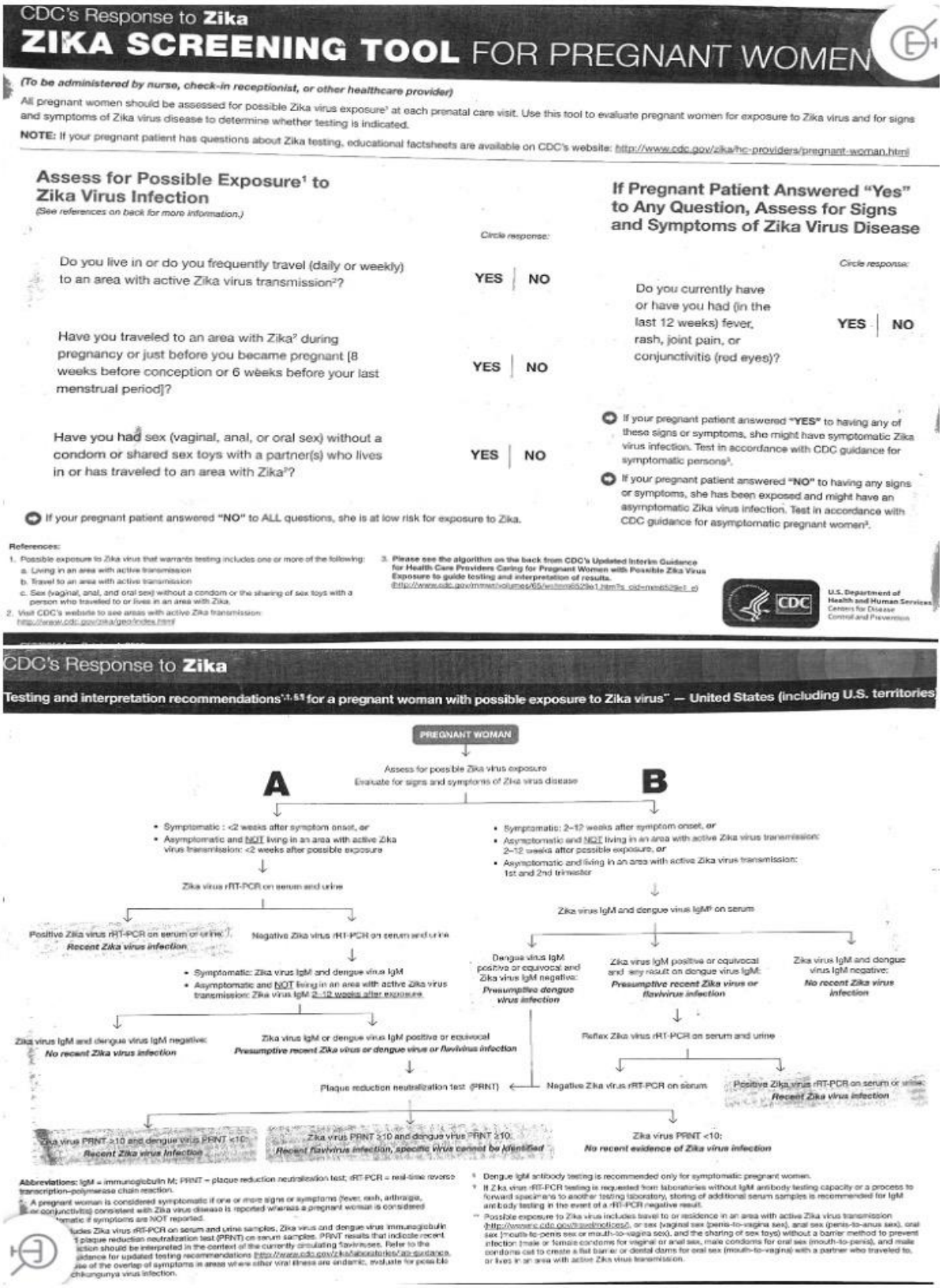
There is only one question on the right side of the paper, and it is formatted the same way as the previous questions. Above the questions are the basic instructions for that section, telling the asker that a response of “Yes” to any of the three previous questions requires assessing the patient for symptoms of Zika infection. The question itself reads, “Do you currently have or have you had (in the last 12 weeks) fever, rash, joint pain, or conjunctivitis (red eyes)?” Below the question there are two bullet points with the circle and right-pointing arrow functioning as the

bullet points. The first says to test the patient for Zika if she answered “Yes.” The second also says to test the patient. The only difference between the two is whether the patient is being tested based on symptoms or exposure. After considering the order of the questions for some time, I remain unable to determine any value to asking the question about symptoms last rather than first or why questions one and two on the left side are divided as they are when all three must be asked regardless of responses. The high degree of redundancy in process using this technical medical document suggests both wasted time and effort as routine in a setting where both are especially valuable. Both bullet points also include superscript number three to direct the user’s attention to reference three at the bottom of the page. Reference three tells the user to “see the algorithm on the back from the CDC’s Updated Interim Guidance to guide testing and interpretation of results

On the back of the document, there is a process tree that starts with the assessment on the front of the document and leads to one of two distinct options for testing. Which option the medical provider chooses is based on several factors, including time since symptom onset (more or less than two weeks), time since exposure if asymptomatic (also more or less than two weeks) and which trimester the patient is in. One the left side of the tree the process revolves solely around testing for Zika, while the right side revolves around tests for Zika, Dengue, and other flaviviruses. Below the algorithm is a segment with explanations of abbreviations used in the algorithm.

In all, the process tree is quite effective with no readily noticeable redundancies unlike the questionnaire for assessment on the front of the document. This odd discrepancy may be due to misperception of the potential end user difference between the two tools since the assessment on the front side might be administered by a receptionist rather than a medical worker and the

algorithm on the back would likely only be used by medical workers. However, this would only explain the clarity and efficiency of the back of the document, not the multiple points of redundancy on the front side.



CDC's Response to **Zika**

ZIKA SCREENING TOOL FOR PREGNANT WOMEN

(To be administered by nurse, check-in receptionist, or other healthcare provider)

All pregnant women should be assessed for possible Zika virus exposure[1] at each prenatal care visit. Use this tool to evaluate pregnant women for exposure to Zika virus and for signs and symptoms of Zika virus disease to determine whether testing is indicated.

NOTE: If your pregnant patient has questions about Zika testing, educational factsheets are available on CDC's website: http://www.cdc.gov/zika/hc-providers/pregnant-woman.html

Assess for Possible Exposure[1] to Zika Virus Infection

(See references on back for more information.)

Circle response:

Do you live in or do you frequently travel (daily or weekly) to an area with active Zika virus transmission[2]? **YES** | **NO**

Have you traveled to an area with Zika[2] during pregnancy or just before you became pregnant [8 weeks before conception or 6 weeks before your last menstrual period]? **YES** | **NO**

Have you had sex (vaginal, anal, or oral sex) without a condom or shared sex toys with a partner(s) who lives in or has traveled to an area with Zika[2]? **YES** | **NO**

➡ If your pregnant patient answered **"NO"** to ALL questions, she is at low risk for exposure to Zika.

If Pregnant Patient Answered "Yes" to Any Question, Assess for Signs and Symptoms of Zika Virus Disease

Circle response:

Do you currently have or have you had (in the last 12 weeks) fever, rash, joint pain, or conjunctivitis (red eyes)? **YES** | **NO**

➡ If your pregnant patient answered **"YES"** to having any of these signs or symptoms, she might have symptomatic Zika virus infection. Test in accordance with CDC guidance for symptomatic persons[3].

➡ If your pregnant patient answered **"NO"** to having any signs or symptoms, she has been exposed and might have an asymptomatic Zika virus infection. Test in accordance with CDC guidance for asymptomatic pregnant women[3].

References:

1. Possible exposure to Zika virus that warrants testing includes one or more of the following:
   a. Living in an area with active transmission
   b. Travel to an area with active transmission
   c. Sex (vaginal, anal, and oral sex) without a condom or the sharing of sex toys with a person who traveled to or lives in an area with Zika.
2. Visit CDC's website to see areas with active Zika transmission: http://www.cdc.gov/zika/geo/index.html
3. **Please see the algorithm on the back from CDC's Updated Interim Guidance for Health Care Providers Caring for Pregnant Women with Possible Zika Virus Exposure to guide testing and interpretation of results.** (http://www.cdc.gov/mmwr/volumes/65/wr/mm6502e1.htm?s_cid=mm6502e1_e)

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

CDC's Response to **Zika**

Testing and interpretation recommendations[1,§,¶] for a pregnant woman with possible exposure to Zika virus — United States (including U.S. territories)**

PREGNANT WOMAN

Assess for possible Zika virus exposure
Evaluate for signs and symptoms of Zika virus disease

A

- Symptomatic : <2 weeks after symptom onset, *or*
- Asymptomatic and NOT living in an area with active Zika virus transmission: <2 weeks after possible exposure

Zika virus rRT-PCR on serum and urine

Positive Zika virus rRT-PCR on serum or urine: ***Recent Zika virus infection***

Negative Zika virus rRT-PCR on serum and urine

- Symptomatic: Zika virus IgM and dengue virus IgM
- Asymptomatic and NOT living in an area with active Zika virus transmission: Zika virus IgM 2–12 weeks after exposure

Zika virus IgM and dengue virus IgM negative: ***No recent Zika virus infection***

Zika virus IgM or dengue virus IgM positive or equivocal: ***Presumptive recent Zika virus or dengue virus or flavivirus infection***

Plaque reduction neutralization test (PRNT)

Zika virus PRNT ≥10 and dengue virus PRNT <10: ***Recent Zika virus infection***

Zika virus PRNT ≥10 and dengue virus PRNT ≥10: ***Recent flavivirus infection, specific virus cannot be identified***

B

- Symptomatic: 2–12 weeks after symptom onset, *or*
- Asymptomatic and NOT living in an area with active Zika virus transmission: 2–12 weeks after possible exposure, *or*
- Asymptomatic and living in an area with active Zika virus transmission: 1st and 2nd trimester

Zika virus IgM and dengue virus IgM[¶] on serum

Dengue virus IgM positive or equivocal and Zika virus IgM negative: ***Presumptive dengue virus infection***

Zika virus IgM positive or equivocal and any result on dengue virus IgM: ***Presumptive recent Zika virus or flavivirus infection***

Zika virus IgM and dengue virus IgM negative: ***No recent Zika virus infection***

Reflex Zika virus rRT-PCR on serum and urine

Negative Zika virus rRT-PCR on serum

Positive Zika virus rRT-PCR on serum or urine: ***Recent Zika virus infection***

Zika virus PRNT <10: ***No recent evidence of Zika virus infection***

Abbreviations: IgM = immunoglobulin M; PRNT = plaque reduction neutralization test; rRT-PCR = real-time reverse transcription–polymerase chain reaction.

* A pregnant woman is considered symptomatic if one or more signs or symptoms (fever, rash, arthralgia, or conjunctivitis) consistent with Zika virus disease is reported whereas a pregnant woman is considered asymptomatic if symptoms are NOT reported.

† Includes Zika virus rRT-PCR on serum and urine samples. PRNT results that indicate recent infection should be interpreted in the context of the currently circulating flaviviruses. Refer to the CDC guidance for updated testing recommendations (http://www.cdc.gov/zika/laboratories/lab-guidance.html). Because of the overlap of symptoms in areas where other viral illness are endemic, evaluate for possible chikungunya virus infection.

§ Dengue IgM antibody testing is recommended only for symptomatic pregnant women.

¶ If Zika virus rRT-PCR testing is requested from laboratories without IgM antibody testing capacity or a process to forward specimens to another testing laboratory, storing of additional serum samples is recommended for IgM antibody testing in the event of a rRT-PCR negative result.

** Possible exposure to Zika virus includes travel to or residence in an area with active Zika virus transmission (http://wwwnc.cdc.gov/travel/notices/), or sex (vaginal sex (penis-to-vagina sex), anal sex (penis-to-anus sex), oral sex (mouth-to-penis sex or mouth-to-vagina sex), and the sharing of sex toys) without a barrier method to prevent infection (male or female condoms for vaginal or anal sex, male condoms for oral sex (mouth-to-penis), and male condoms cut to create a flat barrier or dental dams for oral sex (mouth-to-vagina) with a partner who traveled to, or lives in an area with active Zika virus transmission.

Figure 18. Screening Tool used by nurses at The Valley Baptist Healthy Women's Center

Stage 2 Methods and Methodologies

Stage 2 of my research required remediation/revision of three artifacts collected during Stage 1 of my research. I chose to use the two of the documents I had been given the most of, the 8.5 x 11 inch "Protect Yourself from Zika" flyer (see Figure 3), and the 8.5 x 11 inch "Work Outdoors? Protect Yourself from Zika" flyer (see Figure 4), and the most unique artifact I collected, the "Zika Virus Prevention" accordion-style info card (see Figure 2) from the Pregnancy Resource Center in Harlingen. In all original and revised versions, the web address for more information and logo/sponsor information has been modified or removed to prevent visible connections to the state of Texas and help ensure that participants of Stage 2 are better able to connect with the documents as insiders rather than outsiders since none of them are likely to be from Texas and none live in Texas as I am unable to return to Texas for Stage 2 as planned, given the COVID-19 pandemic.[7]

For the participant analyses part of my Stage 2 research, I planned to recruit ten participants from people I and my family knew well and had continued to be around during the COVID-19 pandemic. I succeeded with recruiting eleven to complete questionnaires similar to but significantly shorter than the original surveys I had used in Texas and to review, assess, and comment on both original and revised versions of the documents listed above. Because I could not acquire the same materials for the revisions that the originals were printed on, I printed copies of both versions of each document on standard mid-weight paper. I initially also printed the three segments of the *Work Outdoors? Protect Yourself from Zika* flyer in matched sequence (see Appendix F) to better ensure participants focused on each segment rather than risk them seeing pages filled with text and rushing through or glossing over portions of it but had similarly

[7] While some of what can be derived from my study could be applied to COVID-19 pandemic public outreach, COVID-19 is beyond the scope of my current work.

segmented the other two documents as well by the time I began working with Stage 2 participants.

Throughout this research stage, I offered participants the choice of individual or paired sessions. Six participants chose to be paired, and five chose individual sessions. Paired sessions lasted slightly longer on average, and paired participants often reacted with visible and auditory delight upon discovering their assessments matched, rather like they were viewing their answer as "correct" since they weren't alone in drawing a specific conclusion. Pairing also led to some rapid-fire discussions between participants as they considered differing perspectives, but none ever seemed shy about offering a different perspective. These discussions were especially valuable in explaining why two people might interpret the same document differently, down to specific words, images, fonts, and phrases. At the end of each session, I showed the participants the original documents collected in Texas.

Based on indicated research method revisions needed over the course of working with the first three participants, I ended up with three versions, mostly due to changes in the design and implementation of the questionnaire.

Demographic Information

To better contextualize the information beyond this point, I am adding the demographic information collected through the questionnaires here. Most participants were white females between the ages of 25 and 34. I only had one participant who self-identified as Black and one who self-identified as Latino. Most worked between the education and service industries, with one participant working across four different industries: college education, service, health care, and public welfare. The divide between political affiliation was unexpected, with none identifying as Republicans, but three preferring not to reveal their affiliation at all. Those who

chose not to disclose their affiliation may have refused to check the Republican option because of the current political climate of 2021. Still, it could be just as likely that they didn't want speculative lines drawn between their responses and politics or that they don't believe in politicizing public health. The following tables show demographics distribution with unselected categories omitted.

Age	**18-24**	**15-34**	**35-44**	**55 +**
	2	5	2	2

Gender	**Male**	**Female**	**Non-binary**
	2	8	1

Ethnicity	**Black**	**White**	**Latino**	**Left Blank**
	1	7	1	2

Education Level	**HS diploma/GED**	**2–4-year degree**	**Master's degree +**
	2	3	6

Job Field	**Education (K12)**	**Education (college +)**	**Health care**	**Service**	**Public welfare/ Administration**	**Other (retired)**
	1	4	2	3	1	1

Political Affiliation	**Democrat**	**Nonaffiliated conservative**	**Nonaffiliated liberal**	**Prefer not to reveal**	**Other (none)**
	2	1	3	2	3

-

Version 1: Artifacts

My first two participants opted to complete our session together. After the participants completed the questionnaires, I asked them to begin reviewing and verbally assessing the printed color copies of both versions of each of the three documents in the order listed at the beginning of this section. I also engaged them in more direct interviewing between each document pairing before moving on to the next. Both document assessment interviews lasted roughly thirty minutes and were audio-recorded.

Version 2: Artifacts

After interviewing the first two participants, I noticed I was still missing out on important information on recall through flaws in my study design. To better gauge the degree of attention and recall during the document assessment process, I started having participants complete the questionnaire at the beginning of our session with the demographic information page leading off and then again at the end without the demographics page. The design and implementation of the questionnaire (discussed in the Stage 2 Questionnaire Results and Discussion Section) was the only change I made in study design between the first two participants and the third participant. The session with this participant lasted close to an hour.

Version 3: Artifacts

After interviewing the third participant and further reflecting on my work with the first two, I realized that I would need to make changes in both the artifact analysis process and materials. The first three participants had too often trailed away from discussions of the alphanumeric and image content to the differences in color between versions. While such discussion did provide some helpful information, the color differences were unintentional and varied from one computer to another and from printer to printer. Without the ability to calibrate the printers I used to match the tones of the digital documents, it became impossible to ensure

any accurate color matching. I valued content assessment more, and I decided that stripping the color out of the physical documents would be the best available method of removing color as a focus in the discussion; thus, I began printing all documents in greyscale.

Early participants also had trouble talking through their thoughts as they read because it was too different from how they usually consumed and used printed information. They would have to reread parts of the documents just before discussing those parts, so I started asking participants to

- highlight any specific words, phrases, and images that stood out to them as they read,
- note which version they felt best conveyed the most relevant information,
- circle the version they found best organized between pairings,
- note which document versions they would be more likely to read all of,
- and then walk me through their responses verbally.

The information collected visually through participant annotation of the documents and during discussion of their assessments was much richer than what I acquired during the first two versions of this stage. Interview sessions with the third and final version lasted 30 minutes on average.

Revision of Artifacts for Stage 2 and Results of Participant Analyses

As explained, some assessment and participant discussion of the revised informational materials were based on unintended factors including variation and a slight change in font between the revised versions and the self-printed original versions. I have chosen to omit the unintended parts of those first three participant discussions from this chapter but will briefly note those aspects in the conclusion. I begin each of the following subsections by providing details

about the revisions I made to the artifacts and then providing information about and discussion of the results.

"Protect Yourself from Zika" flyer artifact revision

I used Adobe Acrobat Pro DC and Microsoft Word to modify a single-sided PDF copy of the "Protect Yourself from Zika" flyer I downloaded from texaszika.org. I chose to modify only the English version since all Stage 2 participants would be native English speakers. After carefully reviewing the document to ensure it was identical to the print copies from the Zika Stakeholder's Toolkits, I removed language and images linking the document to the state of Texas and saved two copies of it. This is a relatively simple document and none of the modifications altered the layout in any way. I also kept the first recommendation of "Apply EPA-Approved Insect Repellent" and forth recommendation of "remove standing water in and around your home as they were in the original document but altered the remaining five.

I began by altering the second recommendation on the list, originally reading, "Wear pants and long-sleeve shirts." As discussed earlier, this seems like an unrealistic expectation based on what my assistant and I observed while conducting research in Texas. I therefore chose to alter this recommendation to better align with the lived experiences of those living and working in especially and typically hot and humid regions of the United States to read "cover as much skin as possible with clothing." This change should lead to a positive active or passive internal response rather than reactive response from the user because it would be perceived as a more reasonable recommendation or request.

I removed the "close windows and doors" part of the third recommendation to better align it with lived experiences and added "secured netting" as an option for those without

traditional window screens or the means to acquire any. I also phrased it as clearly as possible by adding “on any open window or door.”

Figure 19. "Protect Yourself From Zika" flyer -original and revision

In recommendation five, I kept the portion about covering containers where water can collect but did not specifically mention trash cans as the original had because the image of the garbage bin already displayed should be sufficient to convey the idea of trash cans being just such a container. I did recommend clean containers as well as covering them because mosquito egg rafts can lie dormant for extensive periods of drought and may go unnoticed by users. I also suggested clearing debris, an important preventive action missing from the original version of the document.

For the final recommendation, I simply added “nurse” as an option for medical consultation and omitted the word “your” as any doctor or nurse a user could connect with would be able to provide more information and I contend that the term, “your” assumes that the general user of the document has a consistent medical provider or the means to consult that provider.

The last thing I did to revise the document was add the image of a mosquito in the upper right of the document to ensure visual association between the word Zika and the most common vector of the virus.

“Protect Yourself…” Revision: Participant’s Analysis Results and Discussion.

The self-printed copies of the Protect Yourself from Zika flyer was the first document assessed by participants of Stage 2. Eight of the eleven participants stated they preferred the revised version overall as compared to the original version because they believed the revised version to be more informative. One of the three participants who proffered the original version stated that the original seemed shorter and that being shorter “made it seem easier to read.” The two other participants who chose the original version also offered statements about general readability with one noting particularly, that the revised version seemed “a little fancy” whereas the original seemed “dumbed down,” further suggesting that some readers may prefer less precise or scientific language in such informational documents by also stating that it “seems like a normal person wrote it (the original version), like something they (the participant) could write.” Upon reflection, the phrasing used by the participant may further suggest that at least part of the perceived effectiveness of the original version may rest in assumptions of relatability between the end user and the writer/designer of the document.

Ten participants noted the inclusion of the mosquito as especially effective because it provides immediate visual reference. Some specifically noted that the image was the primary

reminder while reading that Zika is spread by mosquitoes, and two participants said they would have "wanted more mosquitoes on it," with one asserting that having it essentially peppered in mosquitoes might even draw more people to pick the document up and engage with it. The one participant who did not claim the mosquito as being effective also did not discount the presence of the image, and I am not certain if the individual even noticed the image as that participant's only comments on the document pairing were, "I know I like the first one (original) because it's shorter, and I guess, well, I don't know, I can't really explain it, but I do like that it's shorter." This participant's response to the first, most simplistic document is of particular interest because their response to the last, longest, and most complex document generated significantly more input and obviously higher engagement. While this may suggest the potential for greater engagement with more complex informational documents offered to the public, it might still be quite difficult to get users to invest initial energy into a longer document in unstructured circumstances.

A key difference between the original and revised document was discussion of appropriate clothing selection during an active mosquito season. One of the nine participants who offered feedback about the clothing sections preferred the original version, noting that the language seemed "more direct." The other eight preferred the revised version for a variety of reasons. Four found the idea of "covering as much skin as possible" to be more reasonable than wearing long sleeves and pants. Another said the "cover skin" part seemed more realistic, since "not many people wear long sleeves and pants in the summer unless they work in a field, so it's at least a middle ground," and yet another commented that the words "cover" and "with clothing" stood out and "seems easier to comply with." One participant said that long sleeves and pants stood out in a negative way in the original because they felt "hot just thinking about it,"

and another also pointed out that “the icons seem more relevant” in the revised version based on the content of the section.

Only seven participants commented on the screen/netting recommendation for open window and doors. Three of the seven preferred the original because it includes the word “mosquito” in the text. Until participant 5 pointed out the omission of mosquito in the revised version, I had not even realized I had written it out of the recommendation, so I cannot supply a valid answer for why I failed to include the word in the revision. In fact, my immediate reaction to the comment was, “wait, what? It’s not?” One participant noted that the inclusion of the word “open” stood out on the revised version because they don’t have an air conditioner and thus felt more of a connection to the phrasing. Two liked the addition of netting, with one specifically stating that they liked the inclusion of “open” and appreciated the idea of using netting instead of screens since netting is a “much cheaper and easier DIY solution.” Participant 4 said that they felt “closing the windows and doors to block mosquitoes is obvious and unnecessary, so not having it in document two (revised) means it’s one ask instead of two, so it just seems easier.”

Two of the five participants who discussed the water collection portion of the documents preferred the original version, one because the original was “more direct,” and the other because the original “seems like less work.” The tree other participants noted that the revised seemed “more specific,” “comprehensive,” and that “clean, cover, and collect stand out more.”

The final piece of design discussed by most participants was the inclusion of nurses as a valid consultation option in the revised version. One participant preferred the original, but did not state why, while six participants preferred the revision because they generally believed nurses were more accessible and a few believed nurses often had “more up-to-date information”

because of ongoing recertification requirements. Table 14 (see appendix C) provides offers a more visual account of assessment results.

Work Outdoors? Protect Yourself from Zika" Flyer Artifact Revision

Once again, I used Adobe Acrobat Pro DC and Microsoft Word to modify a single-sided PDF copy of the "Work Outdoors? Protect Yourself from Zika" flyer I downloaded from texaszika.org and chose to modify only the English version since all Stage 2 participants would be native English speakers. After carefully reviewing the document to ensure it was identical to the print copies from the Zika Stakeholder's Toolkits, I removed language and images linking the document to the state of Texas and saved two copies of it.

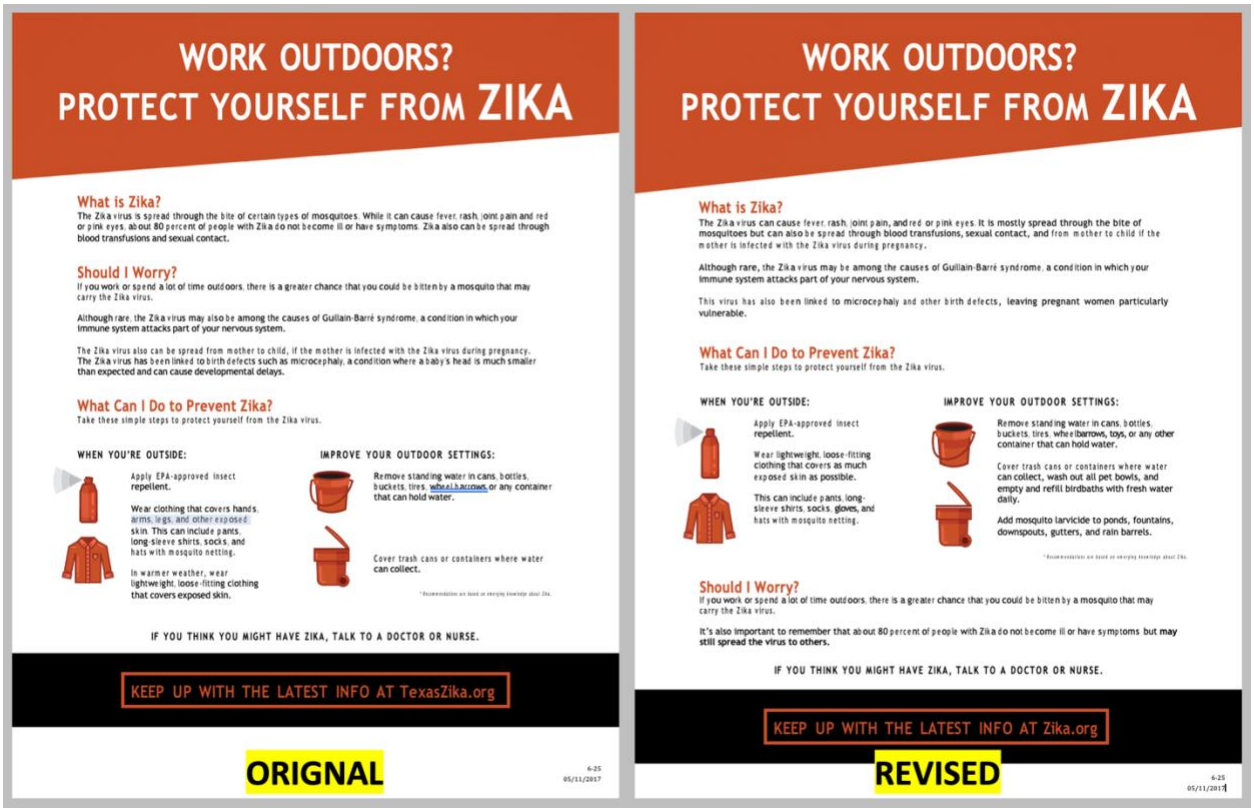


Figure 20. "Work Outdoors? Protect Yourself From Zika" flyer -original and revision

As I previously argued, I believe the information regarding the likelihood of getting sick from Zika is a better answer for "should I worry," so I removed that part from the first paragraph

in the “What is Zika?” section. I then moved the specific, most prominent risks to the beginning of the paragraph because most users would be most interested in what could happen if they contracted the Zika virus. I followed that with all the information about how the virus is spread rather than leave it divided into two different sections as it had been in the original version. The original version also divided the potential effects of Zika infection across the “What is Zika?” and “Should I Worry?” sections, so I chose to move both the information about Guillain-Barré Syndrome and birth defects from “Should I Worry?” into the “What is Zika?” section so that users would have all the information about effects upfront. Part of my rationale for altering the positions of the information was because it seems irrational to separate potential outcomes from each other as it was akin to telling someone they should only worry if they were concerned about either Guillain-Barré Syndrome and birth defects because the other symptoms are more likely to cause simple, temporary discomfort rather than long-term health problems. However, such construction ignores the reality of social interaction and community concentrations where those who display only mild symptoms or are asymptomatic still pose a threat to others in their community by way of vector transmission. This makes it important to keep their anxiety about the virus high enough to prompt their reading of the “What Can I Do to Prevent Zika?” section.

To better promote perusal of the “What Can I Do to Prevent Zika?” section, I switched its position with the “Should I Worry?” section so that information about prevention would directly follow the information about what Zika is and what it can do. On the “When You’re Outside” half, I kept the use of repellent at the top as that is the most realistically simple prevention measure users can take. I then reorganized the two recommendations after that from the original so that the recommendation for wearing lightweight, loose-fitting clothing would feature more immediately in the discussion of wearing long sleeves and pants during mosquito season. I

moved all the information about the variety of recommended clothing to the bottom paragraph. Not only did this organize the information more effectively, but it also allowed for a more condensed version without any change in intent or meaning. On the "Improve Your Outdoor Settings" half, I added more information about what to consider for mosquito breeding prevention, including cleaning out pet bows and birdbaths and other water collection points users may not think about. I kept the small font note about recommendations being based on emerging knowledge beneath the section.

As previously stated, I moved the "Should I Worry" section to the bottom and only included information relevant to threat levels. This very effectively streamlined this section of the document and should improve the information's resonance with the user. I kept the statement about working outside increasing the user's chances of contracting Zika and I added back in the information about only 80% of infected experiencing noticeable symptoms, but then improved the scientific relevancy of the statement by reminding the user that even without symptoms, they may still spread the virus to others. The remainder of the document was kept the same as the original except for removing the connection to Texas.

"Work Outdoors…" Revision: Participant's Analysis Results and Discussion.

Eight of the eleven participants outright preferred the revised version of the "Work Outside" document pairing, one outright preferred the original version, one preferred the original version based on their own age but believed the revised would be better for those of "childbearing age." One preferred the individual sections of the revised version, but the layout of the original. Assessment discussion of the "Work Outside" document pairing was much richer than the "Protect Yourself" document.

Participant 2 was the only participant who preferred the original version overall. The primary reason given for their preference was that the original seemed "dumbed down" while the revised version had too much information, so the original seemed "more like it was written by a normal person," and the revised seemed "like it was written by a professional." This participant also preferred the organization of information in the original version because they liked that "it explains what microcephaly is, as it being a developmental delay, instead of just saying it's a birth defect." This was one of the instances where being paired with another participant produced exchanges of ideas and opinions. Participant 2's partner questioned whether "just having it say microcephaly and other birth defects wouldn't just make you more likely to look up what microcephaly is?" Participant 2 responded with, "well, I mean if it just says birth defects, I'm going to imagine the worst possible thing, so I'd want to know that it's developmental delay." The participant's partner then said, "right, but imagining the worst possible thing would make me want to look it up," to which Participant 2 continued with, "I get what you're saying, but I'd still want to know." In the end, they "agreed to disagree" on the subject. However, Participant 2's rationale for preferring the original version's layout and placement of the "Should I Worry" section helps better illuminate their argument in favor of having microcephaly explained in the document. Participant 2 contended that the original document's inclusion of the "Should I Worry" section below the "What is Zika" section worked better because users could decide whether to worry about Zika in general before they worry about what they must do to prevent infection and spread. These organizational preferences affirm some user's decision making may be based on threat assessment and assessment of personal risks after viewing limited but immediately available information rather than engagement in information seeking practices. The preference for materials produced by "normal people" rather than professionals may also suggest

problems with trust of health and safety professionals without obvious medical degrees and/or a simple preference for perceived relatability. Though Participant 2 preferred the original overall, they did like the addition of information in the "Improved Setting" section of the document because it mentioned "things people don't normally think about like toys."

Participant 4 contended that the arrangement of information in the revised version of the document would be best for those of childbearing age because the information in the revised "What is Zika" section is especially relevant for pregnant women or women who may become pregnant during a Zika outbreak. However, the original version would "work fine for everyone else." Participant 4 chose the revised version over the original overall primarily because the "Should I Worry" section was at the end of the document where it "makes more sense for it to be if you want them to read the whole thing," and the "What is Zika" section contained more relevant information to make an informed decision with than it did in the original "where most people probably won't read past the 80% statistic." The second half of participant 4's argument in favor of the revised version overall gives weight to my decision to move that statistic to the bottom of the page in order to reduce the likelihood of users disengaging with the document after learning that they only have a 20% chance of feeling negative physical effects from a Zika infection. Participant 4 also noted that the order of information in the "When Outside" section made more sense in the revised version, and they also liked the addition of pet dishes and toys in the "Improve Setting" section.

Participant 10 preferred the revised sections of the "Work Outside" document but preferred the layout of the original. They found the inclusions of more important information in the "What is Zika" section particularly valuable and though it was "really cool" that the "Improved Setting" section of the revised version included "more things like toys that people

don't usually think of as collecting water," making that section much more informative. They did, however, prefer the original version's layout because they didn't want the "What Is" and "Should I Worry" sections divided. Like Participant 2, Participant 10 found it important to decide whether to worry before reading about prevention strategies. Participant 10 also preferred the original version of the "When Outside" section because they found it "more direct."

Participants 3 and 6 preferred the revised version overall, but 3 noted as Participants 2 and 10 had, that they didn't like the way the text was divided with the prevention information in the center, but 3 and 6's reason for disliking the divide was based on visual distribution of the icons. Both claimed that it made the visually quality seem "off," but participant 6 further stated that "the organization of the information makes it worth the visual sacrifice," but that adding more icons in other sections "would be able to balance it out better."

All eight who preferred the revised version overall found the revised version to be more informative and to have a better layout that "makes more sense," with two saying that having more information about Zika at the top made it seem like the document "gets to the point faster." Nine participants agreed that the "What is Zika" section of the revised version was more informative, with three noting the inclusion of information about the virus being passed from mother to fetus and the potential for birth defects as important to have "upfront." Two participants loved the inclusion of more information in the revised section, but suggested moving the fact that it is spread by mosquitos to the first sentence (as in the original version) rather than making it the second sentence, and one participant pointed out that the original version's inclusion of the 80% statistic in the second sentence on the page made it seem "like the author was downplaying the situation, so a lot of people may not even make it past the second sentence before they stop reading, so it defeats the whole purpose of making the flyer to begin with."

Their statements further support my own argument for altering where that information was conveyed on the document (in the last sentence of the last main informational section of the page).

Nine participants preferred the revised version of the "Should I Worry" section even if they didn't all approve of the placement. Three preferred it in part because the revised version was shorter, and they believe that deciding whether to worry should be easy once you know more about what it is you may want to worry about. Two participants noted that the 80% statistic made more sense in this section than in the "What is" section. Three said that it was important to know how to prevent Zika and that Zika was something that could be prevented before they decided whether they should worry about it. One participant advised me to make the heading for the "Should I Worry" section larger, and another one pointed out—much to my delight— that "it would be nice if someone also explained how it spreads from person to person because everything so far just makes it seem like mosquitoes just magically have it and don't point out that they get from biting people that have it. That's why people don't see it as so much their problem if they aren't pregnant and aren't scared of getting sick from it. They don't get that no one gets to be an innocent bystander, you're part of the problem or part of the solution and that's it." In the interest of full context and disclosure, the participant said before we began the session that they had been arguing with people over wearing masks (a prevention strategy during the currently ongoing COVID-19 pandemic) all afternoon, so their perspective may easily have been colored by those very recent interactions.

Only seven participants discussed their reactions to the "When Outside" section of the document pairing. One, participant 10, as previously discussed, preferred the original version of this section, saying it seemed "more direct," but two participants said the revised was better

because it provided more information, two also said the order of information was better in the revised version. One participant said the revised version made more sense because "version 2 (the revised version) doesn't tell you to cover your hands, which seems ridiculous in summer if you're not working in a field or in a garden." Participant 11 argued that "'cover as much skin as possible' seems more reasonable, but info about what to wear specifically just seems unnecessary in both versions." Upon reflection, I am inclined to agree.

Ten of the eleven participants preferred the revised version of the "Improve Setting" section, and one moved on to the next document without mentioning the "Improve Setting" section at all. All ten agreed that the revised version was more informative with eight appreciating especially the inclusion of items that people do not usually think of as collecting water, and one noting the inclusion of water treatment as particularly necessary. Two of the participants also believed that the revised version of the section was better "balanced" visually.

Overall, I believe my revised version of the "Work Outdoors" document is a successful example of increased information being worth the additional length as the only mentions of altered length was between the "What is" and "Should I Worry" sections, and the additional length was considered a positive factor in determining preference. I am a bit disappointed that none of the participants mentioned the addition of the phrase "leaving pregnant women particularly vulnerable" because I believed that people would "care" more if the safety of pregnant women was threatened by the virus. Perhaps the seeming lack of notice of the revised phrasing resulted from none of the participants being pregnant or being close to any women who are currently pregnant. Table 10 (see appendix E) provides offers a more visual account of assessment results.

"Zika Virus Prevention" Info Card Artifact Revision

To revise the accordion-style info card, I took photos of the original using my iPhone and then altered them using the graphic design programs, Procreate and Over, along with Microsoft PowerPoint and royalty free vector images from PNGtree.com. Unlike artifacts from the "Zika Stakeholder Toolkit," digital versions of the info card are not easily available online. Though I had to build the copies for revision from scratch rather than simply altering the text of a preexisting digital version, I generally retained the layout and design of the original except for image alterations required by my inability to access the specific images used in the original document. After carefully reviewing the document to ensure it was as identical as possible to the copy obtained from the Pregnancy Resource Center in Harlingen, I removed language and images linking the document to the state of Texas and saved two copies of it. Figure 9 offers a visual comparison between the original and the full revision.

In the first panel on the front side of the unfolded card, I replaced original graphics with approximations available through the service PNGtree.com and the Shapes function of PowerPoint, removed the reference to Cameron County, and then added back in a makeshift rendering of the "Department of Health and Human Services" text in the round shield behind the image of the caduceus. In the second panel, I kept the phrasing of the first statement about Zika's spread and common symptoms but altered two small segments of the second statement from the original, "danger to pregnant women" and "have been reports of microcephaly," to "danger to

Figure 21. Accordion-style Zika Info Card -original and revision

babies in utero" and "are increasing cases of microcephaly." As discussed in the analysis of this document, this alteration in language may increase the protective drive of not only pregnant women on behalf of their fetus, but also the protective drive of others by suggesting Zika prevention as protecting "babies" rather than just protecting pregnant women.

In the third panel, I chose to make several alterations to improve messaging. There were originally four bullets offering "facts" about Zika and the especially important fact that many people who contract the virus may never develop symptoms or be tested and thus easily and unknowingly spread the virus does not appear in the list. To correct this omission, I added a bullet conveying that information to the top of the list. In the other bullets, as discussed in the analysis, I moved forward with changing the

language of “avoiding mosquito bites” to “preventing” them and then combined the bullet about other viruses spread by the Aedes mosquito with the bullet about them being daytime biters. This allowed me to move the bullet about there being no available vaccination to the end of the list while keeping the list limited to four bullets.

All I did in the final panel of the front side was swap references to and the contact information for Cameron County with CDC references and information.

On the back side of the unfolded document, I added to the title of the two-panel segment “Drain & Cover,” changing it to “Spray, Drain, and Cover” because the original title failed to effectively reflect the recommendation to use insect repellent. As discussed in the analysis, I moved two of the seven bullets from their original positions to the top of the list: using mosquito repellent in general and not using it on children under 2 months of age. The only alteration made to these bullets was to the first, removing the “Environmental Protection Agency” included before the “EPA” abbreviation in order better condense the information without altering meaning or purpose. I added “cover containers that could collect water” to the recommendation for draining standing water, moved it down the bullet three, and also added the word “help” as I believe it should be clearer that performing these preventive measures won’t guarantee an end to mosquitoes breeding on a person’s property, but that these measures will help with the problem. I moved the bullet about wearing long-sleeved shirts and pants down from bullet two to bullet four and altered the phrase, “cover your skin, to read, “cover as much skin as possible,” before adding the term “lightweight” to the phrase “long-sleeved shirts and pants. I then added the word “outdoor” to clarify the type of “gear” meant in the permethrin recommendation. I moved the position of the recommendations for children’s

clothing and use of mosquito netting for infants from bullet six to bullet five because it made more sense to include it after the one for adult clothing rather than keeping the two divided by other bullet points. To continue the logical order of the "cover" theme, I moved the recommendation to cover doors and windows so it follows the clothing recommendations and then changed the statement a bit from "cover doors and windows with screens…" to "cover all open doors and windows with screens or secured netting…" to make the statement more actionable for those who lack traditional window screens and screen doors and may be unable to acquire any. The last bullet point in the revised version is about using a bed net to sleep. For this one, I dropped the phrase "if you are not able," replacing it with "if you have trouble" to avoid any potential challenge to or diminishment of the reader's sense of agency. This phrasing better recognizes that protecting yourself from mosquito bites may prove difficult but doesn't suggest an inability to do so. I also added a sense of communal responsibility and value by adding "members of your household" after the individualistic reference, "yourself." The changes to this first half of the back side of the document address all three of the major communication failings of ignoring lived realities, discounting social structures, and cognitive overload.

The third panel of the back side of the document is titled, "if you have Zika virus…" and offers two bullet points. As I noted during my analysis of this segment, the first bullet point on the original version ignores the reality that some who have been diagnosed with Zika may be unable to avoid mosquitos and their bites, so I expanded on the recommendation and altered it to improve recognition of the potential conflict with needing to engage in activities that might expose the infected person to mosquitoes. I

believe I achieved this through the phrase, “try to avoid exposure to mosquitoes” and “use repellent any time mosquitoes cannot be avoided.” For the second bullet point, I avoided using any bold font as a method of highlighting abstinence as a recommendation and rolled the abstinence recommendation into the previous sentence about protected sex so that abstinence becomes a preventive option rather than an oddly highlighted standalone recommendation.

The final panel of the back side of the info card is about building a “Zika virus prevention kit.” The only change I made for this panel was to reorganize the first column of three bullet points, moving insect repellent to the top of the item list and placing the bed net in the middle. The only goal here was to better highlight insect repellent as the most readily available and important tool for prevention of Zika.

“…Prevention” info card artifact revision” Participant’s Analysis Results and Discussion.

The final document pairing of each session was the info card. Seven participants very clearly preferred the revised version of the Zika Virus Info Card over the original version of the document while one clearly preferred the original version. One participant preferred the revision by only a small margin, one didn’t really prefer one version over the other at all but named the revised version when pressed, and one other participant said they preferred the first half of the original version, but the second half of the revised version because of personal interests and the “common” language used. Six participants cited organization as a primary factor in selecting the revised version overall with one noting specifically that the first bullet points on each panel were “the most important features in it (the document) because most people are going to read all of it anyway, it’s

just too much." Seven participants said the revision was more informative, and two cited the "homey" feel of the revision and that the revision feels like it "knows people." One preferred the more defined icons of the revised version and another recommended removing the permethrin info due to toxicity concerns and adding clearer images of mosquitos. Two participants also pointed out that "no one is going to read this whole thing."

Participant 8 preferred the original version of four of the six panels for consideration in the document and preferred the original overall because "the information is more personally relevant." In panel 1, the participant said they preferred the use of "pregnant" as a descriptor in the original over "in utero" on the revision. Three other participants echoed this sentiment because "pregnant women" (used in the original version) "sounds simpler," "more common," and less "weird" than "babies in-utero" (used in the revised version). Three participants preferred the revised version of Panel one because it placed the importance on the danger to babies rather than on the women carrying them. One participant preferred the order of the bullet points in the revision, and one noted that the revised panel was "more visually appealing for some reason, even though they have equal information." One participant did not comment on panel 1 at all, and two participants only skimmed panels 1 through 4 due to burn out by that point in our sessions.

Participant 8 also preferred the original version of panel 2 due to the inclusion of the vaccine information as the first bullet point on the panel. This preference and rationale were shared by four other participants who also viewed availability of vaccines as paramount. One participant preferred the phrasing of the revised bullet points but

argued that the vaccine information should have remained as the first bullet on the list. Three other participants contended that the revised order was more effective because "it's more important to know that can be contagious even if you don't feel sick."

Despite choosing the original version overall, participant 8 preferred the revised version of panel 3, but only because it was shorter, and the original version of panel 4 for the same reason. Several participants did not initially realize that panels 3 and 4 were two halves of a whole until I pointed it out, and so two said they would prefer the original version of panel 3 if the panels were entirely separate but preferred the revised versions when paired with panel 4 because they much preferred the revised version of panel 4. Six participants cited the order of and quality of information as their primary reason for choosing the revised panels. One participant stated that they chose the revised version of panels 3 and 4 because the original was too focused on children, while another participant said they preferred the revision because it focused better on family, and not just self. It would have been beneficial to have the two participants paired to make better sense of the conflicting perspectives, but both had opted for solo sessions. Two of the participants noted the addition of "spray" in the revised heading and did not understand why it was omitted in version 1 (the original). Participant 10 argued that the revised was most effective specifically because "spraying is mentioned first and it's the most important, easiest thing to do. Draining and covering stuff seems like a lot of work, so no thanks, and I am not wearing long sleeves and pants in the summer in North Carolina, so version 1 doesn't work for me." Participants 5 and 6 skipped both panels.

Only nine participants responded to panel 5 and all of them preferred the revised version. One chose the revised because they found it more informative, another because

they found it better organized, another because it was shorter, and another because they liked that "'infected' was used in place of 'ill' and you can feel fine but still be infected." Seven of the nice noted some version of "hating" or feeling "insulted" by being told to "abstain" or "just not have sex" in the original version and argued that it should not have been emphasized.

Seven participants said they preferred the revised version of panel 6 because of the order of the bullet points with repellent being listed as the first tool for prevention in a Zika prevention kit. Table 9 (see appendix E) provides offers a more visual account of assessment results.

The participant's assessments of the info card provided useful information, but less information than I had hoped. I suspect the more limited degree of assessment and discussion offered by participants had more to do with session burnout than with the length of the document or amount of information contained therein. I had separated each panel and presented them individual with the exceptions of panels 3 and 4, so none of the participants were presented with the full and easily overwhelming versions of the document pairing until I asked them to identify the version they preferred overall. It was at that point that some said no one would ever read the entire document. However, when I showed them the original card from Texas and a copied version bent into its proper accordion shape, most suggested an increased perception of value to having the card available for individuals before, during, and after outbreaks, and some even pointed it out that access to such a document could be useful for the COVID-19 pandemic.

As our sessions were ending, I asked most participants (as explained in the Section 2 Questionnaire Design section of this chapter) to complete the questionnaire one more time to gauge how much information they had retained from the documents.

Stage 2 Questionnaire Design

As previously stated, before beginning each session and at the end of all but the first two sessions, I asked participants to complete a much shorter version of the original questionnaire I had used in Harlingen, Texas. I employed two versions of the questionnaires as revisions to the content were required to better gain useful insights.

Version 1: Questionnaires

I asked my first two participants to complete the Public Perception of Zika questionnaire only at the beginning of the session. The questionnaire included five demographic questions about age, sex/gender, ethnicity, education level, and political affiliation or self-classification. I included the question about political affiliation to better understand whether political perspective played a noticeable role in responses to questions of responsibility. The questionnaire also had seven questions designed to gauge knowledge about Zika and sense of responsibility and efficacy (see appendix D).

Version 2: Questionnaires

After interviewing the first two participants, I noticed I was still missing out on important information on recall through flaws in my study design. To better gauge the degree of attention and recall during the document assessment process, I started having participants complete the questionnaire at the beginning of our session with the demographic information page leading off and then again at the end without the demographics page.

To further improve the value of the information I collected through the questionnaire, I also added two new questions. The first new question was:

8. What would be your 2 greatest barriers to preventing Zika?

- ○ I don't think about using repellent until it is too late
- ○ I don't use chemical repellents on my body
- ○ It is too hot in the summer to wear high-coverage clothing
- ○ I can't afford repellents
- ○ I don't have access to prevention tools like screens and mosquito netting
- ○ Even if Zika was present in my community, I am not likely to get it

I added this question because the more I thought about the data I had produced from Stage 1, I regretted never asking more directly about barriers to active personal prevention. The second question I added was a set of 4 scaled questions:

9. On a scale of 1 to 5, with 1 being unlikely and 5 being very likely, how likely are you to:

Wear Mosquito Repellent 1 2 3 4 5

Use screens or netting on windows and doors 1 2 3 4 5

Wear high-coverage clothing 1 2 3 4 5

Buy Repellent wipes from a vending machine 1 2 3 4 5

I chose to ask questions about repellent, screens, and clothing using a scale because I had asked in the original questionnaire if they would use those methods in the next six months but did not question their odds of using them. I also considered it a convenient way to approach asking the last question in the set, which could have filled another gap in the first stage of my research. During this study, I hoped to determine the potential of increased prevention by active site-specific barrier removal. The method I wanted to employ was making mosquito repellent more readily available on-site in public parks via trailhead and restroom area repellent wipe vending machines. Still, I was unable to

navigate the logistics within a reasonable timeframe. However, to attempt to find some answer to the question of inconvenience and memory as barriers, I added: "…how likely are you to buy repellent wipes from a vending machine" to the list of scaled questions.

The addition of these questions resulted in the final version of the questionnaire. Of the nine numbered questions, four gauged knowledge about Zika and its transmission, three gauged perception of responsibility and the potential for prevention, one provided data on prevention barriers, and the four-part question 9 provided data about active prevention.

Questionnaire Results and Discussion

I printed a master list of questions and responses for pre-and post-questionnaires to extract the first data set from the questionnaires. I tallied the responses from all eleven pre-surveys for the demographics and knowledge and perceptions about Zika sections before opting to silo the data from the first two participants since I did not ask them to complete the post-assessment questionnaires.

Knowledge about Zika

Questions 1, 2, 3, and 5 gauged knowledge about Zika and its transmission. I provided correct and incorrect options for each question for participants to select. For example, question 2 asks about the most common symptoms of Zika infection, and the choices I gave were: conjunctivitis, fever, skin rash, joint pain, swollen feet, and sneezing. Only the first four listed here are correct, with my determination of "correctness" based on scientifically supported information confirmed by the CDC and WHO. By comparing the number of correct responses given by participants when questioned before reading the informational documents and the number of correct

answers afterward, I could tell if engaging with the documents actively increased the participant's knowledge (see Tables 5, 6, 7, and 8 with "correct" answers highlighted by yellow cell backgrounds)

1. Can Zika be spread by those infected even if they show no symptoms of illness?			
Options:	**Pre-**	**Post-**	**Difference**
Yes	3	9	+6
No	2	0	-2
Maybe	4	0	-4

Table 5

2. Which of these are common symptoms of Zika?			
Options:	**Pre-**	**Post-**	**Difference**
Conjunctivitis	1	5	+4
Fever	8	8	-
Swollen Feet	1	2	+1
Skin Rash	7	9	+2
Joint Pain	5	9	+4
Sneezing	1	0	-1

Table 6

3. Over the course of a 24-hour day, when do you think you are most at risk of getting Zika from mosquitoes?			
Options:	**Pre-**	**Post-**	**Difference**
Day	1	7	+6
Night	0	0	-
Both	7	2	-5
Not Sure	1	0	-1

Table 7

5. Based on your current knowledge of Zika transmission, which of the following could you do to protect yourself and others from contracting Zika?			
Options:	**Pre-**	**Post-**	**Difference**
Nothing	0	0	-
Mosquito net	5	8	+3
Mosquito repellent	8	9	+1
Fires or smoke	3	0	-3
Citronella or other plants/chemicals as mosquito deterrents	7	4	-3
High coverage clothing	7	8	+1
Eating more pickles/garlic	0	0	-
Condom use or abstinence	3	9	+6
Avoiding sex if pregnant or with pregnant women	2	7	+5
Clean and treat or cover rain barrels and other water storage systems	8	9	+1
Clean gutters	7	7	-
Grow catnip or mint around my house	3	1	-2
Mark this option no matter what	6	6	-
Avoid watering lawn or using water features	3	2	-1
Clearing trash and debris that can collect water	6	9	+3
Fumigation	3	4	+1
Larvicides or mosquito/larva consuming animals	6	3	-3
Playing loud music	0	0	-
Use window and door screens or secured netting	8	8	-

Table 8

Based on the significantly increased frequency of correct responses after participants worked with the informational documents, it seems clear that genuine engagement with information about health and safety hazards, like viruses, and the risks and preventive measures associated with those hazards easily and quickly improves knowledge and awareness. However, without asking participants to complete the questionnaire again later, it is unclear how long individuals might retain what they have learned from these documents. It also would have helped to conduct a third stage of research in which new participants would engage with only one version of each of the three documents, better revealing which versions were most effective at communicating relevant, memorable information without the default repetition that comes from reviewing multiple versions of the same information.

Perception

Questions 4, 6, and 7 gauged perceptions. I created Question 4 to gauge participant perception about whether Zika outbreaks can be prevented. While some may argue that there are right and wrong answers to this question, I contend that a response of "maybe" would be the closest to being a correct answer because of the complexity of transmission with such a pervasive species being the primary vector. Interestingly, of the yes, no, and maybe options I offered in the questionnaire, two of the three who had selected "maybe" in the first round changed their response in the second, with one choosing no and the other choosing yes (see appendix D). With both the pre and post questionnaire, most participants indicated their belief that outbreak prevention was possible.

Questions 6 and 7 asked about perceptions of responsibility for sharing information (question 6) and preventing outbreaks (question 7). Responses to question 6 (see Appendix D) from the first questionnaire completions showed that all participants believed medical and health care providers were responsible for sharing information about virus outbreaks in their community. However, one participant had changed their mind when they completed the questionnaire the second time. While only seven participants indicated that the CDC held some responsibility for sharing information when they completed the questionnaire the first time, all nine believed it when taking it the second time. Only participants 5, 6, 8, and 9 believed sharing information was everyone's responsibility.

Question 7 asked who should be responsible for prevention (see appendix D). When completing the questionnaire the second time, only seven out of nine participants believed that they (individuals) bore any responsibility for preventing outbreaks, down one from the first completion. Six believed that medical and health care providers held some responsibility, while only four felt the same of clinic personnel. Only five indicated that the CDC and WHO were responsible, and only four thought the national government should be accountable. Participants 5 and 8 had indicated it was everyone's job to share information, but not everyone's job to prevent outbreaks, while participants 6 and 9 believed it is everyone's responsibility to both share information and prevent outbreaks. Participant 4 contended it is only an individual's responsibility to prevent outbreaks, and participant 10 believed the onus for both should be placed solely on medical and healthcare workers and the CDC.

What makes the numbers noted here for question 7 particularly problematic is that everyone did not agree that individuals were responsible for prevention. Even though only two of the nine participants did not feel any personal responsibility for preventing outbreaks, if the numbers of the admittedly small-scale study were to translate to a larger scale, that would be an enormous number of people genuinely believing they bore no responsibility for outbreak prevention whether because of low senses of self-efficacy or agency. In fact, the 22% who claimed no responsibility during stage 2 somewhat echoes the 35% who claimed no responsibility in the 40-participant stage 1 study. Unfortunately, the use of the questionnaire both before and after revealed that reviewing the documents did not result in a higher number of respondents feeling more responsible for prevention, and even led one participant to remove themself from the list of responsible parties. Discovering this led me review the documents again to figure what the disconnect might be between providing a lot of information about prevention and users still feeling no sense of responsibility for prevention. Based on a reassessment of the documents through the specific lens of increasing a user's sense of responsibility for prevention, I came to a few potentially useful conclusions.

While phrases like "protect yourself from Zika" and "what can I do to prevent Zika" seem like they should convey a strong sense responsibility, they may not be effective for many users simply because they aren't explicit enough. In chapter 4 of the textbook *Everyone's an Author* (Lunsford et al., 2021), non-native English writers are reminded that, "in US academic English, writers are usually expected to provide direct and explicit statements that lead readers, step by step, through the text" (42). If direct and explicit is what we have trained Americans to expect, then perhaps that's exactly what is

missing. In 1947, the Ad Council coined what is arguably one of the most well-known slogans ever created in the US, “only you can prevent forest fires” (*About the Campaign*, 2021). According to an article on History.com, the ultra-explicit phrase was so effective over the course of its 75 years that it is “thought to have turned public opinion against burns of any kind,” including necessary controlled burns, thus decreasing the frequency of controlled burns and, in turn, literally adding fuel to the fires that did break out (Blakemore, 2019). In fact, smokeybear.com claims the 2001 change to "Only You Can Prevent Wildfires" was “to clarify that Smokey is promoting the prevention of unwanted and unplanned outdoor fires versus prescribed fires” (*About the Campaign*, 2021). Arguing that making such a simple change as adding an explicit statement like “only you can prevent Zika” or the more direct “stop Zika in its tracks” could make a difference in uptake and active prevention may seem like a stretch, but what if?

4. Can Zika outbreaks be prevented?			
Options:	**Pre-**	**Post-**	**Difference**
Yes	5	6	+1
No	1	2	+1
Maybe	3	1	-2

6. Who should be responsible for sharing information about virus outbreaks in your community?			
Options:	**Pre-**	**Post-**	**Difference**
Family	5	4	-1
Friends	5	4	-1
Neighbors	5	4	-1
Community leaders	6	6	-

Medical/health care providers	9	8	-1
Religious leaders	4	4	-
Clinic personnel	5	6	+1
Pharmacies	5	5	-
Radio stations/social media groups	4	4	-
Local government	7	6	+1
CDC	7	9	+3

7. Who should be responsible for preventing virus outbreaks in your community?			
Options:	**Pre-**	**Post-**	**Difference**
Self	8	7	-1
Family or Friends	7	6	-1
Neighbors	7	6	-1
Community leaders	6	5	-1
Medical/health care providers	6	6	-
Religious leaders	3	4	+1
Clinic personnel	4	4	-
Pharmacies	2	4	+2
Radio stations/social media groups	2	4	+2
Local government	6	5	-1
National Government	4	4	-
CDC or WHO	5	5	-

Barriers

Question 8 was the only question I included about barriers to engaging in preventive measures. Most participants contended it is too hot in the summer to wear

high-coverage clothing and that they don't usually think about using mosquito repellent until it is too late. Having repellent available at major trail heads or near restrooms in recreation areas would help remove this barrier for those going into natural areas and at outdoor events. However, such strategies would not change people's behaviors in and around their own homes and neighborhoods. It is possible that creating a convenient sign to hang on the back of a front and back door with seasonal visual checklist including repellent could be useful and potentially marketable.

8. What would be <u>your</u> 2 greatest barriers to preventing Zika?			
Options:	**Pre-**	**Post-**	**Difference**
I don't think about using repellent until it is too late	9	7	-2
I don't use chemical repellents on my body	1	1	-
It is too hot in the summer to wear high-coverage clothing	8	6	-2
I can't afford repellents	1	1	-
I don't have access to prevention tools like screens and mosquito netting	0	0	-
Even if Zika was present in my community, I am not likely to get it	0	1	+1

Active Prevention

Four-part question 9 asked respondents to share their likelihood of engaging in specific methods of active prevention using a one to five scale with five being most likely. For each of the four questions, reported likelihoods increased for some participants when completing the post-study questionnaire. Two people became more likely to wear mosquito repellent, moving up from a four to a five. The likelihood of using netting, window, and door screens increased by one point for one participant up to a five and by

two points for another, also up to a five. The wearing high-coverage clothing category also showed an increase for two participants from a four to a five. The final category of buying mosquito repellent wipes from a vending machine only saw an increase from one participant, moving from a four to a five. While three of the four categories saw increases in likely prevention from two participants, it is worth noting that it was not the same two participants for any of them. What makes this especially important is that improvements only happened among participants with initial selections of three or higher on the scale. Those who selected one or two originally did not change their prevention decisions at all after reading the informational materials. While this study was completed with a very small number of participants and cannot be considered representative, this hints that those who start low on scales of "likeliness" or willingness to change behaviors are less capable of being swayed, meaning also that a certain percentage of the population may always remain beyond the bounds of influence.

9. On a scale of 1 to 5, with 1 being unlikely and 5 being very likely, how likely are you to:

9a. Wear mosquito repellent?

Options:	**Pre-**	**Post-**	**Difference**
1	4	4	-
2	0	0	-
3	1	1	-
4	2	0	-2
5	2	4	+2

9b. Use screens or netting on windows and doors?

Options:	Pre-	Post-	Difference
1	0	0	-
2	0	0	-
3	3	1	-2
4	0	1	+1
5	6	7	+1

9c. Wear high-coverage clothing?			
Options:	**Pre-**	**Post-**	**Difference**
1	2	2	-
2	2	2	-
3	1	1	-
4	4	2	-2
5	0	2	+2

9d. Buy Repellent wipes from a vending machine?			
Options:	**Pre-**	**Post-**	**Difference**
1	3	3	-
2	0	0	-
3	0	0	-
4	1	0	-1
5	5	6	+1

Final Discussion of Stage 2

As shown in this chapter, analyzing, revising, and testing the informational risk mitigation and prevention documents previously available to residents in areas under threat with viral hazards can allow campaign and document designers opportunities to learn more about their target demographics and how to more effectively improve engagement with and retention of important written information and uptake of recommended strategies. While there are several flaws in the design of my study due largely to poor management of the Zika pandemic, I believe there is still value to the data I have collected and the health and safety campaign recommendations I offer in the concluding chapter as urgency to better communicate during times of pandemic threat continues to grow.

Chapter 5: Conclusion

Overall, perceived threat levels were quite low in Harlingen, Texas when I arrived. The Zika pandemic had been over for more than a year by that point, and the human memory for such crises is remarkably short. Because of the low sense of threat perceived by those I surveyed, it is difficult to derive any reliable assessment of what negative outcomes or Zika associated risks, such as flu-like symptoms, would have been primary concerns going into or even during the Zika outbreaks of Hidalgo and Cameron counties in Texas. In Chapter 1 I said that work like I was undertaking should begin with risk understood as the "probability of something bad happening," and then experts and campaign designers can work with the affected community to:

- best define what forms of "bad things" are most relevant to which portions of the community.
- effectively explain probability rates to community members in ways that lead to the most accurate understandings of threat levels.
- best express Zika infection alone as a primary hazard with a high threat level to those most likely to believe they fall into a low or no-risk group.
- frame communication around the values that shape community responses to hazards, threats, and risks.

Based on the data I collected in stage 1, the most relevant forms of "bad things" were flu-like symptoms and risk of birth defects. For males the risk of birth defects would be very low, however, by remembering the prevalence and pervasiveness of the vector, we know that every male bitten adds to risk of children with birth defects being born in the community despite the males themselves being in the low risk/low threat level

population. This means that the advice given by participants in stage 2 about ensuring documents better convey how the virus is transmitted between humans and mosquito vectors. None of the three documents I revised took that clearly necessary approach, thus reducing perceived threat in males or females not of childbearing age or not intending to have children or get pregnant during an outbreak. As one participant explained, the original "Work Outdoors" flier worked well for her, but the revised would be better for a woman of childbearing age.

Perhaps the most effective way of communicating complex technical information about preventive strategies for vector borne pandemic hazards like Zika would be through narrative designs that can more easily explain how the virus spreads, focusing on community overall but with segments that speak to those more concerned with protection of self or family. In "One Size Does Not Fit All: The Case for Tailoring Print Materials" (1999), authors Kreuter, Strecher, and Glassman contend that tailoring print health messages can be akin to playing with Legos to construct a wide variety of objects using a comparatively tiny number of the same blocks over and over in different combinations. So, having a narrative of pandemic transmission built into a specific number of blocks with the potential for different characters to surface based on the targeted audience as part of the prevention narrative, you could create a significant number of tailored stories for varied audiences to engage with. The authors also note that tailored health messaging should adhere to a five-step development process.

1. Analyzing the problem and its determinants
2. Developing an assessment tool
3. Creating tailored messages that address variation on determinants

4. Develop a database to store responses
5. Develop an algorithm to link assessment to communication components

The system laid out in the "One Size Fits All" article is familiar in that it is similar to the methods I have employed in this study and in that I believe some of the original documents I have analyzed in this study seem to have a building block structure to some degree as well, specifically the "Protect Yourself" and "Work Outdoors" flyers.

Ideally, a third stage in this study would have seen me create an entirely new set of campaign materials based on what I learned from stage 2 participants using a building block approach that incorporated more narrative elements, visual elements, and direct phrasing—only YOU can prevent Zika—for the more complex documents that would be distributed through direct mail or, more effectively, distributed door to door in communities. I would avoid using the word "protect" for documents targeted to the individualistic members of a region, choosing to frame the documents' information as prevention rather protection to guard against the assumption that outbreak has reached the point of "save yourself." "Protect" would only be used on documents targeted to the communally minded reducing potential ambiguity and capitalize on savior and helper mentalities. Adding multisized, realistic images of mosquitos, as suggested by another stage 2 participant could also make print documents more noticeable and memorable since information processing is, as posited by Williams and Noyes (2007), context-dependent and heavily impacted by "warning signals." Because warning signals are functionally akin to linguistic signifiers that mandate specific reactions, life-size images of mosquitoes on a flyer or brochure may also subconsciously trigger both mental and physical responses to the documents and adding a splash of red as a universal warning

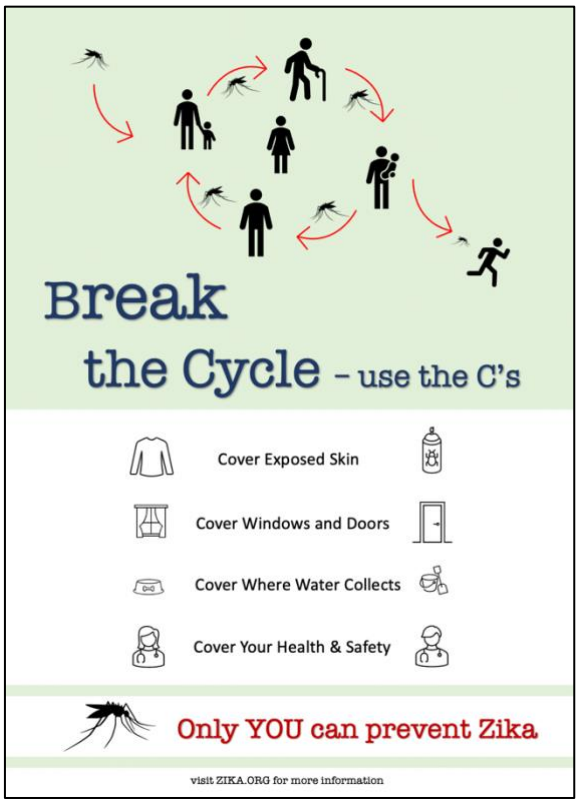


Figure 22. Example of block designed Zika Campaign flyer 1

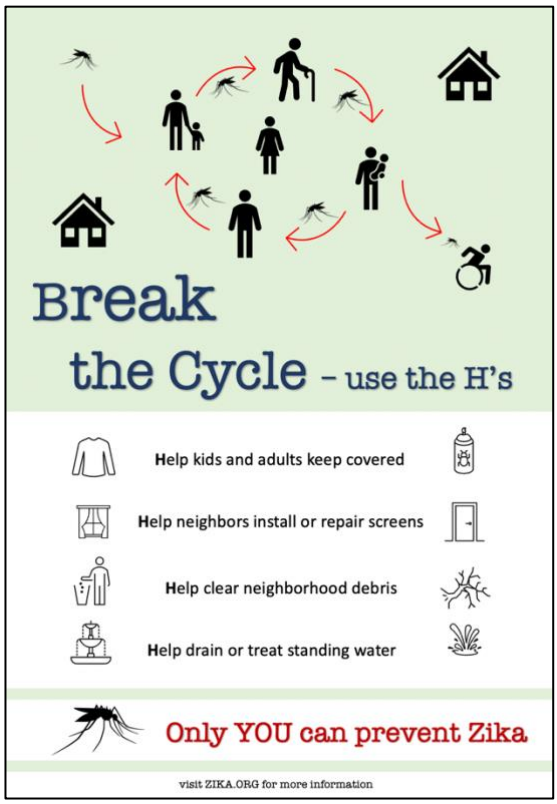


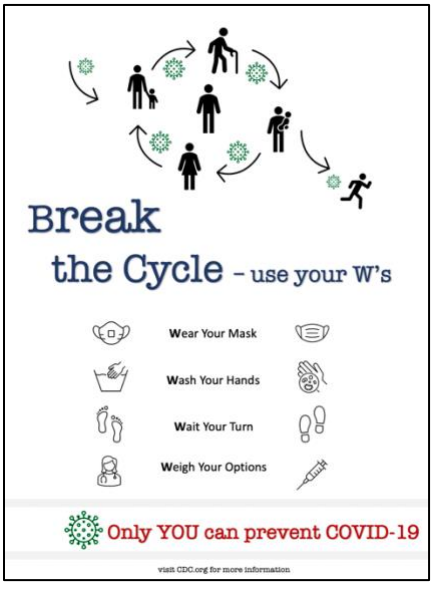
Figure 23. Example of block designed Zika campaign flyer 2

signal for Americans could strengthen the message even further. Such designs need not be overly complicated textually or graphically, nor do they any more than two or three colors to stand out. Figures 21 and 22, for instance, are more textually simplistic, visually stimulating, direct, and use a visual narrative or transmission and more warning signals than the Texas "Protect Yourself" flyer. The central figure and background color are easily alterable, the text elements could be reordered or swapped out with other, situationally relevant instructions, and the one connecting element across a block built

print campaign could be the statement, “only YOU can prevent Zika.” A similar design could be used to communicate about other pathogens too as shown in figure 24.

Part of building an effective campaign using tailored print documents is determining the best methods of getting those documents into the hands of the public. As suggested in the Sorenson, Jordan, and LaDeau (2017) study highlighted in Chapter 1 as one of the studies I sought to intentionally build on, personally engaging with community members to relate Zika information may be part of what made the reframing of their selected documents effective. Tyler, the zoonotic specialists I met with at the health department in Harlingen had, as previously discussed, also hoped I had come equipped with a team that could canvas entire neighborhoods instead of just parks. Engaging with the public physically would be an important first step in establishing trust with those you hope will utilize your materials. In this way, you can effectively shift residents’ perspectives, so they are better able to see those engaged in ground work as people rather than nameless, faceless entities telling them how to live, and, by deliberately selecting targeted health care print materials for those you meet, you can also boost their sense of agency, provide adequate information and recommend resources that can help them if they have more questions, thus reducing their need for unguided information seeking online or in other spaces where false information is abundant. This approach would also reduce the potential for cognitive overload and even health threat fatigue. Collectively, a

Figure 24. Example of block designed COVID-19 Campaign flyer



boots on the ground approach with a variety of carefully targeted materials could counter nine components of the three common communication failings discussed in chapter 2. By getting to know your target audience even a little, you can better understand how to connect with them through other local agents, like churches, local law enforcement, and boards of education. Building a communication web within communities, especially marginalized or particularly vulnerable communities provides greater opportunities to complete occasional reevaluation of campaign materials and strategies as community priorities shift.

This boots on the ground, tailored, proactive approach to pandemic hazard could make significant differences in future pandemic crises. I fear it is too late for such an approach to benefit the public in mitigating risks with COVID-19, our current widespread, life altering, ongoing pandemic. There is much we should have learned about public communication from the Zika pandemic, but robust research studies and relevant expert arguments have too much trouble competing with the political and mass media machinery that drives capitalism and pushes conspiracy theories like Monsanto engineering Zika and China designing COVID-19. American society also seems to suffer collective amnesia following each pandemic regardless of how long it lasts, or the suffering endured. However, intergroup contact theory and volumes of research on empathy, mindfulness, and the 20-60-20 rule as applied by researchers like Dolly Chugh (2018) outside of a business model, can remind us that we can best promote social cooperation and positive behavioral change by working with those we want to reach instead of around them. There is no effective one size fits all or most health or wellness campaign, and we, as rhetoricians and technical communicators have the knowledge and

tools to create positive change and improve uptake of preventive, proactive measures through assessment and revision of current and previous campaigns. It's time we stop waiting to be offered a seat at the table as others prepare for and work through times of crisis. Our voices and ideas have value, so it's time to claim a chair of our own and break into the conversation. This study is my chair.

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Appendix A

IRB Approval Letter

EAST CAROLINA UNIVERSITY
University & Medical Center Institutional Review Board
4N-64 Brody Medical Sciences Building· Mail Stop 682
600 Moye Boulevard · Greenville, NC 27834
Office **252-744-2914** · Fax **252-744-2284** ·
www.ecu.edu/ORIC/irb

Notification of Exempt Certification

From: Social/Behavioral IRB
To: Abigail Morris
CC: Erin Frost
Date: 3/8/2019
Re: UMCIRB 19-000193
Zika Rhetoric

I am pleased to inform you that your research submission has been certified as exempt on 3/8/2019. This study is eligible for Exempt Certification under category #2ab.

It is your responsibility to ensure that this research is conducted in the manner reported in your application and/or protocol, as well as being consistent with the ethical principles of the Belmont Report and your profession.

This research study does not require any additional interaction with the UMCIRB unless there are proposed changes to this study. Any change, prior to implementing that change, must be submitted to the UMCIRB for review and approval. The UMCIRB will determine if the change impacts the eligibility of the research for exempt status. If more substantive review is required, you will be notified within five business days.

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

Appendix B

Questionnaire Used for Stage One of Study

You are being invited to participate in a **research** study titled "*Encouraging Preventive Action by Employing Effective Rhetoric in Public Communication of the Zika Hazard and Associated Risks"* being conducted by Abigail Morris, a doctoral student at East Carolina University in the English department. The goal is to survey 40 individuals living in Harlingen, Texas. The survey will take approximately 15 minutes to complete. It is hoped that this information will assist us in better understanding how information about the Zika virus has been distributed and interpreted. Your responses will remain anonymous. Your participation in the research is **voluntary**. You may choose not to answer any or all questions, and you may stop at any time. There is **no penalty for not taking part** in this research study. Please call Abigail Morris at 1-252-267-0049 for any research related questions or the Office of Research Integrity & Compliance (ORIC) at 1-252-744-2914 for questions about your rights as a research participant.

Non-Identifiable Participant Information

Indicate selections by: ✓, **X** , or ●

Number of females in household aged 15-49: _____

Age Range:

- ○ 18-24 years
- ○ 25-34 years
- ○ 35-44 years
- ○ 45-54 years
- ○ Over 55 years

Sex/Gender:

- ○ Male
- ○ Female
- ○ Non-Binary
- ○ Prefer not to reveal

Ethnicity: _____

Education Level:

- ○ Less than a high school diploma
- ○ High school diploma or equivalent
- ○ Some college
- ○ Master's degree or higher

Are there any members of your household under 15 years of age?

- ○ Yes
- ○ No

Many of the following questions and answer banks were modified from the World Health Organization's resource pack *Knowledge, Attitudes and Practice Surveys: Zika Virus Disease and Potential Complications* (WHO, 2016).

Public Perception of Zika Research Questionnaire:

2. Have you heard of the Zika virus?
    - ○ Yes
    - ○ No (continue to question 7)
    - ○ Not sure

3. Are you aware of previous cases of Zika in Texas?
    - ○ Yes
    - ○ No

4. Do you personally know anyone who has gotten Zika?
    - ○ Yes
    - ○ No
    - ○ Maybe

5. What can you tell me about Zika?

6. How/where did you learn about Zika?

7. Are there any **specific** documents you remember being especially useful or memorable when you were learning about Zika? Flyers, newspapers or TV segments, billboards, pamphlets, etc.?

8. What is the risk that you or a member of your community will get Zika within the next 6 months?
    - ○ High
    - ○ Medium
    - ○ Low
    - ○ No risk

9. Over the course of a 24 hour day, when do you think you are most at risk of getting Zika from mosquitoes?
    - ○ Day
    - ○ Night
    - ○ Both
    - ○ Not sure
    - ○ Other _____

10. How much of the year do you think you are at risk of getting Zika?

11. What risk associated with Zika would you be most worried about if you found out there was an outbreak in the region and why?
    - ○ Flu-like symptoms because _____
      _____
      _____
    - ○ Risk of developmental problems with a baby born to a Zika infected Mother because
      _____
      _____
    - ○ Guillain-barre syndrome because _____
      _____
      _____
    - ○ Other _____
      _____

12. Can Zika outbreaks be prevented?
    - ○ Yes
    - ○ No (skip to question #**15**)
    - ○ Maybe (because) _____
      _____
      _____

13. What have you done/would you do to protect yourself from contracting Zika?
    - ○ Not at risk
    - ○ Nothing
    - ○ Mosquito net
    - ○ Mosquito repellent
    - ○ Fires or smoke
    - ○ Citronella or other plants/chemicals as mosquito deterrents
    - ○ High coverage clothing
    - ○ Eating more pickles/garlic
    - ○ Condom use or abstinence
    - ○ Avoiding sex if pregnant or with pregnant women
    - ○ Clean and treat rain barrels and other water storage systems
    - ○ Clean gutters
    - ○ Grow catnip or mint around my house
    - ○ Mark this option no matter what
    - ○ Avoid watering lawn or using water features
    - ○ Clearing trash and debris that can collect water
    - ○ Fumigation
    - ○ Larvicides or mosquito/larva consuming animals
    - ○ Playing loud music
    - ○ Use window and door screens
    - ○ Other _____

14. What have you done/would you do to protect your community from Zika?
    - ○ Not at risk

- ○ Nothing
- ○ Not my responsibility
- ○ Mosquito net
- ○ Mosquito repellent
- ○ Fires or smoke
- ○ Citronella or other plants/chemicals as mosquito deterrents
- ○ High coverage clothing
- ○ Condom use or abstinence
- ○ Avoiding sex if pregnant or with pregnant women
- ○ Clean and treat rain barrels and other water storage systems
- ○ Clean gutters
- ○ Grow catnip or mint around the neighborhood
- ○ Avoid watering lawn or using water features
- ○ Clearing trash and debris that can collect water
- ○ Fumigation
- ○ Larvicides or mosquito/larva consuming animals
- ○ Use window and door screens
- ○ Not sure
- ○ Other _____

15. Who should be responsible for sharing information about Zika in your community?

- ○ Family
- ○ Friends
- ○ Neighbors
- ○ Community leaders
- ○ Medical/health care providers
- ○ Religious leaders
- ○ Clinic personnel
- ○ Pharmacies
- ○ Radio stations/social media groups
- ○ Local government
- ○ CDC
- ○ Other_____ _____ _____

16. Who should be responsible for preventing the spread of Zika in your community?

- ○ Self
- ○ Family or friends
- ○ Neighbors
- ○ Community leaders
- ○ Medical/health care providers
- ○ Religious leaders
- ○ Clinic personnel
- ○ Pharmacies
- ○ Radio stations/social media groups
- ○ Local government
- ○ National government
- ○ CDC or WHO
- ○ Other (list)

17. Do you believe it is worth taking action to prevent Zika before, during, or after an outbreak is reported?

- ○ Not worth trying
- ○ Before
- ○ During
- ○ After
- ○ Before and during
- ○ During and after
- ○ At all points

18. What actions have been taken by others to protect your community from Zika and by whom?

19. Do you believe more actions should be taken?
    - ○ Yes
    - ○ No
    - ○ Maybe

20. What do you believe are the 3 most effective ways of preventing the spread of Zika?

    1) _____
    _____
    _____

    2) _____
    _____
    _____

    3) _____
    _____
    _____

21. In the next 3-6 months, will you use fumigation, larvicides, or mosquito/larva consuming animals to prevent mosquitos?
    - ○ Yes
    - ○ No
    - ○ I am opposed to their use for personal or environmental reasons

22. In the next 3-6 months, will you regularly use mosquito repellant/bug spray to prevent mosquito bites?
    - ○ Yes
    - ○ No (because)
        - ○ I don't like the way they smell/feel on my skin
        - ○ I am or may be pregnant or nursing
        - ○ They are too expensive
        - ○ I don't like using chemicals on my body
        - ○ Environmental reasons
        - ○ They don't work
        - ○ I forget/don't think about it

23. In the next 3-6 months, will you regularly avoid watering your lawn or using water features, clean and treat rain barrels and other water storage systems, and clean rain gutters? (mark all that apply)
    - ○ Yes
    - ○ No (because)
        - ○ I do not have any of these things
        - ○ I am physically unable to
        - ○ There are rules/codes preventing me
        - ○ I don't want to ruin my lawn or the beauty of my yard
        - ○ I don't have the time
        - ○ I don't have the tools
        - ○ It won't help
        - ○ I don't remember/think about these things

24. In the next 3-6 months, will you prevent mosquitoes in your community by cleaning up/removing trash and debris that may accumulate water?
    - ○ Yes
    - ○ No (because)
        - ○ I stay inside
        - ○ I am physically unable to
        - ○ It is not my responsibility
        - ○ I don't want to trespass
        - ○ I don't have the time
        - ○ I don't have the tools
        - ○ It won't help
        - ○ The city or community groups already do this job
        - ○ I don't remember/think about these things

25. Do you spend more than 1 hour outside most days of the week?
    - ○ Yes
    - ○ No
    - ○ My job requires me to spend time outside

26. How often do you associate with other members of your community?

- ○ Often
- ○ Sometimes
- ○ Rarely

27. Which of the following methods of Zika prevention will you use over the next 3-6 months?

- ○ Mosquito net
- ○ High coverage clothing
- ○ Condoms or abstinence
- ○ Avoiding sex if pregnant or sex with pregnant women
- ○ Use window and door screens
- ○ Avoidance
- ○ Mask and/or gloves
- ○ Medications
- ○ Hand sanitizer
- ○ More frequent hand washing
- ○ Other _____

28. If you had questions about Zika, who would you be most likely to ask?

- ○ Family
- ○ Friends/neighbors
- ○ Health care workers
- ○ Internet
- ○ Other _____

29. If you or someone in your family suspected they had Zika, how would you respond?

- ○ Go to emergency room
- ○ Go to family doctor or clinic
- ○ Wait to be more sure
- ○ Treat symptoms at home
- ○ Nothing
- ○ Other _____

30. If you knew a member of your community had been diagnosed with Zika, how would you react?
    - ○ Avoid them
    - ○ Check on them
    - ○ Take greater preventive action
    - ○ No reaction
    - ○ Other _____

31. If diagnosed with Zika, would you be worried about others finding out?
    - ○ Yes
      If yes, why? _____
      _____
      _____
    - ○ No
    - ○ Not sure

32. Would you like more information about Zika?
    - ○ Yes
    - ○ No

Thank You for Your Participation!

Appendix C

Stages 1 and 2 Recruitment Scripts

Stage 1

Hi, my name is Abigail Morris, and I am a doctoral student in the English department at East Carolina University in North Carolina. I am conducting a research study on public communication about the Zika Virus, and I was wondering if you would be willing to participate by filling out a survey.

The survey is anticipated to take about 15 minutes, and the data collected from it will be used in work toward my PhD with the goal of improving communication about viruses.

Participation in this study is voluntary, and your identity as a participant will remain anonymous during and after the study.

Stage 2

Hi, *participant name*, I am conducting the second phase of my research study on public communication about the Zika Virus, and I was wondering if you would be willing to participate by examining two versions of three different information flyers and sharing your reactions to their content and explaining which versions you find most effective and why.

If you agree, you will be assigned a numeric identifier and the interview will be digitally recorded. This should take about 30 minutes of your time, and the data collected from it will be used in work toward my PhD with the goal of improving communication about virus transmission and prevention strategies.

Participation in this study is voluntary, and your identity as a participant will remain anonymous in all documentation during and after the study.

Appendix D

Data Tables Used to Complete Analyses of Questionnaires for Stage 1

Information	Number of Respondents	Detailed Responses
NON-IDENTIFIABLE PARTICIPANT INFORMATION		
Number of females in household aged 15-49:	**38**	
2	**VIIII (9)**	
0	**XII (12)**	
1	**XIIII (14)**	
3	**III (3)**	
Age Range:	**40**	
18-24 years	**XVIII (18)**	
25-34 years	**VII (7)**	
35-44 years	**VI (6)**	
45-54 years	**III (3)**	
Over 55 years	**VIII (6)**	

Revision of classification for reproductive age as used in most calculations This revision is based on the frequency of unintended pregnancy within the target demographics.		
18-34 years	**IIII- IIII- IIII- IIII- IIII- (25)**	Primary reproductive ages within previous ranges
35-44 years	**IIII- I (6)**	Secondary reproductive ages within previous ranges
45+	**IIII- IIII (9)**	Tertiary reproductive ages within previous ranges

Ethnicity:	**34**	
mixed	**I (1)**	
caucasin	**I (1)**	Caucasin/White (7)
latino	**I (1)**	Latino/Mex-American/Hispanic (23)
Mex-American	**I (1)**	Asian (1)
Hispanic	**XXI (21)**	Indian (1)
White	**VI (6)**	multi-ethnic/mixed (2)

multi-ethnic	I (1)	
Asian	I (1)	
Indian	I (1)	

Breakdown:		
Hispanic Female (11)	Aged 18-24 (7) 25-34 (1) 35-44 (1) 45-54 (1) 55+ (1)	HS eq (4) Some Col (6) MA (1)
Hispanic Male (12)	Aged 18-24 (6) 25-34 (3) 55+ (3)	HS eq (4) Some Col (8)
White Female (4)	Aged (1) 45-54 (1) 55+ (2)	HS eq (1) Some Col (2) MA (1)
White Male (3)	Aged 25-34 (1) 35-44 (1) 55+ (1)	Some Col (2) MA (1)
Multi/Mixed Male (1)	Aged 45-54 (1)	Some Col (1)
Multi/Mixed ---- (1)	Aged 55+ (1)	MA (1)
Asian Female (1)	Aged 35-44 (1)	Some Col (1)
Indian Female (1)	Aged 18-24 (1)	Some Col (1)
Unlisted Female (6)	Aged 18-24 (4) 25-34 (2)	Less than HS (1) Some Col (4) MA (1)
Unlisted Male -none		

Revision of classification/designation for ethnicity as used in data assessments This revision is based on the potential for skewing of threat perceptions within the target demographics considering the significantly higher prevalence of infection internationally as reflected through media content.		
Hispanic Females	**11**	Designated as **HF**
Hispanic Males	**12**	Designated as **HM**
Non-Hispanic Females	**6**	Designated as **NF**
Non-Hispanic Males	**4**	Designated as **NM**
Unlabeled Females	**6**	Designated as **—F**
Unlabeled Human	**1**	Designated as **—**

Sex/Gender:	**39**	
Male	**XVI (16)**	
Female	**XXIII (23)**	
Non-Binary		
Prefer not to reveal		
Education Level:	**39**	
Less than a high school diploma	**I (1)**	

High school diploma or equivalent	**VIIII (9)**	
Some college	**XXIII (23)**	
Master's degree or higher	**V (5)**	
+bachelor	**I (1)**	
Are there any members of your household under 15 years of age?	**40**	
Yes	**VIIII (9)**	
No	**XXXI (31)**	
Public Perception of Zika Research Questionnaire:		
AWARENESS OF ZIKA AS A PATHOGEN		
1. Have you heard of the Zika virus?		
Yes	**XXXVIIII (39)**	
No (continue to question 7)	**I**	
Not sure		
4. What can you tell me about Zika?		
		Mosquito born disease - association c birth defects
		Virus that is in mosquitos
		It is a disease that is transmitted through mosquitos. Besides that not that knowlegdble
		It affects women that are pregnant
		Virus spread by mosquitos
		Pregnant women are at the highest risk, babies prone to encephalitis.
		virus carried by mosquitoes
		it is a virus transferred from mosquitos

		It's a disease spread through mosquitoes that can affect the baby while the baby is still developing
		not a good thing for anyone
		Its transmitted by mosquitoes or by other that has it.
		Zika is a virus carried by mosquitoes
		It is spread by mosquitoes
		Virus carried through mosquitoes
		It's a virus that someone can get from mosquitoes and it can affect pregnant women.
		a virus TRANSMITTED WHEN BIT BY MOSQUITOS
		Virus caused by mosqutioes
		mosquito borne - most @ risk = pregnancy - sexually transmitted
		Transmitted by mosquitoes
		Transmitted by mosquito - affects only women - ~~especia~~ and baby's in the ~~wow~~ uterus. - can affect head size
		afects childbirth
		Contracted by mosquitos
		mosquitos carry Zika
		It is passed on through mosquitos.
		travels in mosquitos
	I	virus from mosquito
		causes birth defects
		It comes from mosquitoes and is deadly when not caught in time.
		Spray for mosquitos
		Not much
		Virus
		Virus transmitted by mosquito that causes microcephaly.
		I wouldn't know
		tropical disease spread by mosquitos.
		es un virus Transmitido por mosquito y efecta ala mujers eubreruzados, seriamente (it is a virus transmitted by mosquito and effects pregant women seriously)

PERCEPTION OF ZIKA AS A PERSONAL THREAT		
2. Are you aware of previous cases of Zika in Texas?		
Yes	**XXVIII (28)**	
No	**XI (11)**	
3. Do you personally know anyone who has gotten Zika?		
Yes	**II (2)**	
No	**XXXVI (36)**	
Maybe	**II (2)**	
7. What is the risk that you or a member of your community will get Zika within the next 6 months?		
High	**III (3)**	
Medium	**IX (9)**	
Low	**XXIII (23)**	
No risk	**IV (4)**	
	I (1)	I don't know
11. Can Zika outbreaks be prevented?		
Yes	**XXII (22)**	
No (skip to question #**15**)	**IX (9)**	
Maybe (because)	**IX (9)**	
		There is current work on a vaccine.
		We just need to be on top of it other wise its an outbreak
		repelent
		~~M~~ Insects carry viruses
		pesticides to kill mosquitoes
		edicate and promote prevention of outbreak

		if people would just keep water out of places that would collect AND if they wear something to protect them
KNOWLEDGE OF HOW ZIKA IS SPREAD		
8. Over the course of a 24 hour day, when do you think you are most at risk of getting Zika from mosquitoes?		
Day	**III (3)**	
Night	**XV (15)**	
Both	**XIV (14)**	
Not sure	**VI (6)**	
Other	**IV (4)**	
		evening
		evening/morning
		Dusk & Dawn
		morning
9. How much of the year do you think you are at risk of getting Zika?		
		not sure
		at least half
		9 months out of the year **/** 9 months
		época de lluvias (rainy season)
		8 mths
	III (3)	Summer
	IX (9)	12 month **/** all year long **/** ALL **/** 100% **/** All year here **/** ALL YEAR **/** all year? **/** all year in South Texas **/** all year around
	II (2)	pretty much spring and summer months **/** spring/summer **/** during the spring or summer months
		half year

		3-6 months
		4 months out of the year
		During the summer, 3 months
		0.9
		0.5
		0.01
		I don't believe I'm at risk at all.
		mainly fall
		majority of the year
		Raining season we have a field next to our apt that floods
		Summer/after rain
		10 months
		Seasonal - Few months of the year.
11. Can Zika outbreaks be prevented?		
Yes	**XXII (22)**	
No (skip to question #**15**)	**IX (9)**	
Maybe (because)	**IX (9)**	
		There is current work on a vaccine.
		We just need to be on top of it other wise its an outbreak
		repelent
		M Insects carry viruses
		pesticides to kill mosquitoes
		edicate and promote prevention of outbreak
		if people would just keep water out of places that would collect AND if they wear something to protect them
19. What do you believe are the 3 most effective ways of preventing the spread of Zika?		
	III (3)	protective sexual activity **/** condom use **/** Preventing people from unsafe sex

	XXI (21)	mosquito repelent **/** mosquito spray **/** for self-protection, using repellant is affective **/** Use of repellent at night time the mosquitos are out more **/** wear mosquto repellent **/** use repellent **/** use of repellants **/** repellent **/** Anything that repeals those bugs **/** Spray yourself **/** wear preventable stuff to keep mosquitoes from biting you **/** ***repellent provider*** **/** use bug repellent **/** regularly using mosquito repellant
		plants to keep them away
	X (10)	informing people of the risks **/** awareness **/** awareness during pike season **/** information **/** Education **/** educate in rural area **/** local Awareness **/** Knowledge - awareness **/** Spread of word **/** Gov. notice
		having doorscreens is also helpful
	II (2)	As well as trying to stay indoors more **/** stay in doors
	X (10)	fumigation **/** Pesticide Application **/** increased mosquito control **/** Spraying **/** City Spray trucks **/** Fumigating **/** City fumigation
	V (5)	Get Vaccinated **/** immunization **/** vaccines
		Avoid areas with high incidence rates
	IV (4)	proper clothing **/** garments **/** long sleeves + pants **/** wearing clothes that cover body fully
	VII (7)	clean **/** Clean debris **/** Clean gutters **/** Maintaining yard **/** clean environment around house hold
		use mosquito net
	IV (4)	go to Dr when you suspect you have the virus **/** acceso a salud (access to healthcare) **/** check with doctor's **/** connect with local healthcare worker who are trustes in the communities
		border control
	II (2)	communication / ***Speaking up***
		application (of recommended techniques)
	VII (7)	Drain water from cans in yard **/** Clean up waterlogging **/** keeping away From having water and trash in your yard **/** keeping water from places it collects **/** Empty Standing water **/** Clearing water and trash **/** clearing out any stand still water

		letting things like bats to eat the mosquitoes
	II (2)	isolation **/** avoiding contact w/those affected
		acessability to resources
		n/a
		Scientific Studies
		Make sure to water plants in morning so water doesn't sit at night
		handwashing
		smoke that is on stakes that are on the ground surrounding an area (citronella-ish)
26. Which of the following methods of Zika prevention will you use over the next 3-6 months?		
Mosquito net	**IX (9)**	
High coverage clothing	**XXIII (23)**	
Condoms or abstinence	**III (3)**	
Avoiding sex if pregnant or sex with pregnant women	**II (2)**	
Use window and door screens	**XXII (22)**	
Avoidance	**XI (11)**	
Mask and/or gloves	**II (2)**	
Medications	**IV (4)**	
Hand sanitizer	**XXIX (29)**	
More frequent hand washing	**XIV (15)**	
Other	**IX (9)**	
REMEMBRANCE OF ZIKA COMMUNICATION PRACTICES		
5. How/where did you learn about Zika?		
		work
	IV (4)	saw somewhere online **/** online **/** online for the most part **/** INTERNET

	XII (12)	news **/** news channel **/** KGBT4 **/** Mainly the news / News, cases from zika. **/** News/Media **/** from the news.
	III (3)	school
		I learned about it from social media.
		Doctor's
	III (3)	College - Human Disease and Epidemiology **/** college
		Pro's Health Care
	II (2)	Television **/** T.V.
		med school
		From whatever was said on social media and TV
		work (hospital setting)
	II (2)	media **/** Through the media
		work/workshop
		TV/internet
		Newspaper
		Science Magazine
		Haven't
		news, tv
		Folletos, ohsas informativos (informational brochures)
6. Are there any **specific** documents you remember being especially useful or memorable when you were learning about Zika? Flyers, newspapers or TV segments, billboards, pamphlets, etc.?		
		Handouts & Flyers - Best
	XI (11)	NO **/** Not really **/** NONE
		powerpoint presentation
	III (3)	There are articles online / Internet (<u>there not for humans.</u>) **/** INTERNET
		Newspapers, TV segments, billboards & pamphlets
		On the news when Zika became mainstream, I heard about the cases in Florida.

	II (2)	Flyers at doctors office **/** Doctor provided info
		TV ads, pamphlets
		Flyers/Infographic
		Nothing comes to mind. The only thing is hearing from the news that Zika is deadly.
		TV segments talking about the virus and pregnant women.
		That it's caused by mosquitos
		Social Media (Face book) - Tv - Radio
		Not at this moment
		Radio Commercial
		TV segments that KRGV news ran.
		pregnant woman from Brownsville
		Flyer newspaper article
		TV segments
		(*pamphlets*)
		newspaper + TV
		School Flyer
		TV, newspapers
		segmento en T.V., espanol (segement on Spanish TV)
14. Who should be responsible for sharing information about Zika in your community?		
Family	**XVII (17)**	
Friends	**XVII (17)**	
Neighbors	**XVII (17)**	
Community leaders	**XX (20)**	
Medical/health care providers	**XXVI (26)**	
Religious leaders	**IX (9)**	
Clinic personnel	**XIV (14)**	
Pharmacies	**XV (15)**	
Radio stations/social media groups	**XXII (22)**	
Local government	**XXV (25)**	
CDC	**XVII (17)**	

Other	**III (3)**	
		schools
		Any public health professional.
		everyone should be informed

27. If you had questions about Zika, who would you be most likely to ask?		
Family	**I (1)**	
Friends/neighbors		
Health care workers	**XXXI (31)**	
Internet	**XXII (22)**	
Other	**IV (4)**	Alexa

BREAKDOWN OF QUESTION 27: WHO WOULD THEY ASK

	Family	Friends	HCW	Internet	Other
Hf			SSSHHSSHMS	HSH	
Hm	H		HSHSSHSH	SSSHSSSH	
Nf			HMSSS	MMSS	
Nm			S	SMS	
-F			SMSS	SSS	
--					

L = less than high school H = high school or equivalent S = some college M = Masters +

Age ranges: 18-34 | 35-54 | 55+

Male: 9 HCW	**11 Internet**	**VS** **Female: 19 HCW**	**10 Internet**
56%	**68%**	**82%**	**43%**

PERCEPTION OF RESPONSIBILITY		
14. Who should be responsible for sharing information about Zika in your community?		
Family	**XVII (17)**	

Friends	**XVII (17)**	
Neighbors	**XVII (17)**	
Community leaders	**XX (20)**	
Medical/health care providers	**XXVI (26)**	
Religious leaders	**IX (9)**	
Clinic personnel	**XIV (14)**	
Pharmacies	**XV (15)**	
Radio stations/social media groups	**XXII (22)**	
Local government	**XXV (25)**	
CDC	**XVII (17)**	
Other	**III (3)**	
		schools
		Any public health professional.
		everyone should be informed
15. Who should be responsible for preventing the spread of Zika in your community?		
Self	**XXVI (26)**	
Family or friends	**XXI (21)**	
Neighbors	**XVI (16)**	
Community leaders	**XXI (21)**	
Medical/health care providers	**XIV (14)**	
Religious leaders	**V (5)**	
Clinic personnel	**XIII (13)**	
Pharmacies	**XII (7)**	
Radio stations/social media groups	**XVI (16)**	
Local government	**XX (20)**	
National government	**XIII (13)**	
CDC or WHO	**X (10)**	
Other (list)	**II (2)**	
		the pros should tell us how to - this only gives us little info - if an outbreak have them wear a necklace or wrist band that indicates they have Zika

17. What actions have been taken by others to protect your community from Zika and by whom?		
		no one yet
		Misquitoe repellent
		from no one really just whats on the news internet
		cleaning and maintaining standing water
	6	none - Have not taken any action
		my community needs to help by spreading word
		Sharing information about virus - clearing out materials that could collect water - reporting standing water around community
		Mainly just bug repellent & by myself and other family members
		Myself protecting against mesquitoes with Off Spray.
		Mosquito repellent by family/neighbors
	4	not that Im aware - Not Sure - wouldn't know - I'm unsure
		We (Hospital) provide flyers to expecting mothers and during their prenatal care all patients get tested.
		Empty standing water - City spray truck
		CDC local government and health care community work together for better outcome
		Well it seems that the local cities spray to prevent mosquitoes from getting really bad.
		In my neighbor city does spray
		Newspaper Only
		Word Out.
		Government Spraying/TV-Infomercials
		local government, mosquito control
		City sprays for mosquitos
		news reporting ways to protect yourself
		Local + national government

		City Sprays Repellent
		Not much other than minor news broadcasting
		Fumigation
		The city of Harlingen spray for mosquitos.
23. In the next 3-6 months, will you prevent mosquitoes in your community by cleaning up/removing trash and debris that may accumulate water?		
Yes	**XXXIII (33)**	
No (because)	**VII (7)**	
I stay inside		
I am physically unable to		
It is not my responsibility	**I**	
I don't want to trespass	**I**	
I don't have the time		
I don't have the tools		
It won't help		
The city or community groups already do this job	**II**	
I don't remember/think about these things		
PERCEPTION OF PRECAUTIONS		
16. Do you believe it is worth taking action to prevent Zika before, during, or after an outbreak is reported?		
Not worth trying		
Before	**XV (15)**	
During	**III (3)**	
After	**II (2)**	
Before and during	**II (2)**	
During and after		

At all points	**XIX (19)**	
18. Do you believe more actions should be taken?		
Yes	**XXX (30)**	
No	**I (1)**	
Maybe	**VI (6)**	
PROTECTIVE MEASURES TAKEN OR PLANNED		
12. What have you done/would you do to protect yourself from contracting Zika?		
Not at risk	**I (1)**	
Nothing	**VII (7)**	
Mosquito net	**XXVII (27)**	
Mosquito repellent	**V (5)**	
Fires or smoke	**XI (11)**	
Citronella or other plants/chemicals as mosquito deterrents	**XV (15)**	
High coverage clothing	**III (3)**	
Eating more pickles/garlic	**VI (6)**	
Condom use or abstinence	**IV (4)**	
Avoiding sex if pregnant or with pregnant women	**XVI (16)**	
Clean and treat rain barrels and other water storage systems	**XVI (16)**	
Clean gutters	**III (3)**	
Grow catnip or mint around my house	**IX (9)**	
Mark this option no matter what	**V (5)**	
Avoid watering lawn or using water features	**XXII (22)**	

Clearing trash and debris that can collect water	**VIIII (9)**	
Fumigation	**VIII (8)**	
Larvicides or mosquito/larva consuming animals	**II (2)**	
Playing loud music	**XVII (17)**	
Use window and door screens	**III (3)**	
Other	**I (1)**	
		Vigilance
13. What have you done/would you do to protect your community from Zika?		
Not at risk		
Nothing	**IV (4)**	
Not my responsibility		
Mosquito net	**VII (7)**	
Mosquito repellent	**XXI (21)**	
Fires or smoke	**III (3)**	
Citronella or other plants/chemicals as mosquito deterrents	**XI (11)**	
High coverage clothing	**IX (9)**	
Condom use or abstinence	**IV (4)**	
Avoiding sex if pregnant or with pregnant women	**V (5)**	
Clean and treat rain barrels and other water storage systems	**XV (15)**	
Clean gutters	**XV (15)**	
Grow catnip or mint around the neighborhood	**I (1)**	
Avoid watering lawn or using water features	**IX (9)**	
Clearing trash and debris that can collect water	**XVII (17)**	
Fumigation	**VII (7)**	

Larvicides or mosquito/larva consuming animals	**IX (9)**	
Use window and door screens	**XII (12)**	
Not sure		
Other	**IV (4)**	
		inform the community
		were we live we don't have the rest on list
		educate and repellent
		contact city about large pools of standing waters
PROTECTIVE MEASURE INTENTIONS		
20. In the next 3-6 months, will you use fumigation, larvicides, or mosquito/larva consuming animals to prevent mosquitos?		
Yes	**XXIV (24)**	
No	**XII (12)**	
I am opposed to their use for personal or environmental reasons	**V (5)**	
21. In the next 3-6 months, will you regularly use mosquito repellant/bug spray to prevent mosquito bites?		
Yes	**XXXII (32)**	
No (because)	**V (5)**	
I don't like the way they smell/feel on my skin	**I**	
I am or may be pregnant or nursing		
They are too expensive	**I**	

I don't like using chemicals on my body	**II**	
Environmental reasons		
They don't work		
I forget/don't think about it	**II**	
	I	Allergy
22. In the next 3-6 months, will you regularly avoid watering your lawn or using water features, clean and treat rain barrels and other water storage systems, and clean rain gutters? (mark all that apply)		
Yes	**XXIV (24)**	
No (because)	**XIV (14)**	
I do not have any of these things	**V (5)**	
I am physically unable to		
There are rules/codes preventing me	**II (2)**	
I don't want to ruin my lawn or the beauty of my yard	**II (2)**	
I don't have the time	**I (1)**	
I don't have the tools	**I (1)**	
It won't help		
I don't remember/think about these things	**III (3)**	
23. In the next 3-6 months, will you prevent mosquitoes in your community by cleaning up/removing trash and debris that may accumulate water?		
Yes	**XXXIII (33)**	
No (because)	**VI (6)**	cant it's a field

I stay inside		
I am physically unable to		
It is not my responsibility	**I**	
I don't want to trespass	**I**	
I don't have the time		
I don't have the tools		
It won't help		
The city or community groups already do this job	**II**	
I don't remember/think about these things		
26. Which of the following methods of Zika prevention will you use over the next 3-6 months?		
Mosquito net	**XIV (14)**	
High coverage clothing	**XXIII (23)**	
Condoms or abstinence	**III (3)**	
Avoiding sex if pregnant or sex with pregnant women	**II (2)**	
Use window and door screens	**XXII (22)**	
Avoidance	**XI (11)**	
Mask and/or gloves	**II (2)**	
Medications	**IV (4)**	
Hand sanitizer	**XXIV (24)**	
More frequent hand washing	**XIV (14)**	
Other	**IX (9)**	mosquito repellont; Citronella; mosquito repellant (2); repellent (3); spray (2); Pesticide
RESPONDING TO INFECTION		
28. If you or someone in your family suspected they had Zika, how would you respond?		

Go to emergency room	**XVIII (8)**	
Go to family doctor or clinic	**XXVI (26)**	
Wait to be more sure		
Treat symptoms at home		
Nothing		
Other		

Breakdown of Q 28: Responding to suspected infection						
	ER	**DR**	**wait**	**home**	**nothing**	**other**
Hf	IIII- **(5)**	IIII- II (7)				
Hm	IIII- II **(7)**	IIII- III (8)				
Nf	III (**3)**	IIII (4)				
Nm		IIII (4)				
-F	IIII- **(5)**	III (3)				
--		I (1)				
Male VS Female **ER | DR ER | DR** **7 12 13 14**						

29. If you knew a member of your community had been diagnosed with Zika, how would you react?		
Avoid them	**III (3)**	
Check on them	**XIV (14)**	
Take greater preventive action	**XXVIII (28)**	
No reaction		
Other	**III (3)**	provide help if needed; support; offer help with anything/But I'd also stay safe
30. If diagnosed with Zika, would you be worried about others finding out?		
Yes	**XII (7)**	

If yes, why?		Maybe & I've been exposed
		I would be worried about other people close to me getting it.
		avoidance
		wouldn't want other to worry about their health
		yes of our own health to prevent spread
		backlash
		because I don't believe others are aware of what Zika is.
		for my health
		I don't want to be segregated
		they need to know why and get fixed
		Because it's a life threatening disease
No	**XXIV (24)**	it will help prevent transfer
Not sure	**IV (4)**	
CONCERN ABOUT SPECIFIC RISKS		
10. What risk associated with Zika would you be most worried about if you found out there was an outbreak in the region and why?		
Flu-like symptoms because		
	I	it can just be written off as the flu
	I	my family members have weak immune systems.
	I	Risk of dehydration.
	I	your body would want to fight off the foreign bacteria
	I	what if they become fatal.
	I	can be mistaken for a common cold
	I	people might think it is a common cold when it could potentially be Zika.
	I	it will be hard to differentiate between the two.
	I	50+ yrs of age

	I	you couldn't tell if you were sick from the flu or if its actually Zika.
	I	could easily be spread & be contagious
	I	I'm Senior
	I	its in the valley
	V (5)	----------
Risk of developmental problems with a baby born to a Zika infected Mother because		
	I	The baby wouldn't grow up to live a happy healthy life
	I	currently have an expecting mother in family.
	I	maternal defects
	I	they baby is infected
	I	of the future complications for the baby
	I	babies are supposed to be cute
	I	There can be health defects or complications.
	I	I wouldn't want my or any other infected child being infected with this virus.
	II (2)	Defects
	I	of however the virus has infected or spread thru the blood stream.
	I	Of my line of work
	I	affects fetus
	I	the risk of infection spreading
	I	deformity
	I	falta de atención medica (lack of medical attention)
	I	for my girls
	I	passed to the baby
	V (5)	----------
Guillain-barre syndrome because		
	I	can be life threatening

	I	my grandfather suffered due to an expired flu vaccine and passed away a few years ago
	I	virus
	I	----------
	I	(not familiar with this)
Other		
	I	more virusus
	I	need more preventative solution due to no financial help - no insurance
PERSONAL PRACTICES NOT SPECIFIC TO ZIKA		
24. Do you spend more than 1 hour outside most days of the week?		
Yes	**XXXI (31)**	depends if I have work.
No	**VI (6)**	
My job requires me to spend time outside	**I (1)**	

Question Number 24 Breakdown : A1			
	Yes A1a	**No A1b**	**My job requires it A1c**
Hf	IIII- II **(7)**	IIII **(4)**	
Hm	IIII- IIII- **(10)**	I **(1)**	I **(1)**
Nf	IIII- III **(8)**		
Nm	III **(3)**		
-F	IIII- **(5)**	I **(1)**	
--			

25. How often do you associate with other members of your community?		
Often	**XVI (16)**	
Sometimes	**XII (12)**	
Rarely	**IX (9)**	

BREAKDOWN OF COMMUNITY ENGAGEMENT : A2			
	Often A2a	**Sometimes A2b**	**Rarely A2c**
Hf	III **(3)**	IIII- **(5)**	III **(3)**
Hm	IIII- II **(7)**	IIII **(4)**	I **(1)**
Nf	IIII **(3)**	II **(2)**	II **(2)**
Nm	II **(2)**	I **(1)**	
-F	I **(1)**	II **(2)**	III **(3)**
--			

INTEREST IN BECOMING MORE INFORMED ABOUT ZIKA			
31. Would you like more information about Zika?			
Yes	**XXIV (24)**		
No	**XVI (16)**	unless its about more ways to prevent it (that's not in this bookelet)	

Appendix E

Questionnaire Used for Stage 2

You are being invited to participate in the second stage of a **research** study titled "*Encouraging Preventive Action by Employing Effective Rhetoric in Public Communication of the Zika Hazard and Associated Risks"* being conducted by Abigail Morris, a doctoral student at East Carolina University in the English department. The goal of this stage is to interview participants as they engage with original Zika information documents and revisions of those documents and follow the interview with a brief survey to gauge information uptake. The interview should take approximately 30 minutes to complete, and the survey should take about 5 minutes. It is hoped that this information will assist us in better understanding how individuals engage with physical information documents about viruses and recommendations for prevention. Your responses will remain anonymous. Your participation in the research is **voluntary**. You may choose when to respond to questions that come up during the interview and may end the interview at any time. There is **no penalty for not taking part** in this research study. Please call Abigail Morris at 1-252-267-0049 for any research related questions or the University & Medical Center Institutional Review Board at 1-252-744-2914 for questions about your rights as a research participant.

Do you agree to participate in this stage of my research?

Participant identifier: #

Non-Identifiable Participant Information

Indicate selections by: ✓, **X** , or ●

Age Range:

- ○ 18-24 years
- ○ 25-34 years
- ○ 35-44 years
- ○ 45-54 years
- ○ Over 55 years

Sex/Gender:

- ○ Male
- ○ Female
- ○ Non-Binary
- ○ Prefer not to reveal

Ethnicity: _____

Education Level:

- ○ Less than a high school diploma
- ○ High school diploma or equivalent
- ○ Some college
- ○ Master's degree or higher

Political Affiliation or Self-Classification:

- ○ Republican
- ○ Democrat
- ○ Nonaffiliated conservative
- ○ Nonaffiliated liberal
- ○ Other _____
- ○ Prefer not to reveal

Some of the following questions and answer banks were modified from the World Health Organization's resource pack *Knowledge, Attitudes and Practice Surveys: Zika Virus Disease and Potential Complications* (WHO, 2016).

Public Perception of Zika Research Questionnaire:

33. Can Zika be spread by those infected even if they show no symptoms of illness?
    - ○ Yes
    - ○ No
    - ○ Maybe

34. Which of these are common symptoms of Zika?
    - ○ Conjunctivitis
    - ○ Fever
    - ○ Swollen Feet
    - ○ Skin Rash
    - ○ Joint Pain
    - ○ Sneezing

35. Over the course of a 24-hour day, when do you think you are most at risk of getting Zika from mosquitoes?
    - ○ Day
    - ○ Night
    - ○ Both
    - ○ Not sure

36. Can Zika outbreaks be prevented?
    - ○ Yes
    - ○ No
    - ○ Maybe

37. Based on your current knowledge of Zika transmission, what could you do to protect yourself and others from contracting Zika?
    - ○ Nothing
    - ○ Mosquito net
    - ○ Mosquito repellent

- ○ Fires or smoke
- ○ Citronella or other plants/chemicals as mosquito deterrents
- ○ High coverage clothing
- ○ Eating more pickles/garlic
- ○ Condom use or abstinence
- ○ Avoiding sex if pregnant or with pregnant women
- ○ Clean and treat or cover rain barrels and other water storage systems
- ○ Clean gutters
- ○ Grow catnip or mint around my house
- ○ Mark this option no matter what
- ○ Avoid watering lawn or using water features
- ○ Clearing trash and debris that can collect water
- ○ Fumigation
- ○ Larvicides or mosquito/larva consuming animals
- ○ Playing loud music
- ○ Use window and door screens or secured netting

38. Who should be responsible for sharing information about virus outbreaks in your community?

- ○ Family
- ○ Friends
- ○ Neighbors
- ○ Community leaders
- ○ Medical/health care providers
- ○ Religious leaders
- ○ Clinic personnel
- ○ Pharmacies
- ○ Radio stations/social media groups
- ○ Local government
- ○ CDC

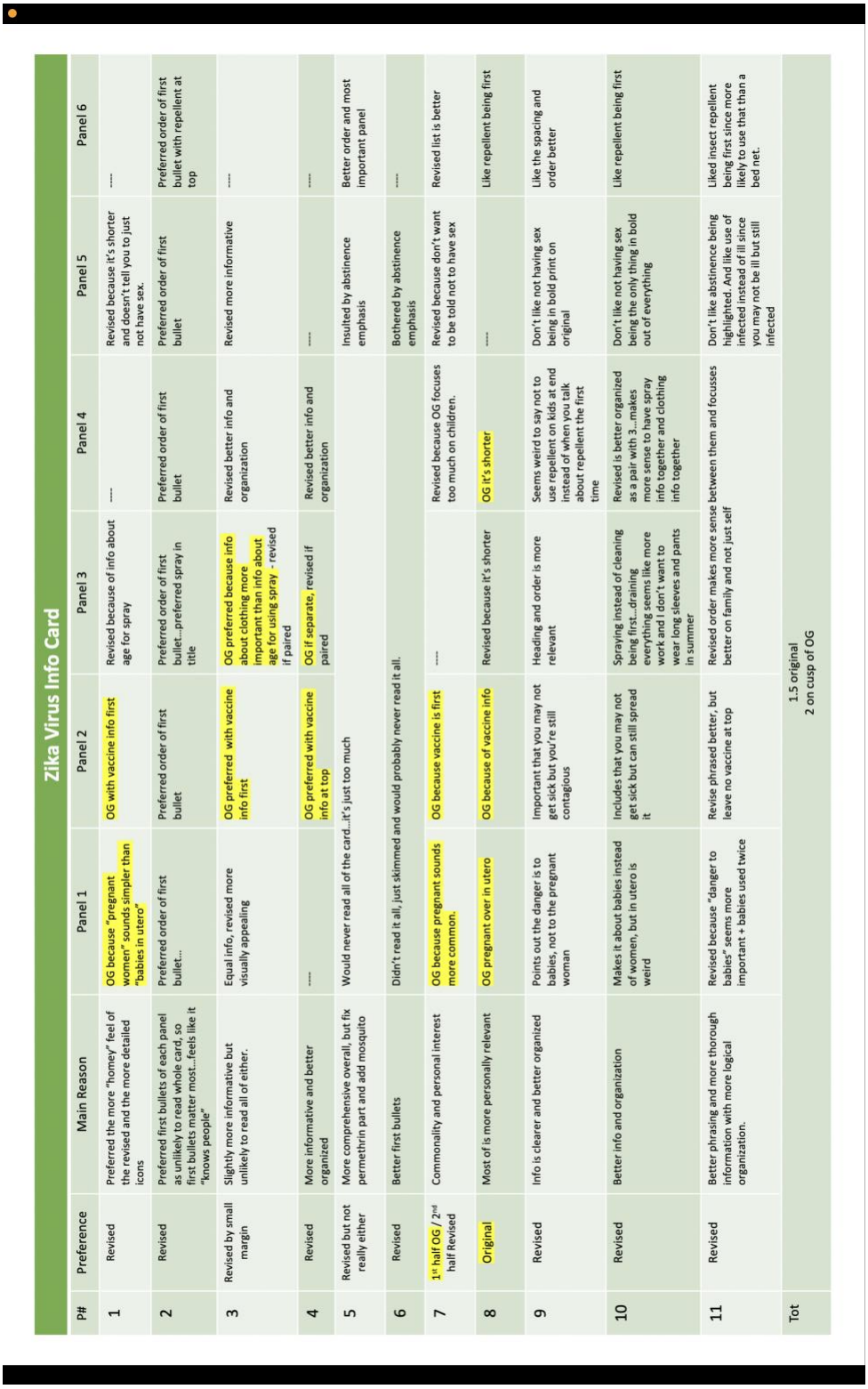
39. Who should be responsible for preventing virus outbreaks in your community?

- ○ Self
- ○ Family or friends
- ○ Neighbors
- ○ Community leaders
- ○ Medical/health care providers
- ○ Religious leaders
- ○ Clinic personnel
- ○ Pharmacies
- ○ Radio stations/social media groups
- ○ Local government
- ○ National government
- ○ CDC or WHO

Thank You for Your Participation!

Appendix F

Data Tables Used to Help with Analysis of Stage 2



Zika Virus Info Card								
P#	Preference	Main Reason	Panel 1	Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
1	Revised	Preferred the more "homey" feel of the revised and the more detailed icons	OG because "pregnant women" sounds simpler than "babies in utero"	OG with vaccine info first	Revised because of info about age for spray	----	Revised because it's shorter and doesn't tell you to just not have sex.	----
2	Revised	Preferred first bullets of each panel as unlikely to read whole card, so first bullets matter most...feels like it "knows people"	Preferred order of first bullet...	Preferred order of first bullet	Preferred order of first bullet...preferred spray in title	Preferred order of first bullet	Preferred order of first bullet	Preferred order of first bullet with repellent at top
3	Revised by small margin	Slightly more informative but unlikely to read all of either.	Equal info, revised more visually appealing	OG preferred with vaccine info first	OG preferred because info about clothing more important than info about age for using spray - revised if paired	Revised better info and organization	Revised more informative	----
4	Revised	More informative and better organized	----	OG preferred with vaccine info at top	OG if separate, revised if paired	Revised better info and organization	----	----
5	Revised but not really either	More comprehensive overall, but fix permethrin part and add mosquito	Would never read all of the card...it's just too much				Insulted by abstinence emphasis	Better order and most important panel
6	Revised	Better first bullets	Didn't read it all, just skimmed and would probably never read it all.				Bothered by abstinence emphasis	----
7	1st half OG / 2nd half Revised	Commonality and personal interest	OG because pregnant sounds more common.	OG because vaccine is first	----	Revised because OG focuses too much on children.	Revised because don't want to be told not to have sex	Revised list is better
8	Original	Most of is more personally relevant	OG pregnant over in utero	OG because of vaccine info	Revised because it's shorter	OG it's shorter	----	Like repellent being first
9	Revised	Info is clearer and better organized	Points out the danger is to babies, not to the pregnant woman	Important that you may not get sick but you're still contagious	Heading and order is more relevant	Seems weird to say not to use repellent on kids at end instead of when you talk about repellent the first time	Don't like not having sex being in bold print on original	Like the spacing and order better
10	Revised	Better info and organization	Makes it about babies instead of women, but in utero is weird	Includes that you may not get sick but can still spread it	Spraying instead of cleaning being first...draining everything seems like more work and I don't want to wear long sleeves and pants in summer	Revised is better organized as a pair with 3...makes more sense to have spray info together and clothing info together	Don't like not having sex being the only thing in bold out of everything	Like repellent being first
11	Revised	Better phrasing and more thorough information with more logical organization.	Revised because "danger to babies" seems more important + babies used twice	Revise phrased better, but leave no vaccine at top	Revised order makes more sense between them and focusses better on family and not just self		Don't like abstinence being highlighted. And like use of infected instead of ill since you may not be ill but still infected	Liked insect repellent being first since more likely to use that than a bed net.
Tot			1.5 original 2 on cusp of OG					

Table 4

Table 5

	Protect Yourself from Zika Flyer | Document 1						
P#	Preference	Main Reason		Clothing	Screens/Netting	Water Collection	Nurse
1	revised	informative	X	Revised was Broader/more reasonable	----	----	----
2	original	"Dumbed down" vs "a little fancy"	X	----	Liked "netting" addition	----	X
3	original	shorter	---	----	----	----	----
4	revised	informative	X	Long sleeves and pants "hot just thinking about it"	Closing window "obvious" & unnecessary - "one ask" vs two in revised	Original preferred "seems like less work"	X
5	revised	informative	X	Covered skin preferred – few people likely to wear long sleeves/pants in summer, "it's al least a middle ground"	Preferred original because it mentions mosquitos	Preferred revised because clean, cover, collect stand out	X
6	revised	informative	X	Preferred revised – more reasonable	Preferred original because it mentions mosquitos	Revised is more comprehensive	X
7	revised	informative	X	Some icons seemed more relevant in revised based on content	----	----	----
8	revised	informative	X	"skin" stood out and seemed more reasonable	No AC, so "open" stood out	----	----
9	revised	informative	X	"Cover" and "with clothing" stood out and seemed easier to comply with	----	----	X
10	original	easier to read	X	Original more direct	liked "open" and netting as an option…cheaper & easier DIY	Original more direct	no
11	revised	informative	X	More reasonable	Original mentions mosquitoes	Revised more specific	X
Tots	3 OG & 8 rev		10	1 OG & 8 rev	3 OG & 4 rev	2 OG & 3 rev	1 OG & 6 rev

Table 6

Work Outside? Protect Yourself from Zika						
P#	**Overall**	**Main Reason**	**What Is Zika**	**Should I worry**	**When Outside**	**Improve setting**
1	Revised	More informative and layout makes more sense	More informative	Shorter and better position	----	Better info about stuff you don't always think about like pet bowls.
2	Original	The original info seemed dumbed down and the revised had too much info…seemed written by a normal person instead of a professional.	Liked that the original explained what microcephaly is as it being a developmental delay.	Thought it belonged where it was in the original so people can decide whether they should worry before they worry about how to prevent it.	----	Liked the info added to this section because it was things people don't think about
3	Revised	More informative and better content layout / original preferred visually because text isn't split	Info about how it's passed, and all the potential problems work better here	The 80% statistic makes more sense in this section	-----	Better balanced visually
4	Revised / original based on age	The arrangement of info is better in revised if of child-bearing age	The revised would seem more relevant if woman of child-bearing age, but original works for everyone else	Prefers at bottom with more info in "what is" section because that section has enough to info to make an informed decision about reading the rest. May not read past the 80% statistic.	Order of info makes more sense	Like inclusion of toys and pet dishes
5	Revised	More informative and better organized	80% stat in original seemed like it was downplaying situation and may not make it past the stat, so defeats purpose. Need to include mosquito info at beginning.	Revised preferred because it's most important they have the prevention tools whether they feel like they should be worried about it or not. Make title of this section bigger to grab attention more.	Revised order of information worked better	Better info because of inclusion of toys and pet dishes
6	Revised	Better info and better content layout	Needs to have mosquito info at beginning	Preferred original version visually with icons at the bottom section, but preferred organization of info in revised…worth the visual sacrifice. Maybe add more icons overall.	----	Better info because of inclusion of things we may not usually think about as collecting water.
7	Revised	More info and better order	More informative	Shorter and makes feel more at ease since already know mosquito spray can stop it.	Seems like more info	More info and better balanced includes water treatment as an option
8	Revised	More info about virus at top…gets to point quicker	More informative	----	More info and doesn't tell you to cover your hands which is ridiculous in summer	----
9	Revised	More instructive, gets to the point faster,	Original doesn't mention birth defects or spread from mother to child	Shorter than original and original doesn't make it seem like you could spread it to anyone even though you can…be nice if explained how you can spread it from person to person.	More reasonable	More informative
10	Revised pieces / original layout	More important info at the top	More informative	----	Prefer original since it's more direct	More informative since mentions things people don't think of.
11	Revised	More informative and better layout	Leads with symptoms and includes mother to child transmission and birth defects info	Info about potential to spread it to others	Covers as much skin as possible seems more reasonable…info about what to wear specifically is unnecessary in both	Includes things you don't normally think about
Tot	Rev 8 full 2 part OG 1 full 2 part					