

Communication Messaging during the Zika Outbreak in the Canadian Media

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ABSTRACT

An increase of both old and new infectious disease outbreaks highlights a need for better understanding of risk information. The purpose of our research is to study the communication of risk information in the Canadian media surrounding the Zika outbreak that disproportionately affected Brazil. This was accomplished with the help of a discourse analysis, which entailed extracting information from statements using the research paradigm and social context. Canadian news articles (n=1422) about Zika published between May 2015 and December 2019 made up our corpus. The media is the most influential way that risk information is disseminated during emerging public health events. Our research will help fill the gap between infectious disease outbreaks and how health risks are communicated in the media. With the new understanding we have of media communication through this research we can make better informed risk communication decisions.

Keywords: Zika, Media Communication, Outbreaks, qualitative media analysis

Une augmentation d'éclosions de maladies infectieuses souligne le besoin d'une amélioration au niveau de la communication d'information sur des risques. Cette recherche tente d'étudier la communication d'information sur des risques dans les médias au Canada, portant sur l'épidémie de Zika, touchant le Brésil de manière disproportionnée. Cela sera accompli à l'aide d'une analyse du discours. Cette méthode de recherche implique d'extraire l'information de ces déclarations en utilisant le paradigme de recherche et le contexte social. Notre corpus se constitue d'articles de presse canadiens (n = 1422) sur le Zika publié entre mai 2015 et décembre 2019. Les médias influencent grandement la diffusion d'information sur les risques lors d'événements de santé publique. Nos recherches aideront à combler l'écart entre les éclosions de

maladies infectieuses et la manière dont la communication des risques se déroule dans les médias. Grâce à notre recherche, nous allons approfondir les connaissances sur la communication d'information sur des risques et subséquemment, nous allons permettre aux gestionnaires de programmes, aux communicateurs et à tous les décideurs dans le domaine de la santé publique à prendre des décisions informées à ce sujet.

Mots clés: Zika, Communication médiatique, Éclotions, Analyse qualitative des médias

TABLE OF CONTENTS

ABSTRACT	II
LIST OF TABLES	VI
LIST OF ABBREVIATIONS AND ACRONYMS	VII
ACKNOWLEDGEMENTS	VIII
CHAPTER 1: INTRODUCTION	1
1.1 Rationale	3
1.2 Purpose Statement.....	4
1.3 Research Questions	4
1.4 Positionality	4
1.5 Language Disclaimer	4
1.6 Thesis Structure	5
1.7 Definitions.....	5
CHAPTER 2: LITERATURE REVIEW	6
2.1 Risk Communication	6
2.1.1 Journalists Reporting on Health Issues	6
2.2 Infectious Disease	7
2.3 Zika History	8
2.4 Zika Virus and Infection	9
2.5 Globalization at its Core	10
2.5.1 Climate Change.....	11
2.5.2 Zika in the Context of Climate Change	12
2.6 Sexual and Reproductive Health.....	14
2.7 Zika and the Brazil Outbreak.....	15
2.7.1 Existing Research About Zika Media	17
2.8 How is this a Canadian problem?	17
CHAPTER 3: Media Analysis of Zika Risk Messaging	19
3.1 Abstract	20
3.2 Introduction.....	21
3.3 Materials and Methods.....	23
3.4 Results.....	25
3.5 Discussion	34
3.6 Conclusion	36
3.7 Acknowledgements	37
3.8 Declaration of Interest Statement.....	37

3.9 References.....	38
CHAPTER 4: Discourse Analysis of Canadian Media.....	44
4.1 Abstract	45
4.2 Introduction.....	45
4.3 Materials and Methods.....	47
4.4 Results.....	49
4.5 Discussion	54
4.6 Conclusion	56
4.7 Acknowledgements	57
4.8 Declaration of Interest.....	57
4.9 References.....	58
CHAPTER 5: DISCUSSION	58
5.1 <i>Self versus Other</i> Ideology.....	64
5.2 Risk Communication and Infectious Disease	65
5.3 Illness as a Metaphor	68
5.4 In Context of Other Media Studies	70
CHAPTER 6: CONCLUSION	74
6.1 Contribution of Research	75
6.2 Areas for Future Research.....	75
REFERENCES.....	77
APPENDICES	96
Appendix A: Terminology	96
Appendix B: Timeline.....	98
Appendix C: Coding Grid.....	100

LIST OF TABLES

Table 1. Canadian News Article Corpus

Table 2. Frequently Used Terminology Definitions

Table 3. Timeline and Notable Events During the Zika Outbreak of 2015-2016

Table 4. Final Coding Grid used in Nvivo12 for Corpus Coding

LIST OF ABBREVIATIONS AND ACRONYMS

CDC	Centre for Disease Control
EnRiCH	Enhancing Resilience and Capacity for Health
OB/GYN	Obstetrician and Gynecologist
MERS	Middle Eastern Respiratory Syndrome
UN	United Nations
PHAC	Public Health Agency of Canada
PHEIC	Public Health Emergency of International Concern
SARS	Severe Acquired Respiratory Syndrome
SES	Socioeconomic Status
SDG	Sustainable Development Goals
SDH	Social Determinants of Health
SRH	Sexual and Reproductive Health
WHO	World Health Organization

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“Every individual matters. Every individual has a role to play. Every individual makes a difference. [...] The greatest danger to our future is apathy.”

Jane Goodall

CHAPTER 1: INTRODUCTION

Both the emergence and re-emergence of infectious diseases in recent years is concerning for public health. Several factors are involved in this re-emergence, including antimicrobial resistance (National Institutes of Health (US) & Biological Sciences Curriculum Study, 2007). Emergence of infectious diseases has included HIV/AIDS, SARS, Lyme Disease, West Nile virus, and Zika, to name a few. The 1918 Spanish Influenza pandemic and HIV/AIDS are easily recalled recent global pandemics that had mass casualties (Center for Disease Control, 2020c). That is, until today. Currently, the world is coping with a global pandemic called COVID-19 or SARS-CoV-2 (World Health Organization, 2020g). Although there has been a transition to non-communicable disease research in the field of public health, there is still a need to understand infectious diseases.

The factors that influence infectious disease rates include, but are not limited to: Climate change, antimicrobial drug resistance, vaccine hesitancy, population growth, wealth inequities, increased global travel, and globalization (Labonté & Ruckert, 2019; Lashley, 2003; National Institutes of Health (US) & Biological Sciences Curriculum Study, 2007). With vast social inequities seen globally, many countries have high death rates from what are now considered to be preventable diseases (Walker et al., 2013). There are countries —like Brazil— who contend with infectious disease such as yellow fever, chikungunya and dengue (*CDC Yellow Book 2020*, 2019). In 2015, Brazil became the epicenter of the Zika outbreak that affected several countries (Lowe et al., 2018). The difference in the past few years is the presence of novel infections and related diseases that the scientific community are not familiar with, and do not know how to immediately control (Kubiak et al., 2010; Wilcox & Colwell, 2005).

Recent emerging infectious diseases include Severe Acquired Respiratory Syndrome (SARS) in 2003, Middle Eastern Respiratory Syndrome (MERS) in 2012, and currently COVID-19 in 2019-20 which is causing a pandemic (*WHO | Disease Outbreaks*, 2020). Another outbreak, which began in 2015, which challenged the scientific community, and was heavily reported in the media, was the Zika outbreak that disproportionately affected Brazil (Lowe et al., 2018). The Zika outbreak led to thousands of babies being born with microcephaly due to infection during gestation (Carabali et al., 2018; Lowe et al., 2018). The Canadian news media featured Zika heavily in 2016, with articles still referring to the outbreak three years later in 2019.

‘Risk’ is based on several different factors including empirical evidence, historical data and trends, expert opinion, previous information, and social constructs (Hansen, 2009). These variables make risk difficult to communicate because there is a degree of uncertainty when trying to quantify risk, which is exacerbated when there is no historical data, many unknowns, and disagreement between relevant experts in the field (Hansen, 2009). Several of these factors are relevant to the Zika outbreak in 2015-2016, resulting in a dynamic media communication profile as the outbreak and scientific knowledge developed. Reporting of scientific topics, like the Zika outbreak, tend to be based upon what journalists decide is newsworthy (Armon & Baram-Tsabari, 2017). Mass media is the best tool for disseminating information about health risk, especially during public health events (Barry, 2009).

The challenge public health agencies face during outbreaks is how to communicate health risks successfully to the public. Communication and technology experts have become increasingly important alongside health authorities (Kreps & Maibach, 2008). Developments in public health are now not only reliant on scientific discovery, but also follow changes in

communication strategies and technological advancements (Kreps & Maibach, 2008). With mass media both in print and online, new information is disseminated throughout the day. There are more platforms that public health authorities can use to disseminate their information (Heldman et al., 2013; Ventola, 2014) and it is important that they are communicating effectively through these new channels.

With an increase in old and new infectious disease outbreaks, and the advancements in communication platforms, there is a need to understand how risk information is being communicated (Smith et al., 2014). For this reason, the purpose of my thesis work is to study the communication of risk information surrounding the Zika outbreak in the Canadian news media over the five years between 2015-2019, through a discourse analysis. This research will contribute to broader understanding of how communication of risk occurs during a period of novel infectious disease outbreak. With the frequent and unpredictable changes to infectious disease patterns, it is imperative that health media communication be practiced in a manner to represent the risks to those who need to be aware of them. It is important that risk information be communicated in a way that will lead to positive and protective changes in health behaviour.

1.1 Rationale

From 2016-2019, Dr. Tracey O’Sullivan led a large study focused on disaster resilience and social participation, funded by the Social Sciences and Humanities Research Council (SSHRC). Using mixed methods, Dr. O’Sullivan’s EnRiCH research team has been exploring how capability and vulnerability among high-risk populations are framed, particularly in the media and emergency planning documents. My masters research project is a sub study within this SSHRC project. I chose the Zika outbreak as a case study due to its unique characteristics

and the limited knowledge surrounding this outbreak and associated media messaging in Canada. It is a disease that challenged public health professionals in Canada and across the world.

1.2 Purpose Statement

The purpose of this research is to explore the discourse in Canadian news media surrounding the Zika outbreak of 2015-2016, with specific focus on how communication of risk information was used to describe Zika and the outbreak, as well as high-risk populations. My thesis research contributes to understanding of how Zika was portrayed in Canadian media and how the media communicate risk.

1.3 Research Questions

1. How was risk about Zika communicated in the media, with regard to high-risk populations?
2. In the context of Zika virus, how were high-risk populations portrayed in Canadian media articles?

1.4 Positionality

I am a white woman of childbearing age; whose first language is English. I was born in Canada and remain a Canadian citizen. I have an undergraduate degree, a graduate diploma, and I am working on my master's thesis. I am pro-choice.

1.5 Language Disclaimer

For this thesis document I would like to address that I am limited by the language used in the corpus. While I do not agree with the lack of inclusivity observed in the media surrounding this outbreak, I am bound by the terms used in the corpus. In many articles, journalists referred to 'men and women' discussed with binary sex identities. Even though it is recognized that gender is a spectrum, unfortunately that is not reflected in the discourse throughout this corpus. The

language used caters to address the risk of those who identify with heteronormative and cis-gendered terminology. While this does not accurately represent all people at risk in this outbreak, it is what the corpus uses. For the remainder of this thesis document those terms will be used to address the topics and, in the discussion, even if they are not the most appropriate and inclusive terminology.

1.6 Thesis Structure

This thesis is presented in the format for submission as defence by article. Under the University of Ottawa guidelines, a student is allowed to present either a monograph or article to be submitted to a peer-reviewed journal as their thesis defence.

1.7 Definitions

This thesis uses some technical words; some useful definitions of the terminology found in this thesis is provided in Appendix A.

CHAPTER 2: LITERATURE REVIEW

2.1 Risk Communication

Following the SARS outbreak in 2003 there were improvements in public health messaging and communications; Canada is now more prepared to disseminate information about infectious disease outbreaks (Avery & Lariscy, 2014). Strategic risk communication is critical, given the volume of misinformation available online (Macario et al., 2011; Sharit et al., 2016; Tam, 2018). Risk perception drives protective health behaviours, therefore it is important to communicate risk information effectively to the public (Schmälzle et al., 2017). It is important that public health communication and messaging remain the most credible sources for risk communication (Macario et al., 2011; Park et al., 2019; Tam, 2018).

Public communication of health risk information is typically dependent upon news media for dissemination (Armon & Baram-Tsabari, 2017). Journalistic framing is an important issue and there is a need to consider style and standards when reporting on health issues. Science reporting tends to be based upon what journalists decide is newsworthy (Armon & Baram-Tsabari, 2017). There is a lack of research connecting media reporting and infectious disease communication. When a health issue is addressed in the news it can have a positive or negative consequences on health behaviour(s) (Hong, 2014). Messages are framed in a way that lead to persuasive effects, making message framing an important consideration for public health (Hong, 2014).

2.1.1 Journalists Reporting on Health Issues

Journalists are one part of the group that are responsible for the messages in the media. It is important to note that it is not solely journalists who can influence the information that gets published in the media. However, journalists who are reporting on health issues and/or emerging

public health events are not required to have a background in health; they rely on traditional journalist training and practices when reporting on health issues. Decisions centre around what to include, construction of the issues, and framing (Leask et al., 2010). Ethos, pathos, and logos are examples of how journalists use information strategically to affect a reader one way or another (Mshvenieradze, 2013). They are perspectives using morals, emotions, and facts respectively. However, these are not the only tool journalists have.

Thematic and episodic framing are other examples of journalistic tools. When an issue is constructed and reported on as a theme versus a single person's encounter with the given issue (Hong, 2014). This framing difference affects where a reader will assign blame for the issue. When it is thematic reporting it is society that is to blame, but when it is episodic the blame tends to be placed on the individual for their given circumstance (Hong, 2014). There can be points of contention between journalists and public health officials. Journalists tend to rely on expert testimonials rather than empirical scientific evidence, anecdotal evidence rather than statistical, and they tend to focus on polarities rather than complexities (Leask et al., 2010). These issues are all important to keep in mind when looking through the discourse surrounding Zika in the media.

2.2 Infectious Disease

The media is the best tool for disseminating information about infectious diseases (Barry, 2009). Infectious diseases can be borne from several different microorganisms that are pathogenic: Bacteria, viruses, fungi, and parasites (World Health Organization, 2020e). An infectious disease is defined as an illness that can be transferred from one person (or animal) to another person (or animal), and zoonotic means that it can transfer between animals and humans (World Health Organization, 2020e). This transfer can take place via several different routes: Direct contact, fecal-oral route, blood-borne, sexual contact, air-borne/droplets, vector-borne,

and through an intermediate host (Center for Disease Control, 2019b). Vector-borne disease is when a vector such as a mosquito or bat population is a suitable host for a pathogen to reproduce and this vector lives in a climate that supports both the pathogen's and the vector's reproduction (Semenza & Suk, 2018). Climate is a crucial factor in vector-borne disease.

With increases in temperature, scientists have become increasingly concerned about virulent infectious diseases (Yang & Sarfaty, 2016). Vectors such as mosquitos thrive in the changing climate conditions that have been seen in recent years, those changes being increased heat, precipitation, and humidity (Yang & Sarfaty, 2016). In these climatic conditions a mosquito population can expand greatly. Not only does this increase their geographic range with more areas being suitable climates, but it also increases their life cycle, thereby increasing their ability to carry disease and pass it to humans (Yang & Sarfaty, 2016). Because female mosquitoes need a blood meal to reproduce, an increase in life cycle and numbers will lead to an increase in human bite rates (Yang & Sarfaty, 2016).

2.3 Zika History

Zika is a vector-borne infectious disease caused by a virus, which was first discovered in 1947 in Rhesus monkeys in a Ugandan forest (Plourde & Bloch, 2016; Saad-Roy et al., 2018; Waddell & Greig, 2016). It is transmitted by mosquitos and goes on to cause typically asymptomatic infections in humans (Robinson, 2017; Saad-Roy et al., 2018; Teale et al., 2016; Waddell & Greig, 2016). When Zika began to spread outside of its endemic regions of Africa and Asia in 2007, it led to outbreaks worldwide (Saad-Roy et al., 2018; Waddell & Greig, 2016). Zika is more likely to be endemic in developing countries where conditions are favourable for its sustainability (de Campos, 2017; Muchaal, 2018; Waddell & Greig, 2016).

2.4 Zika Virus and Infection

Zika rarely causes life-threatening infections, and usually presents as asymptomatic (Saad-Roy et al., 2018). Some people experience a mild fever, achy joints, headache with symptoms worsening when there is coinfection with another arbovirus (virus transmitted by an arthropod vector) (Plourde & Bloch, 2016; Robinson, 2017; Teale et al., 2016; Waddell & Greig, 2016). There is an increase in the incidence of microencephaly and Guillain-Barré syndrome in fetuses when there are epidemics of Zika (Singh et al., 2018; Tetro, 2016; Waddell & Greig, 2016). As an arbovirus Zika can also be spread through intrauterine, sexual contact, and blood transfusions (Plourde & Bloch, 2016; Teale et al., 2016; Waddell & Greig, 2016). The virus has been detected in semen for >181 days and female genital secretions for 3 weeks, with transmission being documented from male-to-female, female-to-male, and male-to-male (Robinson, 2017; Saad-Roy et al., 2018).

With an increase in Zika infections there is a correlated increase in pre-natal, maternal, and infant health care costs (de Campos, 2017). The concern around fetal health and outcomes brings the conversation about abortions to the forefront (de Campos, 2017). Considering the varying stances on abortion around the globe this can affect social and mental health outcomes for pregnant women infected with Zika (de Campos, 2017). Abortion is illegal in several countries where Zika is endemic and where the outbreaks occurred (de Campos, 2017). Having to abruptly decide whether or not to carry a pregnancy to term can cause negative mental health outcomes (de Campos, 2017). There is stigma surrounding abortion practices and decisions, even in countries where it is legal and possible to access abortion services (de Campos, 2017). If women are aware of a potential threat to their health, they are able to make more informed choices when making decisions.

2.5 Globalization at its Core

Globalization affects population health; the characteristics of globalization can influence each other to varying degrees (Labonté & Ruckert, 2019; McMichael, 2013). It involves complex and uncertain dynamic systems that have rippling effects down to the population health level (McMichael, 2013). These effects to population health include but are not limited to: Infectious disease, non-communicable disease, antimicrobial resistance, and workplace health hazards; exacerbating these conditions are the wealth, education, and social inequities (Labonté & Ruckert, 2019; McMichael, 2013). There are, however, some positive influences on population health from globalization: Coordination of vaccinations, information exchange, and ability for long distance response to disasters (McMichael, 2013).

Globalization has many effects on infectious disease through trade, travel, climate change, and intellectual property rights (Labonté & Ruckert, 2019). The nature, ecology, epidemiology, and mechanisms of the infectious agent dictate the factors that are capable of influencing their spread (Labonté & Ruckert, 2019). One factor is international air travel and its role in spreading vector-borne disease, especially in industrialized countries where air traffic is frequent (Ali et al., 2017). In combination with air travel, seaborne trading also aids in the spread of mosquitos, which are the vectors for many infectious agents including Zika, yellow fever, dengue, malaria, and chikungunya (Semenza & Suk, 2018). Through these methods there will be a further spread of the virus to regions where it is not endemic. If there is a mosquito population suitable to its reproduction transmission, on a long term basis can occur (Plourde & Bloch, 2016).

2.5.1 Climate Change

Human activity is at an all-time high, being influenced by increased trade, movement of peoples, flow of information, regulatory systems, and flow of capital (McMichael, 2013; Patz et al., 2014). It is now thought we are entering a new geologic epoch moving from the Holocene Era to the Anthropocene Era (McMichael, 2013). The levels of human induced climate change have reached levels that are unsafe and will soon lead to an Earth that cannot sustain human well-being (McMichael, 2013). The global effects of climate change include ocean acidification, sea level rise, extreme weather events, land degradation, drought, flooding, deforestation, ozone depletion, soil depletion, loss of biodiversity, and disruption of global phosphorus and nitrogen cycles which result in negative health outcomes (Costello et al., 2009; McMichael, 2013; Patz & Thomson, 2018). Climate change is considered to be the biggest health threat that we will face in this century (Costello et al., 2009; Patz & Thomson, 2018). Climate change will cause both direct and indirect effects on health.

Food security, water supply, and shelter are essential aspects to human life, and will be severely affected by climate change (Costello et al., 2009; Hasegawa et al., 2018). Climate change will worsen food securities that already exist; it will also increase undernutrition and the under-five mortality rates (Costello et al., 2009; Hasegawa et al., 2018). Rising temperatures will affect farmers' crops and create food shortages and subsequent economic burdens, while extreme weather event destruction will loom over the remaining crops (Hasegawa et al., 2018). With rising sea levels there will be a salination of local fresh water fisheries, which decreases food supply and access to fresh water (Costello et al., 2009).

Extreme weather events damage crops and bring droughts or floods (Caminade et al., 2017; Costello et al., 2009). This reduces access to clean and sanitary drinking water. In a

drought there is an increase in the practice of keeping water reserves, such as a barrel full of water (Ali et al., 2017). This is a breeding ground for mosquitoes that carry infectious disease, and other quicker acting microorganisms (Costello et al., 2009). This can increase the mortality from both vector- and water-borne diseases, especially when combined with poor nutrition health inequities leading to reduced access to health care treatments, and migration (Costello et al., 2009; Patz et al., 2014). Migrants' houses may be underwater or uninhabitable due to rising sea levels, or in geographic areas where there is such severe drought it is no longer habitable resulting in not only negative health outcomes but negative social and economic outcomes as well (Costello et al., 2009).

In the poorest communities climate change will increase the negative health inequities surrounding the social determinants of health if there is no mitigation (Costello et al., 2009; Patz et al., 2014). These health inequities are directly related to rates of infectious disease through their association with the social determinants of health. For example, social determinants of health that would have affected the Zika outbreak in Brazil would be income distribution (i.e. ability to buy mosquito repellent), education (i.e. reproductive health information), and housing (i.e. proximity to stagnant water) (Morano & Holt, 2017).

2.5.2 Zika in the Context of Climate Change

Zika virus patterns will be affected by several different pathways of globalization and its outcomes. Because Zika is a vector-borne disease, its transmission will be affected by climate change. Zika had infected over 500,000 people in over 40 countries and territories as of early 2017 (Ali et al., 2017). Globalization factors have —and will continue to— influence the global ecology of arboviruses. Globalization factors include: Urbanization, poverty, climate change, political politics, social practices, human movement, and land use (Ali et al., 2017).

There is a changing ecology of arbovirus diseases, there is a shift from being predominantly in Africa and Asia to spreading through the Pacific and Indian Ocean Islands to Southern America, which highlights the global change these disease are undergoing (Ali et al., 2017; Costello et al., 2009). There are social changes that mix with the environmental changes, resulting in sometimes additive effects on Zika transmission (Ali et al., 2017; Bardosh, 2019). Changes that happen after or during a natural disaster can lead humans to come into contact with an increased amount of infected mosquitoes (Ali et al., 2017). These changes can be disruption of or damage to infrastructure, loss of clean drinking water sources resulting in standing water storage, or loss of homes and resultant sleeping outdoors, all of which will lead to increased contact between humans and infected mosquitoes (Ali et al., 2017). In a more obvious vein, natural disasters can disrupt ongoing vector control practices, access to health care services, access to reproductive health care needs, and access to educational programs (Ali et al., 2017). There can be reliance on the media to disseminate quickly changing information during natural disasters, and during infectious disease outbreaks, as the media is a useful tool for risk communication.

The outbreak of Zika in Brazil is well known and could have been influenced by a reduction of mosquito control measures as well as an increased amount of people moving around (Yang & Sarfaty, 2016). However, a more likely piece of the causal pie is weather change (warmer, wetter) as the result of climate change (Ali et al., 2017; Yang & Sarfaty, 2016). Climate conditions were favourable for the *Aedes* mosquito when there was a warming of El Niño in northeastern region of South America during the second half of 2015 (Paz & Semenza, 2016; Yang & Sarfaty, 2016). Mosquitoes thrive and base their geographic location on temperature and moisture (Yang & Sarfaty, 2016).

The year 2015 was considered to be the record warmest year for the Southern Hemisphere (in 136 years), which led to a growth in the mosquito population and played a part in the subsequent Zika outbreak (Paz & Semenza, 2016). Increases in temperature can lead to an expansion of Zika's geographical location (Caminade et al., 2017; Paz & Semenza, 2016). The change in temperature can increase the reproductive cycle of both the vector and the virus that replicates within it (Ali et al., 2017; Costello et al., 2009; Semenza & Suk, 2018; Tjaden et al., 2018).

Changes in higher annual temperature can lead to increased transmission of Zika, as it changes from a seasonal risk to an endemic constant threat (Ali et al., 2017; Caminade et al., 2017). This was shown when the warmest El Nino swept through Brazil leading to water storage in the household due to record breaking seasonal temperature (Ali et al., 2017; Caminade et al., 2017). This in theory puts regions such as North America at risk from a typically tropical or subtropical affliction (Ali et al., 2017; Caminade et al., 2017). Changes from seasonal to endemic threat of an infectious disease would result in more media articles being published on the outbreak. There is a need to make sure the communication of risk information is done accurately and effectively if there will be increased amounts of infectious disease and outbreaks in years to come.

2.6 Sexual and Reproductive Health

Sexual and Reproductive Health (SRH) is a human right and a public health issue. This was highlighted during the Zika outbreak. During disasters or crises SRH is especially important, as it is a comprehensive issue that requires input from several different areas of the healthcare system (World Health Organization, 2020c). During the Zika outbreak, the areas of SRH that were notable were abortion care, access to contraceptives, family planning, and gender based

sexual violence (Carabali et al., 2018; de Campos, 2017). Without access to SRH services there is an increased rate of maternal and fetal death rates, trauma, unwanted pregnancies, unsafe abortions, and increased incidence of sexually transmitted diseases (World Health Organization, 2020c).

2.7 Zika and the Brazil Outbreak

The Federative Republic of Brazil —or more commonly Brazil— is a Portuguese speaking upper middle-income country located in South America (*Brazil*, 2020). It is the fifth most populous country in the world and is considered to be multicultural and ethnically diverse and it is the largest country in South America (*Brazil*, 2020).

In the early 2000's, there was a seamless transition of power that gave Brazil the political stability it had been vying for for years (Green et al., 2018). The political stability was short lived and ended when Dilma Rousseff took power in 2010. There were frustrations over corruption, police brutality, inefficiency of politics and public service, peaceful protests began against her as soon as she took office (Scruggs, 2015). During her time in government she was accused of being involved in multiple bribery and tax evasion schemes and was eventually impeached by congress in 2016 (Guazina et al., 2019). It is important to note that during her impeachment and trial the Zika outbreak was happening simultaneously.

In 2015, in northeastern, Brazil, an extremely low-socioeconomic area, an unusual amount of microcephaly cases were being reported by doctors (Lowe et al., 2018; Vissoci et al., 2018). There were several OB/GYN doctors that noted this unusual rise in incidence, and the cause remained unknown (Vogel, 2016). It was not until there was an association between increased Zika infections in Recife that this become associated with the microcephaly incidence (Vissoci et al., 2018). It quickly spread from Recife to other areas, as Brazil is very familiar with

the *Aedes aegypti* mosquito having endemic rates of dengue and yellow fever (Lowe et al., 2018; Vissoci et al., 2018). It grabbed global attention by the end of 2015, and by February 2016 the World Health Organization declared a Public Health Emergency of International Concern (PHEIC). News stories took center stage during February 2016, showing pictures of microcephalic babies and Brazilian slums. The cause of this sudden association between microcephaly and Zika was not previously known or understood by the medical or scientific community and was highly debated (Vogel, 2016).

There was a high amount of uncertainty surrounding the unique features of the Zika outbreak and the potential risks it posed to any given population. It was not just pregnancies that were at risk, adults could themselves get Guillain-Barré syndrome. Guillain-Barré is caused when the immune system attacks the peripheral nervous system. It can result in temporary or permanent paralysis and can be fatal if the nerves associated with breathing are affected (Nobuhiro & Hans-Peter, 2012). In most cases people who have Guillain-Barré syndrome will make a full recovery (World Health Organization, 2020a). There were previous cases of Zika in other countries that never had microcephaly or Guillain-Barré associated with the infections. It was not understood what made this outbreak different from others or why it was happening in Brazil. There are a few theories as to the origin of the outbreak. One prominent theory is that a traveller from French Polynesia visited Brazil in mid to late 2013 while they were infected with Zika, and were bitten by a local mosquito that took up the virus (Lowe et al., 2018). Since *Aedes aegypti* is a prominent mosquito in Brazil it was able to spread quickly; combined with the warmest El Niño on record, an optimal environment for mosquito transmission occurred.

2.7.1 Existing Research About Zika Media

At least one study sought to explore the differences between national and local reporting practices in mass media in the United States, specifically during the Zika outbreak (Jerit et al., 2019). Their primary goal was to determine the difference in reporting at national and local levels, as there is still no vaccine for Zika and mass media communication might be the most efficient way to contain the disease (Jerit et al., 2019). The authors decided based on previous research (Fung et al., 2011) that geographical location of the newspaper and outbreak were important factors that influenced the risk messaging. The further a reporting newspaper was established from an outbreak, the more it tended to have loaded-word use and a lack of emphasis on risk reduction messaging. They determined that newspapers from Tampa Bay provided more individual-level risk information when compared to *The New York Times*, as Tampa Bay experienced local Zika transmission (Jerit et al., 2019). The researchers made note that even with the difference between the two tiers of geographical reporting, both of the locations used sensationalist and dramatic language while simultaneously relying on inaccurate risk information (Jerit et al., 2019). While this represents important research, it only considered two newspapers within the United States context. There are still questions that need to be answered about communication of risk information through the mass media during infectious disease outbreaks.

2.8 How is this a Canadian problem?

During the Zika outbreak, there was an increase in cases outside the Central and South American hub where the virus seemed to thrive, to varying degrees around the globe (Lowe et al., 2018). In Canada, there were infections from travellers returning from an outbreak region (Tataryn et al., 2018). Returning travellers led to cases of sexual transmission between partners where one person had recently returned from a high-risk zone (Tataryn et al., 2018). Canada at

the beginning of the outbreak in 2015 did not have any *Aedes aegypti* populations. Recently there have been reports that in Southern Ontario, specifically in the Windsor area, these mosquitos have started to nest (Public Health Agency of Canada, 2019). *Aedes aegypti* mosquitos are typically tropical mosquitoes and do not like cold weather, making it logical that it would not be a major issue for community transmission (Public Health Agency of Canada, 2019). However, with climate change effecting the seasonal temperature rates, this is no longer as certain.

Scientists have also discovered that some of the other mosquito species can be used as the vector for the Zika virus and they are not as restricted to tropical regions (Boyer et al., 2018).

The transmission of Zika slowed down in 2017, with 16 new cases diagnosed in Canada between June and August 2017, a reduction of 88% from the previous year (Muchaal, 2018). There was a transition from where it is endemic, to a more susceptible population where it can easily lead to an outbreak (Muchaal, 2018). Another major factor is the increase in globalization; there is increased worldwide travel that can propagate the spread (Muchaal, 2018; Plourde & Bloch, 2016). There is concern that Zika might become endemic to Canada due to the fact Zika is moving beyond its endemic zones (Muchaal, 2018). There is a gap in the surveillance and research surrounding the viruses ability to become endemic in irregular regions (Muchaal, 2018). Not only is this a potential issue for Canadians given the many facets of globalization previously mentioned, it is also important to learn from the media communication for future infectious disease outbreaks.

CHAPTER 3: Media Analysis of Zika Risk Messaging Within a Canadian Context

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**Amanda Mac is an author on this paper because of her contribution as my research assistant in data coding. Amanda co-coded 30% of the final news article corpus. She confirmed the themes after analysis.

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3.1 Abstract

Communication between the media and the general public is an important risk management practice; it is paramount during infectious disease outbreaks given the reliance on the media to communicate risk reduction information. It is imperative that research investigate the messaging disseminated to the public during outbreaks. In this study, our research questions centered around how the media described high risk populations for the Zika outbreak. Using a case study design, we conducted a media analysis that included a corpus of Canadian newspaper articles focused on Zika virus from 2015-2019, comprised of (n=1422) news articles sourced from the Canadian Major Dailies, Canadian Broadcasting Company (CBC), CTV (a Canadian broadcasting company), and Global News media outlets. Four themes emerged through our inductive media analysis: 1) Emphasis of a Dichotomy, 2) Non-Inclusive Discourse Surrounding Risk, 3) Complications of Global Governance, and 4) Dispatching of Fear. The implications of this study highlight the important role of media messaging relating to risk communication during infectious disease outbreaks.

Keywords: media communication; media analysis; Zika virus; Canada; outbreak

3.2 Introduction

In the past 100 years there have been outbreaks of several different pandemic flu strains (i.e. Spanish, Hong Kong, Swine) and coronavirus strains (i.e. SARS, COVID-19). These outbreaks received widespread media attention during their occurrence. Communication between the media and the general public is an important risk information tool; it is paramount during infectious disease outbreaks as there is reliance on the media to communicate risk reduction information (Covello, 2003; Krewski et al., 2006). However, misinformation is common in the media, thus making evidence-based risk communication a priority in public health emergency responses (Tam, 2018).

Risk is based on several different factors including empirical evidence, historical data and trends, expert opinion, previous information, and social constructs (Hansen, 2009). These variables make risk difficult to communicate because there can be a degree of uncertainty when trying to quantify risk (Hansen, 2009). Reporting of scientific topics tends to be based upon what journalists decide is newsworthy (Armon & Baram-Tsabari, 2017).

Messages are framed to persuade audiences, this persuasiveness is emphasized during a public health event (Hong, 2014). Journalists reporting on health issues can frame messaging with a thematic frame (depiction of general evidence); with this frame readers tend to be led to blame society (Hong, 2014). In contrast, when messaging is framed with an episodic frame (a specific event) the reader is more likely to blame the individuals versus society (Hong, 2014). This highlights the importance of journalistic framing when reporting on health issues and risk, especially when considering blame might lead to stigmatization of a given community.

The challenges of communicating risk during infectious disease outbreaks have been identified before, in particular with the challenges encountered during SARS. Indeed these

studies offer valuable insight into the study of risk communication in the media but, this outbreak occurred in 2003 (Hansen, 2009). While the SARS research is important, media and knowledge surrounding communication of risk have evolved since 2003. Case studies from recent years that occurred with modern media would be beneficial to understand how infectious disease outbreaks are currently being reported.

A more recent example of risk information being disseminated in the media is the 2015-2016 Zika outbreak that disproportionately affected Brazil. Zika is an infectious disease that can cause a mild infection with symptoms such as fever, chills, aches, and pains (Robinson, 2017; Teale et al., 2016; Waddell & Greig, 2016). Zika is a vector-borne disease, meaning it uses an intermediary to infect humans, which in this case is the *Aedes aegypti* mosquito (Plourde & Bloch, 2016). The Zika virus garnered media attention during its 2015-2016 outbreak when there was an increased incidence of microcephaly associated with infections during pregnancy (de Campos, 2017; Plourde & Bloch, 2016).

Communication of health information is dependent upon mass media for its dissemination to the general public (Armon & Baram-Tsabari, 2017). The public is told about threats to their health and will want to know if they are personally at risk; personal risk perceptions are interpreted differently than group risk perceptions (Schmälzle et al., 2017). This underscores the need to understand the communication of risk around Zika in a modern context.

The purpose of this research is to study the risk messaging surrounding the Zika outbreak present in Canadian news media over the five years between 2015-2019 using discourse analysis. Specifically, we aim to answer the following questions:

1. How was risk about Zika communicated in the media, with regard to high-risk populations?

2. In the context of Zika virus, how were high-risk populations portrayed in Canadian media articles?

This research will help fill the gap about how we are communicating risk messaging in the media during emerging infectious disease outbreaks, such as Zika.

3.3 Materials and Methods

Research Design

This research was conducted using a qualitative media within-site case study design. This media analysis is embedded within a larger multiple case study project, looking at different disasters within the Canadian media context. Case studies are useful for integrating contextual conditions as they relate to the phenomenon under study (Yin, 2018). This approach results in a case description and case themes for the specific case study topic presented here (i.e., Zika in the media).

This project is guided by a social constructionist paradigm, with the orientation that there is not one truth or reality to be discovered (Crotty, 1998). The social constructionist epistemological perspective focuses on understanding how sociocultural contexts and structural conditions lead to the account under observation. Discourse analysis entails extracting information from statements using the lens of the research and social context (Foucault, 1970; Rose, 2012). The social constructionist paradigm is appropriate for this study, as discourse analysis is about determining the meaning behind words and phrases and offers an interpretative approach for looking at words.

Data Collection

The corpus consists of Canadian news articles published between May 2015 and December 2019. The timeline begins at the start of the Zika outbreak in Brazil and ends in 2019

to have current media included in the analysis. The news articles were collected using ProQuest (Canadian Major Dailies), Canadian Broadcasting Corporation (CBC), CTV News (a Canadian broadcasting company), and Global News. The term ‘ZIKA’ was used to search each database. The results within the predetermined time frame were used to create the initial corpus. Inclusion criteria included publication date (May 2015-December 2019), language (English), and mention of Zika. The exclusion criteria included publication date (outside time frame), videos, language (non-English), and no mention of Zika. Duplicates with more than 80% of the same content were manually removed before the news articles were transferred to NVivo12 for coding (Table 1).

Table 1. Canadian News Article Corpus

The initial corpus was matched to the inclusion and exclusion criteria and the resulting final corpus used for analysis was 1163 news articles.

News Article Source	# from initial search	# included in final corpus
<i>CBC</i>	210	163
<i>CTV</i>	414	357
<i>Global</i>	136	95
<i>Canadian Major Dailies</i>	662	542
<i>Total</i>	1422	1157

Data Analysis

An inductive approach was used to code the data. This approach gives a useful description of the overall corpus that emerges from the data, rather than trying to fit the data into pre-determined frames (Braun & Clarke, 2006, 2012, 2019). However, it is important theoretical and epistemological commitments are not forgotten during an inductive approach. We used NVivo12 software to help manage the corpus. The first two authors determined a list of

preliminary codes by reading 10 news articles from the corpus. The codes were combined and organized into a preliminary coding grid, which was used to code 20 more articles randomly selected from the corpus. The codebook was subsequently revised, and the final codebook was uploaded to NVivo12 to facilitate coding of the documents. The second author (AM) who is familiar with this protocol coded 30% of the articles to ensure there was a reflexive approach, and to provide a richer approach to data analysis (Braun & Clarke, 2019). When the coding was complete, we analyzed the data and memos to identify themes, then we made note of patterns we saw in the corpus that became preliminary themes. After identifying preliminary themes, we reviewed and revised them before confirming the final themes presented below. All three authors discussed and refined the themes until consensus was reached.

3.4 Results

Prior to discussing the themes, it is important to note that our analysis is limited by the language used in the media, and we acknowledge its lack of inclusivity. In this corpus of news media articles, ‘men and women’ were discussed as binary sex identities. While gender is recognized along a spectrum, unfortunately this is not reflected in the discourse throughout this corpus. The language used in describing risk is limited to heteronormative and cis-normative terminology; or limited by heteronormative and trans-exclusive understanding of sex identities. While this does not accurately represent those at risk, our use of these terms is a reflection of the data gathered in Canadian media.

Four themes emerged through our inductive media analysis; they are titled: 1) Emphasis of a Dichotomy, 2) Non-Inclusive Discourse Surrounding Risk, 3) Complications of Global Governance, and 4) Dispatching of Fear.

Theme 1: Emphasis of a Dichotomy between Geography and Socioeconomics

What became clear in our analysis of the media articles is a dichotomy between geography and socioeconomics. In the explanation below, we provide examples of how this dichotomy appeared, as well as examples from the media articles that portrayed this theme.

Country Identity

The data revealed a dichotomy related to geographical areas defined by socioeconomic status. Within the media discourse, Canada (a high-income country) was framed as being impacted by the virus, while lower-income countries such as Brazil were framed as contributing to the spread of Zika. Canadian populations affected by Zika included travellers attempting to get a refund for their cancelled travel, and those who had returned from travelling to a high-risk Zika zone.

Courtney Ohler and her husband, Jon, are expecting their first child this spring, but tough parental decisions have already started. “This is the first big decision we’ve had to make as parents—as future parents—so we want to make the right one,” Courtney Ohler said. The couple had to take a hard look at travel plans when news of the Zika virus started to circulate (Campbell, 2016).

People at high-risk of being affected by Zika in Canada were portrayed in the media as those who were wealthy enough to be able to afford international travel (specifically to warm Zika outbreak regions).

In contrast to Canada’s portrayal, Brazil’s identity in the media became intertwined with the Zika virus. When Brazil was discussed in the news articles, the content focused on poverty, political instability, and highlighted numerous social issues – of which Zika was framed as a small one. The news articles frequently describe single mothers who are extremely poor and cannot deal with the pregnancy or with the potential of having a child with microcephaly. These images of the Zika outbreak became linked with the identity of Brazil at that time.

Portrayal of Risk

While the biological risk of Zika does not differ from a Canadian to a Brazilian, the social risk is vastly different. The social and biological difference is not separated in the corpus. The media portrays the high-risk populations in Canada and Brazil as being of the same magnitude. Canadians who travelled and wanted to become or who were pregnant were framed as being at risk. This choice to travel internationally provided Canadians with some autonomy around the possibility of contracting the virus. Brazilian populations, however, were framed as having little autonomy in their level of risk.

Sexual and Reproductive Health

Sexual and reproductive health refers to the subset of human health rights that relate to sexuality and reproduction. In some Central and South American countries abortion is legal and assessible, and in others it is punishable by 40 plus years imprisonment (Zureick et al., 2018). There were several mentions of abortion in the corpus as an option for those at highest risk. In the Canadian media the legalities, risk of unsafe abortion, and social context were mentioned with quotations from Pope Francis on the topic when it came to Brazil. The response of Brazilian priests to the Pope's 'liberal' suggestion of using contraceptives was highlighted. The media presented quotations from interviews with the Pope about the events happening in Brazil and he stated contraception is acceptable to use '*as the alternative is murdering a human and that is an absolute evil*' (Winfield, 2016). In the context of Brazil, the discussion centered mainly around unsafe and illegal abortions. However, women not having access to contraceptives, having no autonomy or choice of whether to become pregnant was discussed several times.

While Canadian regulations and laws surrounding abortion were not mentioned or explained, the stigma surrounding it remained. In the few instances when it was discussed in the Canadian context, the topic of abortion was more about the moral and ethical dilemma of

whether they should perform a late term abortion, rather than whether they would be allowed or have access to a safe abortion.

Woman refused Zika test may abort baby “We are going to be left with the option of terminating what could be a perfectly healthy pregnancy, because we are just completely unwilling to take the chance” (Kirkey, 2016)

In Canada, testing was the main topic that surrounded pregnancy – in contrast to abortion. Tests for Zika were not administered in Canada unless symptoms were present, however many cases of Zika are asymptomatic. Parents did not want to abort a ‘*perfectly healthy*’ fetus when they did not know if the fetus had been exposed to the Zika virus.

It is important to note Canada and Brazil are not the only countries mentioned in this corpus that fall into this theme; Zika was widespread and affected many countries. Central and South American regions became grouped together and did not have their own individual identities. Whether it was abortion rights, rates of violence, country debt/economy, cultural or social practices, or political instability, these comments in the Canadian media became a generalization of the entire ‘Latin American’ region. This sweeping generalization did not take into account how these countries have their own identities and cultures. Journalists mention that abortion is illegal and unsafely performed in Central and South America. However, in El Salvador, for instance, a woman can go to jail for 40 years if she has an abortion, whereas Colombian laws allow abortions to take place under very specific circumstances (González-Vélez et al., 2019; Zureick et al., 2018). The lack of specificity in reporting reflects dismissiveness of the varied experiences of those who are able to bear children at the time of this outbreak, and cultural heterogeneity throughout the Americas.

Theme 2: Non-Inclusive Discourse Surrounding Risk

In this corpus, heteronormative and cis-normative terminology were used frequently when discussing risk from the Zika virus. The articles framed Zika as a virus affecting monogamous, heterosexual couples (one man and one woman) and their ability to conceive and/or start a family. This approach excludes same sex couples, those wishing to have a child on their own, or other potential scenarios from the narrative. For instance, a pregnant woman who is not in a committed relationship and has sex with a man who has recently traveled outside the country would be at risk if she is unaware of the potential for Zika transmission. Both of these parties need to be aware of the potential risks and understand the best course of action when it comes to protecting themselves, yet they were not represented in media narratives.

The different risk information provided is based on binary sex identities. The media advised Canadian women who had recently travelled to abstain from sex for the duration of their pregnancy if they chose to travel, while men were advised to wear a condom for 6 months post trip. This recommendation changed to a duration of 8 weeks, as scientific knowledge became more informed at the end of the time period studied. It was advised if both the man and woman planned to go on a trip, they should not try to conceive until six months post trip. The risk is towards those who can bear children, yet the risk avoidance advice is to abstain from any sexual intercourse. Men are mostly advised to wear a condom during sexual intercourse. This is contradictory advice coming from the media because the risk avoidance information is not consistent for everyone. Anyone who can bear a child is at increased risk during Zika, yet those who could potentially transmit the virus to them are not also told to abstain. There is a disconnect between real-life social dynamics and the advice coming from public health entities.

Moreover, most governments (e.g. Brazil, Colombia, El Salvador, Nicaragua) advised people not to get pregnant during the outbreak, while the science community was uncertain.

However, pregnancies can be and often are unplanned. Not everyone has the choice to control whether they become pregnant, potentially due to sexual violence, a coercive sexual relationship, or lack of access to contraceptives. Many of the instances of governments advising women not to conceive occurred in nations with the least accessible information, inaccessible contraceptives, high rates of sexual violence, and few or no options for a safe legal abortion (Carabali et al., 2018; González-Vélez et al., 2019).

Theme 3: Complications of Global Governance

Global health is a term that encapsulates the purpose and actions to improve population health, and attempt to establish health equity. With increased globalization comes more discussion around global health issues, governance, practice, and research. The World Health Organization (WHO) is an agency of the United Nations that has a dominion on the governance of global health issues (Van de Pas et al., 2017). As such, the WHO was the most cited entity within this corpus. Quotations from the WHO were frequently used by journalists to make a supportive statement for the purposes of their article. This is a common journalistic strategy. The use and portrayal of these quotations led to some troublesome perspectives from a global health perspective. For instance, three days prior (February 4, 2016) to the WHO declaring Zika to be a Public Health Emergency of International Concern (PHEIC), articles were published stating:

Brazilian officials say they're sending a set of samples related to the Zika outbreak to the United States, a move which follows complaints that the country was hoarding disease data and biological material. The announcement came hours after The Associated Press revealed that international health officials were frustrated at Brazil's refusal to share enough viral samples [...] U.S. and U.N officials told AP that Brazil probably shared fewer than 20 samples when experts say hundreds, or thousands of samples are needed to track down the virus' evolution and develop accurate diagnostics and effective drugs and vaccines (Cheng et al., 2016)

The World Health Organization declared a global emergency over the explosive spread of the Zika virus, which has been linked to birth defects in the Americas, calling it an

*“extraordinary event” that poses a public health threat to other parts of the world
(Keaton & Cheng, 2016)*

This discourse is problematic because the article portrayed Brazil as not being cooperative on a global level. It might not be realistic to expect Brazil to be focused on research whose results would not be available until years down the road. Using quotations from global entities, like the WHO, with strong statements had the potential to be taken out of context. There are a multitude of complex decision-making factors that the news readership may not be aware of that can then become misinterpreted and misrepresented. Misrepresentation can lead to stigma in various communities when reported through the mass media (Maiorano et al., 2017; Srivastava et al., 2018).

The WHO received criticism for not declaring a PHEIC sooner in relation to the Ebola outbreak in Africa. As such, in our corpus there are frequent comments and critiques about the WHO's handling of Ebola and how the WHO did not want to make a similar mistake again with Zika. Journalists noted this past critique and cited it as the reason the WHO was quick to declare a PHEIC surrounding Zika. One article prefaced their use of a WHO quotation (that addressed Zika) with the Ebola experience:

WHO, which was widely criticized for its sluggish response to the 2014 Ebola crisis in West Africa, has been eager to show its responsiveness this time. Despite dire warnings that Ebola was out of control in mid-2014, WHO didn't declare an emergency until months later, after nearly 1,000 people had died. "If indeed, the scientific linkage between Zika and microcephaly is established, can you imagine if we do not do all this work now and wait until the scientific evidence comes out?" Chan said. "Then people will say, 'Why didn't you take action?'" (Keaton & Cheng, 2016)

In the news media, there is a focus on Ebola and the past, instead of Zika and the current state in Brazil. The quotation seems to play on the idea that the WHO is afraid of additional backlash to a sluggish response to an infectious disease outbreak that has the potential to cost severe

casualties. However, the focus on WHO's past draws away from the populations affected by the outbreak.

Theme 4: Dispatching Fear

A prominent theme throughout the data was the underlying tone of fear through the articles. There was pervasive discussion surrounding the uncertainty about this version of the Zika virus, and its unusual presentation in offspring of infected people. Microcephaly is the strange occurrence with Zika, and it prompted researchers to look for reasons and an understanding of the phenomenon. The dominant messaging in the media suggests there is no way to know about exposure. If a person is experiencing flu-like symptoms or is pregnant/wanting to become pregnant and is worried, nothing can be done. For example from an article in 2016:

This 'silent circulation' of the disease may make tracking the virus' spread more difficult, he said [Head of WHO's epidemic response team] (CTVNews.ca Staff, 2016)

Most of the articles include discourse related to fear. Journalists discuss the potential effects of Zika on a fetus, emphasizing there are no vaccines or treatment; and reports that around 80 percent of infections are asymptomatic and go undetected.

These reports— which contribute to public fear— are also evident through the equation of Zika to HIV/AIDS; several articles frame Zika as the new HIV/AIDS epidemic. For example from an article published in 2016:

This is the same as AIDS, Dr. Melo said one night this past week, slumped in the glow of the ultrasound screen. It's just the same (Nolen, 2016)

Zika and HIV/AIDS are two completely different diseases that have different risk profiles and different severities of outcomes. HIV/AIDS was not known, whereas Zika was discovered in

Uganda in the 1940's. There are social impacts in making this comparison. Zika is compared to many other mosquito-borne diseases such as dengue, yellow fever, and chikungunya (all common in Brazil). However, the severity of these diseases are again different from Zika.

Another comparison was made to the thalidomide incidences of the 1960's:

Dr. Scavuzzi, the women's health co-ordinator at IMIP hospital in Recife, warned that the potential consequences of a link with Zika could be even greater than the thalidomide scandal, which affected a generation of children (Bowater, 2016)

This was another instance where there was an unknown risk to fetuses. Comparisons to well-known infectious diseases that have severe health consequences send fear-based messages. Zika had many unknowns surrounding why it caused microcephaly, but it was not a novel virus. In comparing it to infectious disease situations that had devastating effects —without grounds to make that comparison— puts fear into the article's message.

Another source of fear messaging was the use and portrayal of expert opinion. In several of the articles an expert in the field was quoted or asked a series of questions related to the Zika outbreak. Indeed, expert opinions can be beneficial to explain the facts about an outbreak, however, in each article typically one expert's opinion was expressed. This omission of multiple viewpoints is problematic because in the scientific field at large, there was no consensus about what occurred with the specifics of the Zika virus in Brazil and why it was causing the large number of microcephaly cases at the time (Lowe et al., 2018). Even the ways in which it could be transmitted in a population (i.e. blood transfusions, sexual fluids) were highly debated. This led to media articles using differing and sometimes contradictory information.

3.5 Discussion

The purpose of this study was to explore the discourse of media communication of risk information within Canadian media around the Zika outbreak. The communication centered around a stark dichotomy that was defined by socioeconomic status. Brazil and Canada were the two most frequently mentioned countries and socioeconomic status was often emphasized when discussing high-risk populations. Risk and impact were framed in non-inclusive terms, with the key message oriented toward monogamous married young couples. It tended to exclude individuals who would have been at high-risk. Messages about high-risk individuals had fear messaging suffused within the article. Global governance of infectious disease outbreaks was also highlighted, with the WHO's guidelines being widely distributed. This had drawbacks and led to portrayals global cooperation that may have been misrepresented.

Consistent with previous media portrayals of infectious disease and media, Brazil becomes synonymous with a global security risk and the outbreak narrative (Elbe, 2010; Pieri, 2019; Wald, 2008). These media portrayals neglected to represent Brazil as the diverse country it is. The data in the present study support previous findings of a singular negative association with the country deemed 'at risk' and its blamed for the spread of the outbreak (Leach & Dry, 2010; Wald, 2008). Communication is about disseminating important information to those who are high-risk or vulnerable to the given risk (Covello, 2003). Effective risk communication ensures that education and preventative measures are given to these high-risk populations (Covello, 2003). Many high-risk populations are considered so due to uncontrollable social risks they experience, not personal choices or neglect/ignorance of a risk (O'Sullivan & Phillips, 2019). People do not have a choice if they are affected by a given infectious disease disaster.

They can take preventative and proactive measures to help reduce their exposure and risk, but ultimately cannot remove the risk or the blame.

The results of this study show there is a discrepancy between the risk profile of an infectious disease and the communication of risk information, especially when it comes to social norms, such as monogamous heteronormative couples being targeted for risk messages. There is a concern stemming from public health surrounding stigmatization of cultures and populations during outbreak reporting. This was seen during the SARS outbreak in Toronto, Canada; the Chinese population suffered harassment due to stigmatization from news media health communication (Tyshenko & Paterson, 2010). In this study, stigmatization was seen in how countries in the epicentre of the outbreak were depicted. Brazil was depicted as a dependent low socioeconomic status country made up primarily of slums, whereas Canada was seen as an independent high socioeconomic status country, where Zika was of little concern to its citizens.

Media representation of Central and South America tended to homogenize the region, with few articles accounting for significant cultural differences between individual countries. The reader of international news articles is often isolated from the situation being reported. There may be no immediate action to be taken to help resolve or support those facing this problem (Pieri, 2019). The practice of providing resources to help news readers was not seen with Zika and has been absent in infectious disease outbreaks, as resources are centered around public health funds. Interestingly, with recent events such as the Australian Fires in an increasingly connected global world, there have been several links in media for ways to donate funds to various organizations to help the people and animals living in Australia from across the globe (Hauser & Holson, 2020). Similarly, with COVID-19 there have been calls for supplies to be made and donated to healthcare and frontline workers (Simon, 2020). There is an apparent shift,

with the interconnectedness of the globe, towards providing relief during events of varying causes (i.e. natural disaster or infectious diseases).

When communicating risk, transparency and honesty are key to building trust with an audience (Covello, 2003), thus journalists reporting on health issues must understand the topics they are reporting. Health messaging is framed to be persuasive and interesting to read and details that are seen as unimportant are often left out (Schmälzle et al., 2017). These decisions about what is seemingly unimportant could in fact be excluding essential information from reporting. We agree with other recommendations that journalists reporting on health issues have some sort of health communication training, including knowledge of the importance of including essential details when infectious disease reporting (Ophir & Jamieson, 2020). This might not have been as important in Zika media messaging in Canada, with Canadians not necessarily at risk unless they (or someone they were involved with) were traveling to an outbreak zone. It would be more crucial during an outbreak of an infectious disease that might not rely on a vector, such as pandemic influenza or a coronavirus. Zika reporting can therefore serve as a learning opportunity for Canadian media outlets to examine how to effectively communicate risk and support public health response during an outbreak.

One limitation of this research, which should be taken into consideration, is that our inclusion criterion included articles written in English; this excluded articles written in other languages. The corpus was also limited to Canadian news media. News coverage in other languages and regions would be an interesting comparison.

3.6 Conclusion

Absence of an effective communication strategy during an outbreak is worrisome; particularly considering the rates of climate change are increasing and the rates of infectious

diseases globally alongside it (Ali et al., 2017). Creation of an effective strategy would require an interdisciplinary team of journalists, risk scientists, communications experts, and infectious disease experts. Combined with outputs from globalization creating an increased likelihood of infectious disease spread, there is an immediate risk to understand the way we frame health messages during infectious disease reporting, as there tends to be a reliance on non-medical sources such as mass media during an outbreak (Ophir & Jamieson, 2020).

Health communication in the mass media is an important practice given the recent climate and infectious disease trends (Ophir & Jamieson, 2020; Paz & Semenza, 2016) and the increased reliance on the media to inform the public (Covello, 2003; Krewski et al., 2006). The findings from this study can be used to inform future practice among journalists reporting on health and public health organizations.

3.7 Acknowledgements

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3.8 Declaration of Interest Statement

There are no conflicts of interest.

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**CHAPTER 4: Discourse Analysis of Canadian Media
during the 2015-2016 Zika Outbreak**

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4.1 Abstract

Public health is the practice of managing diseases while also promoting health and wellbeing. Communicating risk information and to high risk populations is an important aspect of public health. The way we communicate public health messaging has changed alongside technological advancements. Communicating has become increasingly important as the number of outlets for information sharing has increased. Clear and effective health messages are essential, especially in the public health setting.

Metaphors have long been used in the media when discussing illness. Discourse refers to how we think about statements (or groups of statements) and their construction of our social reality, which can subsequently shape our actions. In this study, we used discourse analysis to explore metaphors and word choices around the Zika outbreak reported in the Canadian media. Throughout the dataset, metaphors were used to describe illness. There was use of personification by the journalists, which entails giving human traits to a non-human entity. This occurred with the mosquito that carried the Zika virus. Discourse in infectious disease outbreaks seems to rely heavily on the use of metaphors to depict the disease; this practice should be carefully considered, to prevent harm or potentially the risk of exacerbating a crisis.

Keywords: Discourse, Canada, Media, Zika, Metaphors

4.2 Introduction

The diversity and severity of infectious disease outbreaks have changed over time (Harper & Armelagos, 2010), and those of greatest concern now do not necessarily reflect past

issues. The practice of promoting health and wellness and fighting these diseases is considered the practice of public health (Center for Disease Control, 2020a). In the past two decades there has been a dramatic change in not only the face but the function of public health. The 20th century was filled with advancements in public health, from Virginia Apgar, to Salk's and Sabin's polio vaccines (Katz, 2004). These major public health advancements shifted the focus from reactionary to proactive and preventative measures (Centre for Chronic Disease Prevention (Canada) & Public Health Agency of Canada, 2015).

The evolution of technology and the 24-hour news cycles bring a new challenge to the advancement of public health. Even with successful advances in public health over the past few decades, infectious disease outbreaks still occur (e.g. Zika, Ebola, HIV/AIDS, SARS, MERS, COVID-19), and public health authorities have an important role to play. The challenge public health faces during these outbreaks is how to communicate risk information successfully to the public using their best tool; the media (Barry, 2009; Century, 2002).

Communication and technology experts have become increasingly important alongside health authorities (Kreps & Maibach, 2008). Developments in public health are not all related to biological discovery but instead some are due to changes in communication strategies and technological advancements (Khan et al., 2019; Kreps & Maibach, 2008). With mass media being both in print and online, new information is disseminated throughout the entire day. Compared to the time of the SARS outbreak, there are more platforms public health authorities can use to disseminate their information (Heldman et al., 2013; Ventola, 2014) and it is important that they communicate effectively through these new channels.

Dissemination of clear and accurate information during infectious disease outbreaks is imperative to ensure the public can protect themselves accordingly. Research about media

messaging during outbreaks can help advance knowledge of what messages are being disseminated—and how—and the effect these messages may have on the general population. An example is the outbreak of the Zika virus which occurred in 2015-2016, which disproportionately affected Brazil. This outbreak was featured heavily in the Canadian news media during 2016. An exploration of how health journalists reported on this event can inform how an infectious disease outbreak health risk is communicated in the media.

The purpose of this research is to explore the commonly used strategies and relied on discourse to describe and communicate the Zika outbreak in the news media. Zika provides a good example as it affected Canadians and was broadly reported in Canadian news media, but its origins were elsewhere. Infectious diseases travel across international borders, and it is likely we will experience outbreaks that originate from a different country in the future. Media analysis can help to inform how infectious diseases risks are framed, and how discourse contributes to the social reality we experience.

4.3 Materials and Methods

Research Design

This qualitative study is guided by a social constructionist perspective, with the orientation that there is not one truth or reality to be discovered (Crotty, 1998). The social constructionist epistemology focuses on understanding how sociocultural contexts and structural conditions lead to the account under observation. A social reality is created through incomplete, ambiguous, and contradictory discourses that we interpret as solid and real (Phillips & Hardy, 2002). Discourse refers to statements (or groups of statements), that structure how something is thought about and how that thinking shapes our subsequent actions (Foucault, 1970; Rose, 2012). The social world is borne from these words and not all individuals have the privilege of deciding

their reality, their truth, or even their identity (Phillips & Hardy, 2002). For our analysis we used Canadian news media that were published during the Zika outbreak that disproportionately affected Brazil. Discourse analysis is appropriate to address the purpose of this research, as this method seeks to determine the meaning behind words and phrases – and offers an interpretative approach for looking at words.

Our research combines the fields of media risk communication, health communication, and infectious disease outbreaks. Application of discourse analysis to the Zika news media included exploration of the how the disease was portrayed and the underlying messaging prevalent in the media.

Data Collection and Analysis

The dataset consists of Canadian news articles reporting on Zika, published between 2015 and 2019. We collected data representing the start of the Zika outbreak in Brazil in May 2015 until December 2019 to cover the duration of the outbreak and to include current media in the analysis. The news articles were collected using ProQuest (Canadian Major Dailies), Canadian Broadcasting Corporation (CBC), CTV News (a Canadian broadcasting company), and Global News databases. The search term 'ZIKA' was used to identify relevant articles in each database. Inclusion criteria for this dataset included publication date (May 2015-December 2019), language (English), and mention of Zika. The results within the predetermined time frame were used to create the initial dataset (n=1422). The exclusion criteria included publication date (outside time frame), videos, language (non-English), and no mention of Zika. Duplicate articles (those with more than 80% of the same content) were manually removed from the dataset. In total, 1157 articles were transferred to *NVivo12* for coding.

An inductive approach was used to code the data. This approach gives a useful description of the overall data, rather than trying to fit the data into pre-determined frames (Braun & Clarke, 2006, 2012, 2019). We used *NVivo12* software to manage the dataset. Our research team determined a list of preliminary codes by reading 10 initial news articles from the dataset. The codes were combined and organized into a preliminary coding grid, which was used to code 20 more articles randomly selected from the dataset; the codebook was subsequently revised, and the final codebook was uploaded to *NVivo12* to facilitate coding of the documents. This codebook was primarily used for the inductive thematic analysis of this dataset. However, there was a specific code to ensure that discourse related to infectious disease descriptions were captured when reading through the dataset (Keller, 2013). This code was created inductively through the observation of militaristic discourse during the creation of the codebook (Keller, 2013). The coding report from this code was used for the discourse analysis as the contents spanned the entire corpus. A research assistant who is familiar with this protocol coded 30% of the articles to ensure there was a reflexive approach, and to enhance the rigour of data analysis (Braun & Clarke, 2019). Through coding, we were able to determine discourse commonly used across the dataset for further analysis.

4.4 Results

The discourse analysis resulted in several interrelated observations about strategies and commonly used and relied on discourse during the outbreak. The discourse in the Zika media centered around the use of metaphors to describe illness and risk. There was use of personification, which is a specific type of metaphor, alongside militaristic discourse throughout the dataset.

Metaphors as a Journalistic Style

Metaphors are phrases or words that are symbolic or representative of an action or object and are not to be taken literally (Landau et al., 2010). The use of metaphors is not a novel practice when reporting on health in the media or discussing health in any platform (Nie et al., 2016; Reverby, 2011; Sontag, 1978). Metaphors break down a barrier that is created from using science and technically heavy discourse, to create a dialogue that is better understood by the general population. Communication practices surrounding health topics tend to rely heavily on the use of metaphors, which create a common language between health professionals and the general population (Álvarez et al., 2017). This type of dialogue occurs between individuals and health professionals as well. When discussing health concerns people tend to rely on metaphors for communication, which a health professional can then interpret more easily (Álvarez et al., 2017).

Personification

Personification is a specific type of metaphor that applies human characteristics and traits to a non-human entity (Landau et al., 2010). While it is important to note that metaphors surrounding health and illness are not limited to the use of personification, it was particularly prevalent in this dataset. The application of human characteristics occurred primarily with the vector and virus. Specifically, human traits and characteristics were given to the mosquito (the vector) across the dataset. For example, the following quotations:

[...] *the U.N. health body [WHO] described as an opportunistic and tenacious menace*
(Reuters, 2016)

It's one of the most relentless stalkers on Earth, using a tiny, needle-like probe to sip its victims' blood (Dennis, 2016)

All of us need to act the same way, because if the mosquito comes to breed it's a terror.

(The Associated Press, 2016a)

These quotations include phrases such as '*tenacious menace*', '*terror*', and '*relentless stalker*' which created vivid imagery of the Zika mosquito. The communication surrounding this infectious disease vector leads to a description of an entity that should be feared. In creating this messaging around the vector, it could have helped the news readership to pay more attention to risk reduction messaging they may come across. Specifically, infectious disease control measures such as wearing bug repellent. However, this personification could also have been used by journalists as an approach to attract the interest of readers.

Human nature seeks to place blame when there is a negative outcome to help them cope with the negative event (Major et al., 1998; Snyder & Ford, 2013). When there is no obvious cause of an adverse situation, this type of strategy can turn into personification of entities to take on that blame (Snyder & Ford, 2013). Personification happens when people are trying to explain the behaviour of the entity and are motivated to understand it (Landau et al., 2010). The mosquitos that transmit the Zika virus take on this blame. If the alternative is a person or culture taking on this blame, then the use of personification could be an adaptive, strategic tool in infectious disease outbreak reporting. Throughout the dataset, and demonstrated by the above quotations, are different ways in which this messaging becomes ingrained in the media surrounding this outbreak. This phenomenon of personification is not uncommon when discussing health issues in the media (McMichael, 2002; van Regenmortel, 2016; Wallis & Nerlich, 2005). This type of metaphor used by journalists could be beneficial if there is an

increased uptake in protective risk behaviour and reduction of blame placed on people(s) and/or culture(s).

Militaristic Discourse

Discourse that commonly emerges when discussing infectious disease outbreaks centers around militaristic terminology (Bleakley et al., 2014; Flusberg et al., 2018; Nie et al., 2016). Through using discourse that centers on a war, messaging creates a sense of antagonism against a foreigner (Bleakley et al., 2014; Nie et al., 2016). This militaristic discourse gets relayed into our social reality and manifests as stigmatization against the ‘foreign’ entity (Sontag, 1978). It is important during health risk reporting to not create this divide between self and other that leads to stigmatization of people(s) and/or culture(s). This divide can lead to negative outcomes (i.e. hate crimes or discrimination based on perceived racial or cultural identity) that can remain even post infectious disease outbreak (Dale et al., 2016; He et al., 2020). In our dataset there were several militaristic terms used throughout the entire timeline of the outbreak. The journalists’ use of words or phrases that were derived from militaristic origins created a divide between self and other. This divide can have negative social outcomes when the other is transposed on ‘foreign’ people(s) and/or culture(s). The use of this discourse can be seen in the following quotes:

The government, churches, football teams, labour unions...everyone must do their part to eliminate the breeding grounds, she said. We will win this war [...] Afterward, Health Minister Marcelo Castro echoed her words, telling reporters "the mosquito is not stronger than the entire country. We will win this war." (The Associated Press, 2016b)

Officials can also request backup from police to raid any building suspected of being a mosquito breeding ground [...] Brazil has sent about 220,000 troops to battle the Aedes aegypti mosquito that transmits Zika, dengue, chikungunya and yellow fever (The Associated Press, 2016c)

In the Canadian media the outbreak, which disproportionately affected Brazil, was made out to be a war fought between the Brazilian people and the mosquito. The militaristic language (e.g. battle, fight, war) combined with high rates of media outpourings may have led readers to have inherent tendencies towards victim blaming and stigmatization (Nie et al., 2016; Sontag, 1978).

Many of the quotations used in media messaging from the President and Health Minister of Brazil were about sending out armed troops to combat the enemy (mosquito). Both the health authorities and journalists used old infectious disease outbreaks to emphasize the ability of Brazil to ‘*win this war*’ as they have before with yellow fever. The emphasis on Brazil’s ability to win assuages some of the concern surrounding Zika and gives that personified mosquito the target of blame. In this instance, perhaps the metaphor could be useful in its strong message to motivate citizens to help in this fight and create a sense of community (Bleakley et al., 2014). However, conversely, the use of statements and phrases such as ‘backup from the police to raid’ and ‘sent 220,000 troops to battle’ increase the divide between self and other. The militaristic discourse in the media communication tends to lead to violent phrases within the article, which can lead to justification of violence in social and political situations (Nie et al., 2016). In using such powerful words in the risk messaging, the underlying implication can flow into daily life as these words create our social reality (Phillips & Hardy, 2002). While these words may be important to

capture attention and convey the risk about health issues, there is a point in which the negative implications of such terminology can outweigh the positive risk changes.

4.5 Discussion

The purpose of this discourse analysis was to investigate the strategies and commonly used words and phrasing in the Canadian media during the 2015-2016 Zika outbreak. We found that there were different types of metaphors used throughout the dataset. This included metaphors such as personification, which occurred with the mosquito. There also was a tendency to use militaristic discourse throughout the media.

Metaphors were prevalent across the dataset when communicating risk, and this practice is deeply ingrained in medical and health discourse (Álvarez et al., 2017; Flusberg et al., 2018; Lazard et al., 2016; McMichael, 2002; Sontag, 1978). A tendency to use metaphors in risk communication was noted in other media studies conducted about SARS during the mid 2000's (Hansen, 2009). It is human nature to want to understand or blame an entity for a negative event to help cope with said negative event (Major et al., 1998; Snyder & Ford, 2013). This is why communication of risk is important. In communicating risk, those responsible for informing the public do not want to provide the unintentional set up for an entity to become the victim through their negative framing or metaphor use.

Humans tend to struggle to conceptualize an experience when they are not able to understand why the experience is occurring (Major et al., 1998; Snyder & Ford, 2013). Thus, personification serves as an outlet to help conceptualize a negative event by giving the uncontrollable entity human characteristics. When communicating risk using these human characteristics, combined with the militaristic discourse, there is a sense of hope provided that this negative event will not devastate the population and a 'victory' can be obtained. The risk

communication discourse set up a ‘war to be won’ against a foreign entity which may be easier to understand and could foster support and a sense of community (Bleakley et al., 2014). However, historically these metaphors have led to unethical treatment to be justified with non-consenting participants being purposefully exposed to an infectious disease in the name of ‘winning the war’ (Nie et al., 2016; Reverby, 2011).

Studies have been conducted on the SARS media coverage during the 2003 outbreak which led to 800 deaths (Hansen, 2009; Muzzatti, 2005). The reporting of SARS risks diverged from the medical realities the population faced to panic inducing and racialized stereotype messaging (Leung, 2008; Muzzatti, 2005). The SARS media coverage was said to be laden with fear-mongering, xenophobia, and sensationalism (Hansen, 2009; Leung, 2008; Muzzatti, 2005). Militaristic metaphors were heavily used during SARS reporting, and led to a sense of ‘alien or other’ which resulted in stigmatization (Hansen, 2009; Muzzatti, 2005; Sontag, 1978). SARS reporting served to be a projection of privilege through an infectious disease that was distinctly reported to be of Asian origin (Leung, 2008; Muzzatti, 2005). In our dataset we saw the reporting of the clear designation of a Brazilian infectious disease being the risk. Militaristic metaphors and phrases were heavily used during the Zika risk communication reporting. We know that using metaphors can cause stigmatization of culture(s) or peoples, yet it is still being used in recent media reporting (Brandt & Botelho, 2020; Cohen & Kupferschmidt, 2020; Cori et al., 2020; Devakumar et al., 2020; Horton, 2020; Logie & Turan, 2020; Varma, 2020; Wicke & Bolognesi, 2020).

There is a tendency to discuss health related topics with metaphor. However, it is important to be cognizant of when the use of metaphors is going to create a potential negative impact, for example using war terms and legitimizing violent actions (Dale et al., 2016; Nie et

al., 2016; Reverby, 2011). There are repercussions of using metaphors in this regard despite the usefulness of the approach to create a common dialogue regarding public health issues (Álvarez et al., 2017). Potential beneficial metaphors could include the use of personification during vector-borne disease communication, such as tick-borne Lyme disease in Ontario. This might let the news readership place the blame for the negative event on non-human entity. While it may not be ideal to place blame on one specific entity for a complex and multifactorial occurrence, this is a better alternative than to have the blame placed or centered on peoples and/or culture(s).

While metaphors can be a useful tool in creating a common dialogue, they need to be used cautiously (Álvarez et al., 2017). Journalists and those reporting or writing about health risks and issues need to be aware of the implications of using metaphors. Specifically, when an infectious disease seems to have ‘foreign’ origins then metaphors are likely to create a divide between self and other and lead to stigmatization of peoples and/or culture. Since health journalists do not need a background in health, they may not be aware of the subtle workings these metaphors have when used in infectious disease discourse.

4.6 Conclusion

Through a discourse analysis of the media surrounding the Zika outbreak we sought to understand the strategies and commonly used and relied on discourse to describe and communicate about the outbreak in the Canadian mass media. This discourse shapes our reality and thus it is important to know how the media and public health authorities are communicating risk during infectious disease outbreaks (Phillips & Hardy, 2002). Journalists who are reporting about risk information during public health events need to be aware of the inherent nature of health discourse to rely on metaphors. This was seen in both the use of personification to help rationalize a negative event, and the use of militaristic terms. Health journalists and those

reporting on health risks need to be aware of the dependency of metaphors and militaristic discourse which have the potential to create negative social outcomes, and to avoid these strategies when communicating risk information.

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4.8 Declaration of Interest

There are conflicts of interest to report.

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CHAPTER 5: DISCUSSION

Through a media analysis of the Zika outbreak, we sought to explore the discourse with specific focus on how media communication was used to describe Zika and the outbreak. Specifically, the purpose of this research had specific focus on how communication of risk information was used to describe Zika and the outbreak, as well as high-risk populations. We wanted to know how risk about Zika was communicated in the media (in regard to high-risk populations), as well as how high-risk populations in the context of Zika were portrayed in the Canadian media.

5.1 *Self versus Other Ideology*

Discourse and words are incredibly important, as was shown in the data analysis stages of this project. Discourse surrounding *self vs. other* ideology is something I noted several times throughout data coding. This ideology became apparent through the use of personal memoing while coding, and was agreed on during thematic analysis meetings once the coding stage concluded. *Self vs. other* can be seen in the resulting thematic analysis as well, which is provided in article one of this monograph. As a reminder, discourse refers to statements that structure how something is thought about, and how that thinking shapes our subsequent actions (Rose, 2012). Therefore, discourse analysis involves extracting information from statements that reflect assumptions made in the group of statements within the lens of the given research and social context (Rose, 2012).

Throughout the corpus there was a discourse centered around a *self vs. other* ideology. In our social reality we create *us*, and we also create *others*. This creation of group identities can create unequal power relations between the various identified groups (KhosraviNik, 2015). Hegemonic ideologies enforce dichotomous identities such as *us vs. them*, and can lead to

unequal cultural or racial power relations in society (KhosraviNik, 2015). This can happen on an international level where there is a combination of social, cultural, political, and economic relations (KhosraviNik, 2015).

In this corpus, there were a number of instances where messaging perpetuated the discourse of *self vs. other*. This happened differently depending on the specific media article. In some instances, the Canadian media disseminated messages reflecting a *Canada vs. other* discourse, while other articles contained a *Brazil vs. other* discourse. The kind of *self vs. other* ideology present in the discourse varied depending on whether the media article centered on a Brazilian perspective (i.e. risks and narratives) or a Canadian perspective.

In cases where the narrative was *Brazil vs. other*, messaging was usually framed as a ‘war’ between the Brazilian people and the mosquito. Statements in the media coming from the Brazilian government and Ministry of Health tended to center on winning the battle against the mosquito; they emphasized that Zika would not defeat them, and that they have won the battle in the past. Comments such as these referenced the high rates of yellow fever infections that Brazil had struggled with in the past but managed to overcome.

5.2 Communication of Risk Information and Infectious Disease

The media in the corpus contained inconsistencies surrounding how journalists would report on the spread of Zika, and the potential transmission pathways. The news articles frequently mention Zika as a mosquito-borne disease and discuss its effects, but fail to mention it is also sexually transmissible and can be spread through both direct and indirect transmission. The sparsity of relevant information about transmission risk was consistent throughout the Zika timeline. Fairly early on, Zika was known to be sexually transmissible, which would have been a potential risk for Canadians. In the media there was a lack of clarity about how Zika is

transmissible, and the ways in which you could mitigate the risks it posed. Although scientific information about transmission was known fairly early on, there were inconsistencies within the news articles even when they were published during the same news cycles. When reading the articles, and while coding, the timeline of recommendations would become confusing, as there seemed to be large variations in the advice provided in news articles. This is not a novel discovery in media reporting and these reporting inconsistencies were seen in Norwegian media surrounding the SARS outbreak in 2003 (Hansen, 2009).

Media articles in the corpus did sometimes show differing opinions between those in the scientific community, and highlighted that not everything was known surrounding the topic of Zika. There were articles that quoted members of the scientific community recommending people wait before panicking. Similarly, other scientists' opinions were seen as very dismissive of Zika risks. Communication between the scientific community and the journalists could have been part of the issue. There were several microbiologists, zoonotic disease experts, epidemiologists, entomologists, among other science professionals from differing fields that all contributed to the information about Zika. When the people providing information for health issues and risks are disconnected from one another this reduces the effectiveness of the risk information message.

It might be useful for journalists reporting on health issues to better understand the topics they are reporting on to be better equipped to build trust with the audience, while avoiding potential negative outcomes related to message framing. When communicating risk, transparency and honesty are key to building trust with an audience (Covello, 2003). Journalists' health messages are framed to be a medium that is persuasive and interesting to read, with seemingly unimportant details not included (Schmälzle et al., 2017). The decision making

process of deciding what to include is where it would be vital that journalists reporting on health issues have some health communication training (Ophir & Jamieson, 2020). This training would provide essential knowledge that is to be included when reporting on infectious disease outbreaks (Ophir & Jamieson, 2020). According to journalists, including ‘extraneous’ information might make a less interesting overall article, but the important outcome of this practice could lead to risk behaviour changes (Armon & Baram-Tsabari, 2017; Leask et al., 2010). The outcome of this practice would be better communication through the media with all essential health risk information included in the articles.

Journalists’ level of health knowledge may not have been as crucial in Zika media messaging compared to another infectious disease outbreaks. Our corpus consisted of Canadian media and, during Zika, Canadians were most at risk from travel related transmission. Increased health knowledge among journalists would be even more important during an outbreak of an infectious disease that can easily spread globally (unlike Zika which relies on a vector). For example, during the current COVID-19 outbreak, health risk information is crucial to the Canadian public. The best tool for dissemination of health information is the use of mass media (Armon & Baram-Tsabari, 2017; Barry, 2009).

The current COVID-19 pandemic occurring in 2020 is similar to Zika in the sense that there are many unknowns. Currently, there is a huge outpouring of COVID-19 communication in the news media. There are also articles and research coming out simultaneously from the scientific community. There are similar patterns with how the events of the Zika outbreak evolved, although Zika was on a much smaller scale than COVID-19. Communication messaging surrounding COVID-19 has been crucial for promoting behaviour changes (i.e. hand washing, social distancing, avoiding crowds) and establishing an accurate risk perception in the

population (Cori et al., 2020). A study looking at risk perceptions and COVID-19 sought to determine which factors affect risk perceptions and which increase or mitigate fear (Cori et al., 2020). They determined that voluntariness, knowledge, visibility, and trust were essential (Cori et al., 2020). For trust, the authors stated that consensus in the scientific community was essential to reduce fear, and they suggested that public authorities find alliances in society to build confidence and thus reduce fear (Cori et al., 2020). In the case of Zika, there was a lack of consensus in the scientific community, which only served to increase fear through lack of trust and understanding (Cori et al., 2020).

Zika is a good example of communication of infectious disease health risks in recent years. In the context of modern media, compared to the studies that have been completed on SARS communication in the media (Hansen, 2009; Person et al., 2004; Tyshenko & Paterson, 2010). The rates of climate change are increasing, which in turn results in a rise of infectious disease rates and outbreaks (Ali et al., 2017). Combined with globalization, there is an immediate need to understand the way we frame health messages during infectious disease reporting. There tends to be a reliance on non-medical sources such as mass media during an outbreak (Barry, 2009; Ophir & Jamieson, 2020).

5.3 Illness as a Metaphor

The discourse surrounding Zika in the Canadian news media relied on the use of metaphors to describe illness and risk. This is not a novel practice when reporting on health in the media, or discussing health in any platform (Sontag, 1978). Communication practices surrounding health topics tend to rely heavily on the use of metaphors. Metaphors allow a common language to be created between health professionals and the general population (Álvarez et al., 2017). They break down the barrier created by scientific and technically heavy

language to create a dialogue that is better understood by everyone. This dialogue also flows in the opposite direction; when discussing their illness(es) with a health professional, people tend to rely on metaphors for communication, which can then be interpreted (Álvarez et al., 2017).

In our corpus there were a lot of metaphors used when discussing the risk of Zika, and this practice is deeply ingrained in both medical and health discourse (McMichael, 2002; Sontag, 1978). The use of metaphors in health communication was seen in other media studies conducted regarding the SARS outbreak during the mid 2000s (Hansen, 2009). Militaristic language (e.g. battle, fight, war), combined with high rates of media outpourings, may lead readers to have inherent tendencies towards victim blaming and accusations of blame (Dale et al., 2016; Nie et al., 2016). It is human nature to want to understand, or blame, an entity for a negative event to help cope with said negative event (Major et al., 1998; Snyder & Ford, 2013). Humans tend to struggle to conceptualize an experience when they are not able to understand why the experience is occurring (Major et al., 1998; Snyder & Ford, 2013).

It is common to discuss health related topics with metaphors, and this practice could not be completely abandoned. However, it is important to be cognizant of when the use of metaphors may create a negative impact. Their use breaks down a discourse barrier of technically heavy language, but there are repercussions of relying on this practice. This includes stigmatization of peoples and or/cultures, violence, discrimination, hate crimes, legitimization of unethical treatment of certain groups of people (Dale et al., 2016; He et al., 2020; Nie et al., 2016). These repercussions can be seen in the current COVID-19 media (Brandt & Botelho, 2020, p. 19; Cohen & Kupferschmidt, 2020; Devakumar et al., 2020; He et al., 2020). Both Zika and COVID-19 risk messaging relied heavily on militaristic discourse and metaphors. These two outbreaks

also showed the practice of giving an entity human characteristics via personification of a mosquito (Zika) and a virus (COVID-19).

5.4 In Context of Other Media Studies

Media studies are useful to determine how media communicates about risk during infectious disease outbreaks. One media study sought to discover the differences in risk related reporting of Avian Influenza between 2003-2007 in Hong Kong and the United States (Fung et al., 2011). They were able to determine differences in reporting in *The New York Times* and *South China Morning Post* (Fung et al., 2011). The news in *The New York Times* tended to have increased tones of dreadfulness, uncertainty, and catastrophic potential when compared to the *South China Morning Post* (Fung et al., 2011). The authors emphasize that the social differences (i.e. proximity to outbreak, downstream economic issues) between citizens of Hong Kong the United States influence the different reporting tones (Fung et al., 2011). This is interesting when compared to the portrayal of risk. The social risk of Zika was not emphasized in the media and the media only offered the news readership the potential biological risk, whether they were in Brazil or Canada. Our study only looked at Canadian media so we cannot make the same conclusions. However, social risk may be influential when reporting risk related information, and not just reporting biological risk. It was noticeable that social risk was left out in the news reporting of the Zika outbreak.

Media studies have also been conducted on SARS, and the coverage that occurred during the 2003 outbreak that led to 800 deaths globally (Hansen, 2009; Muzzatti, 2005; Wallis & Nerlich, 2005). The reporting of SARS risks deviated from the medical realities the population faced (Muzzatti, 2005). SARS media coverage was laden with fear-mongering, xenophobia, and sensationalism (Hansen, 2009; Muzzatti, 2005). Militaristic metaphors were heavily used during

SARS reporting and led to a sense of ‘*alien or other*’ regarding the virus and its origins which then resulted in stigmatization. (Hansen, 2009; Muzzatti, 2005; Sontag, 1978). International SARS reporting functioned as a projection of the country’s privilege when the virus was distinctly reported to be of Asian origins, with using metaphors such as *First Briton to bring home deadly virus* (Muzzatti, 2005; Wallis & Nerlich, 2005). In our corpus, we saw the reporting of *self vs. other* and the clear designation of a Brazilian or Latin American illness being the risk. Militaristic metaphors were also heavily relied upon in Zika media reporting. It is well-known that using metaphors (i.e. *killer virus, relentless stalker, brings home deadly virus*) can cause stigmatization of a culture(s) or peoples, yet they are still being used in recent media reporting (Brandt & Botelho, 2020; Wallis & Nerlich, 2005; Sontag, 1978).

The media from the current COVID-19 pandemic in 2020 shows that the use of metaphors continues, even though academics, sociologist, and linguists have established this as an issue when reporting on disease. An article published in *The New England Journal of Medicine* examines the use of the term ‘the perfect storm’ to describe the COVID-19 pandemic (Brandt & Botelho, 2020). Drawing on the work of Sontag, the authors discuss the issue that using metaphors, such as *the perfect storm*, can lead to misdirection when addressing emerging pandemics (Brandt & Botelho, 2020). They describe ‘*the perfect storm*’ as creating a sense of volatility and randomness through implying a natural phenomenon and uncontrollable cause that could undermine risk mitigation and infection control measures (Brandt & Botelho, 2020). When describing infectious disease outbreaks as ‘*the perfect storm*’, it diminishes the idea that we are capable of prevention and mitigation approaches to future pandemics (Brandt & Botelho, 2020). The conditions that led to Zika’s outbreak were also described as ‘*the perfect storm.*’ This

highlights the frequent and detrimental use of metaphors when reporting on infectious disease outbreaks in the media.

Another media study approached the analysis of media in a different way, and used Zika as their case study (Jerit et al., 2019). The authors sought to determine whether risk information and reporting was similar between national and local news coverage of Zika in *The New York Times* and the *Tampa Bay Times* (Jerit et al., 2019). Their results showed higher quality coverage in the local newspaper, but both local and national papers had sensationalist language and imprecise risk information (Jerit et al., 2019). This aligns with the results of our study, as the inability to accurately relay risk information was seen throughout our entire corpus. Communicating risk presents challenges to journalists attempting to convey the information in a news article. This further highlights the need for journalists who are reporting on these issues to have a working knowledge of health issues and risks.

Zika was the focus of another study that looked at both traditional news sources (i.e. mass media) and social media news sources (Chan et al., 2018). The authors sought to study the risk perceptions and behaviours surrounding Zika reporting in the United States (Chan et al., 2018). Their results showed that social media risk information sources, like Twitter, correlated with changing risk perceptions, whereas mass media reporting correlated with protective behaviours (Chan et al., 2018). While exploring changing risk behaviours was outside the scope of this study, our findings complement these findings. We determined that risk information was not consistently reported in our corpus, and perhaps this is an inherent issue ingrained within news media reporting, that is absent in social media. In the social media study, the authors were able to complete a subpopulation analysis to determine who was using social media versus traditional news sources (Chan et al., 2018). They observed that social media captured risk changes in a

wide range of subpopulations while traditional media captured few subpopulations, including people with lower levels of education (Chan et al., 2018). Our study showed a tendency to use technical language that might be inaccessible to some of the audience readership. The presence of technical language could be due to health journalists not understanding the topic well enough to alter the scientific phrasing, or in some cases they may have been advised not to change it. This further highlights the importance of journalists to have an understanding of health issues and risks.

CHAPTER 6: CONCLUSION

Through a media analysis of the Zika outbreak, we sought to explore the discourse with specific focus on how media communication was used to describe Zika and the outbreak, as well as high-risk populations. Discourse shapes reality, and thus it is important to know how journalists are communicating risk information during infectious disease outbreaks (Phillips & Hardy, 2002). We were able to determine the prevalent themes and prevalent language used in our corpus through thematic analysis. Together these findings allow us to understand not only the important issues that need to be addressed when discussing infectious disease outbreaks, but also the specific language used in describing these outbreaks. These findings can be used to improve reporting on health risks and issues, but together they are even more influential.

There is a tendency to use metaphors when reporting on health risks and issues. This use of metaphors is something that health journalists need to be aware of when reporting on public health events. Metaphors can lead to negative social outcomes through creating a social reality based on the discourse in the news articles. This may lead to stigmatization of a culture or people, victim-blaming, among other unknown repercussions. While metaphors can be a useful tool, they need to be used cautiously during communication in the mass media as to not create stigma surrounding a peoples and/or culture.

When it comes to the general public, communication of health information is dependent upon mass media for dissemination (Armon & Baram-Tsabari, 2017). The public is told about threats to their health, and will want to know if they are personally at risk (Schmälzle et al., 2017).

6.1 Contribution of Research

There are several areas this work can be applied to. Given the current climate and discourse surrounding COVID-19, there is evidence that this is an issue that will be ongoing and will require society to adapt. Communication of risk information via the media is an important method for keeping populations safe during outbreaks. Not everyone has an understanding of risks to their health and how to approach mitigating these risks. The media is the most influential channel for risk information to be disseminated (Barry, 2009).

6.2 Areas for Future Research

The information that we found through our analyses of over a thousand media articles surrounding the Zika outbreak provided insight for future research. Knowing how the media is portraying disease risk in the media and the potential effects that this communication can lead to, can inform practitioners and journalists about how to better communicate risk. The language the media uses to convey risk is important. It is crucial for risk information to be disseminated quickly and efficiently, but it also is important to do it in a way that reduced the potential negative impacts it could have –like stigmatization of a culture or peoples. Without taking into account gender identities as well, especially when discussing a sexually transmissible virus, this could cause not only mental and emotional harm, but someone might not receive the correct risk reduction messaging. Future studies could look at the impact of certain message framing on readers through interviews about thoughts, opinions, and knowledge surrounding a risk reduction message that involves an infectious disease.

Future research that can be done based on these results would perhaps be an extension of Zika communication, whereby Brazilian media is used as the corpus. If the same case study bounds are used, there could be a multiple-case study design. Another extension, based on the

results of this research would be to look at perceptions of risks. Interviews could be conducted at the beginning of an outbreak about perceptions of risk, and then as the media disseminates information, multiple points could be used for secondary interviews. These interviews could help determine changes in risk perception. Zika and COVID-19 both were associated with an Olympic game (Rio de Janeiro and Tokyo, respectively). A comparison of the media leading up to the Olympics could be compared and contrasted to look at the different portrayals of high-risk population and metaphors, and the risk information being presented to the media readership.

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APPENDICES

Appendix A: Terminology

Table 2. Frequently Used Terminology Definitions

Terminology	Definition	Source
Arbovirus	Arbovirus is a specific type of vector-borne virus that uses an arthropod as its vector. In the case of Zika it is a mosquito (arthropod) that it uses as its vector.	(Beckham & Tyler, 2015)
Asymptomatic	This means that someone has an infection, and would test positive for it, but they have absolutely no symptoms. They are still able to transmit the infection to someone (ex. another person, or a fetus, animal) but they do not show any signs themselves.	(Moghadas et al., 2017)
Direct Transmission	Direct transmission refers to a type of disease transmission where there is human to human contact involved. This would include skin to skin contact, kissing, sexual contact, droplets.	(Center for Disease Control, 2019a)
High Risk Population	A group of people who have a characteristic in common that makes them likelier to contract an illness. Each illness can have a different high-risk population.	(Center for Disease Control, 2020b)
Indirect Transmission	Indirect transmission refers to type a of disease transmission that is not contact based. This can include vectors, inanimate objects, air particles, vehicles (food, water, blood) as intermediaries.	(Center for Disease Control, 2019a)
Metaphor	Metaphors are phrases or words that are symbolic or representative of an action or object and are not to be taken literally.	(Landau et al., 2010)

Personification	Personification is a specific type of metaphor that applies human characteristics and traits to a non-human entity.	(Landau et al., 2010)
Risk Communication	Refers to the practice of communication where information is shared by experts to people whose health, economic, or social wellness may be threatened.	(World Health Organization, 2020d)
Socioeconomic Status	It is a measurement of social standing based on several different factors. These can include education, income, and occupation. This social standing highlights inequalities and privilege where resources are concerned.	(Williams et al., 2016)
Stigmatization	“The action of describing or regarding someone or something as worthy of disgrace or great disapproval.”	(Oxford Dictionary, 2020)
Vector-borne	Vector-borne refers to the type of infectious disease. A vector-borne infectious disease needs an intermediary (vector) to spread the microorganism from one susceptible person (or host) to another. For example: malaria and Anopheline mosquito, Zika and Aedes mosquito, schistosomiasis and snails, etc.	(World Health Organization, 2020b)
Vulnerability/Vulnerable Populations	Refers to populations who are at higher risk of poor health. This can be the result of social, economic, political, and environmental barriers to accessing resources. These populations are more likely to share a high burden of disease during disasters and emergencies. For example, malnutrition, homelessness, and poverty contribute to vulnerability.	(World Health Organization, 2020f)

Appendix B: Timeline**Table 3.** Timeline and Notable Events during the Zika Outbreak of 2015-2016

Time Period	Articles Gathered	Articles Coded	Notable Event
2015			
May	1	1	Brazil declares an outbreak of Zika
June	0	0	
July	0	0	Northeastern Brazil reports a surge of neurological disorders
August	0	0	
September	1	1	
October	0	0	Colombia confirms outbreak with 150 cases within a month Brazil reports an unusual amount of microcephaly in area of high Zika infection rates
November	0	0	Zika has now spread to 5 other countries (including Mexico) Brazil declares National Public Health Emergency
December	5	5	In Brazil Zika was detected in amniotic fluid and in a microcephalic fetus Brazil, El Salvador, and Jamaica urge women to 'not get pregnant'
2016			
January	120	113	Canada has 4 cases in returning travelers declares PHAC Brazilian ophthalmologists notice severe eye malformations in microcephalic babies
February	221	186	First sexual transmission case in the US First blood donation transmission in Brazil WHO declares PHEIC, Zika now present in 24 countries
March	90	69	First sexual transmission case in Canada
April	77	53	Scientists confirm the presence of Zika Virus in Aedes albopictus for the first time CDC concludes sufficient evidence to associated microcephaly with Zika infection during pregnancy President Rouseff of Brazil is impeached
May	96	74	
June	108	65	In the US 3 babies have been diagnosed with Zika linked birth defects

July	151	93	Athletes start to drop out of the Rio Olympics, some citing Zika as the reason Florida has mosquitos that are transmitting on US soil (Miami) As of July 29th Canada, has 170 reported Zika infections
August	177	149	August 5-21st, the Rio Olympics take place Singapore has local transmission Mainland US local mosquito population transmission in Florida
September	49	41	WHO safe sex/abstain for 6 months recommendation
October	35	24	
November	23	17	WHO ends PHEIC declaration
December	37	29	
2017			
January	10	8	During 2017 there were 14 cases of Zika in Canada An <i>Aedes aegypti</i> mosquito egg is foun in Southern Quebec during surveillance
February	15	13	
March	23	18	
April	8	7	
May	18	13	
June	8	5	
July	7	6	
August	15	11	
September	7	6	
October	4	4	
November	8	5	
December	5	3	
2018			
January-December	57	23	August 31 st – since October 2015 569 Canadian travel related cases, and 4 sexaully transmitted cases
2019			
January-December	46	20	

Appendix C: Coding Grid**Table 4.** Final Coding Grid used in NVivo12 for coding

Family	Code	Sub-Code	Definition
Approaches to 'Problem' Over Time	Challenges	Health supply Shortages	Challenges refers to anything that is deemed an issue to the approach of combating Zika spread and cases. This could be blood supply, zika tests, any sort of issue where there is a shortage of health care supplies in relation to Zika.
		Health Services Funding	This could be vaccine development, or healthcare systems funding. When healthcare either is getting additional funding related to Zika, or they cannot do certain preventative or treatments because of funding reasons.
	Education		Education refers to any sort of implementation of education to help control the spread of Zika.
	Legislative Decision Making		Legislative decision making refers to any sort of description about approaches to Zika that are legislative in nature i.e. banning blood donation from people who have recently travelled to a Zika zone.
	Precautionary Measures	Infection Control Measures	Infection control refers to measures that control the spread of infection i.e. caution and/or warnings about risks of Zika, travel advisories for Zika hot-zones.
		Vector Control Measures	Vector control refers to measures taken to control the mosquito population that is carrying the Zika virus i.e. pesticides, gene alteration.

	Surveillance/Monitoring		Surveillance/Monitoring would be used for any sort of mention to this as a solution or approach to Zika infections i.e surveillance data on number of microcephaly cases is going to be collected. The lack of surveillance in place is also important to note.
	Vaccine Development		This code is used when there is mention of vaccine development. This can be ongoing development or discussion about vaccine development as it relates to Zika.
Climate	Change		Description of climate change events creating unusual weather patterns <i>i.e. an unusually warm El Nino one year in Brazil</i>
	Conditions		Describing the weather conditions, or seasonal change that is affecting the flow of infection in one way or another <i>i.e. cold winter does not sustain mosquito growth</i>
Country at Risk	Canada		If this specific country is mentioned in relation to Zika.
	Central America		If this specific country is mentioned in relation to Zika.
	Mexico		If this specific country is mentioned in relation to Zika.
	Other Regions		If this specific country is mentioned in relation to Zika.
	South America	Brazil	If this specific country or region is mentioned in relation to Zika.
	United States	Southern United States	If this specific country or region is mentioned in relation to Zika.
Globalization			Describes the increased connectedness of the world through cultures, economies,

			societies etc. It is a vast topic but will include things such as data sharing between countries, international cooperation, trade negotiations or deals etc.
Health Authorities, Governments, and Scientific Community	CDC		Center for Disease Control
	EPA		Environmental Protection Agency
	Public Health Entities		Any public health entity mentioned in relation to Zika. <i>i.e. Public Health Agency of Canada, or public health authorities from x</i>
	WHO		World Health Organization
Messaging	Comparison to Other Infectious Diseases		For example: HIV/AIDS Dengue Yellow Fever Malaria Chikungunya
	Effects of Zika	Non-Specific Biological	Non-specific biological terms would be those that are describing a health effect but not noting specific conditions <i>i.e.</i> birth defects, mild illness, neurological issues
		Personal Economic Cost	This refers to anything that is going to affect someone's financial status personally. For example, if they cannot go on a trip due to a pregnancy and they won't be given a refund, or a store is having trouble operating and is suffering due to Zika restrictions.
		Specific Biological	Specific biological would be terms used to describe the effects of Zika that are specific in terminology <i>i.e.</i> microcephaly, Guillain-Barre.
		Tourism/Economy	Tourism and Economy refers to Zika effecting the amount of

			tourism a country is experiencing or its tourist attraction has lowered due to being considered a no travel zone. If Zika has created a dent in their economic growth or revenue due to this decrease in tourism.
	International Concern		International concern refers to the description of Zika being a problem for multiple countries/globally, not just where the reports or cases are coming from.
	Parental Feelings		Parental feelings refers to any sort of description from parents about what they are feeling about the risk or consequences of Zika infections i.e. frightening, devastating or not concerned, will deal with whatever comes our way.
	Political Strategy		Political strategy refers to the use of Zika and its increase in cases as a tool for political gains i.e. mentioning Zika in a political campaign as something they are going to fund research for.
	Spreading of Fear	Birth Defects	Birth defects refers to using this terminology to spread fear about Zika with the consequence of having a baby born with birth defects
		Global Epidemic	Global Epidemic refers to a rise in infectious disease cases that are not normally seen that are crossing international borders and are an issue for multiple countries.
		Outbreak	Outbreak refers to the epidemiological word and definition meaning when there is a spike in number of infections relating to an

			infectious disease that are not normally observed
		Unknowns	Unknowns refers to spreading fear through highlighting the unknown risk and consequences of Zika.
	Terminology		Terminology refers to words or phrases that are used that strike an innate reaction (whether positive or negative). These are words that stand out for their drastic use. These words can include things like: alarm, urgency, homegrown vs. foreign, militaristic terms (explosive, shot, fighting). This would not include words or phrases that are necessary for context.
	Uncertainty of Infection		Uncertainty of infection is when there is any messaging surrounding information about the uncertainty of Zika infection i.e. when bitten by a mosquito it is not known what percentage of people will go on to be infected. This could also be used to describe the uncertainty that surrounds being infected because Zika infections are usually 80% asymptomatic.
	Unknown Properties of Zika/Scientific Discoveries		This refers to the unknown information that is needed to approach Zika infections and risk i.e. the transmission pathways are not known, or the evidence to support the causal link between Zika and microcephaly is not clear.
Misinformation	Abortion		When an article mentions abortion but the information, they state is inaccurate.

			If the information is correct it would not be included under this code.
	Transmission		When an article mentions how Zika is transmitted but the information they state is inaccurate. If the information is correct it would not be included under this code.
	Vector Presence		When an article mentions vector presence (i.e. where the mosquitos that carry the virus are and are not) but the information they state is inaccurate. If the information is correct it would not be included under this code.
Olympics			Whenever the Olympics that were held in Brazil during 2016 were mentioned.
Population at Risk	Canadians		If the person at risk is described as someone from Canada.
	Men		If the person at risk is described as being a man.
	Travellers		If the person at risk is described as being a traveller to a Zika zone, or somewhere where they would be at higher risk of Zika.
	US Continental		If the person at risk is described as someone from the US continent
	Women	Pregnant	If the person at risk is described as being: a pregnant woman when she is at risk for Zika.
		Wanting to become pregnant	a woman wanting to become pregnant in the future and is not currently pregnant when Zika is a risk issue.

Reader Comments			This was created for an article that was published that was just quotes about what people thought about Zika Virus.
Reproductive Health Terms	Abortion	Can't Find Provider	This would be used if there is a description of someone seeking abortion services in relation to Zika and are unsuccessful.
		Funding Barriers	This could include both personal funding/insufficient funds to access an abortion as well as provincial/state funding insufficiencies to provide to service <i>i.e. Planned Parenthood being defunded.</i>
		Legal Barriers	Anything that is considered to be blocking someone's access to abortion services through legalities <i>i.e. abortion is illegal in certain states.</i>
		Moral/Ethical Dilemma	This would be considered anything that describes a difficulty in making a decision to abort a fetus related to Zika.
		Rates	This is used when rates of abortion are mentioned.
		Religious Beliefs	If there is an issue between seeking abortion services and religion <i>i.e. Catholic so do not believe in abortion as an option, or lives in a Catholic country.</i>
		Spontaneous Abortion	Spontaneous Abortion is when a pregnancy is ended on its own, sometimes referred to as a miscarriage.
		Support Systems	Whether those seeking abortion have support from their partners and/or families in seeking an abortion in relation to Zika.
		Unsafe	Any mention of an abortion being unsafe is discussed. This could be about types of abortions provided, or

			personally choice, or due to other reasons.
	RSH Terminology		This is used when there is terminology or phrasing related to reproductive sexual health matters that stands out for any particular reason.
	Sexual Reproductive Health	Contraception	When there are mentions of contraception, a method used to stop a pregnancy from occurring during sexual intercourse, and a means of reducing sexually transmitted infections.
Time Periods	Long Term (May not show immediately)		When talking about long term birth defects that can happen due to Zika <i>i.e. birth defects may not show immediately after birth, effects of Zika may not be known.</i>
	Trimester Difference		When different outcomes of Zika as they relate to different time periods of pregnancy (the various trimesters) or description of risk as it relates to pregnancy trimesters.
Zika	Definition		When they describe what Zika is <i>i.e. infectious, viral.</i>
	Rates		Description of what the rates of Zika infections are doing, whether cases are increasing or decreasing.
	Symptoms		Description of the symptoms that Zika infection can cause <i>i.e. flu like symptom.</i>
	Testing		If there is testing being done for Zika infections.
	Transmission	Direct	Description of how Zika is being transmitted whether it is: Direct- when there is contact between two people (<i>sexual, in utero</i>)
		Indirect	Indirect- when there is no direct contact between two people (<i>mosquito, blood borne</i>)

	Vector	When there is anything mentioned about the vector or potential vectors for Zika virus. These can include known vectors or suspected vectors.
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