The Communication of West Nile Virus Risk: A Newspaper Analysis

by

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Abstract

The purpose of this research was to understand how the risks associated with West Nile virus (WNV) were presented by the *Winnipeg Free Press*. A detailed content analysis was completed on all *Winnipeg Free Press* articles and Manitoba Health news releases, between 1999 and 2008, containing information related to West Nile. Additional data included interviews with government and media representatives. Several recurring frames, including blame, controversy, rights and fairness, risk, and uncertainty were found in the newspaper data. Over time there was a decrease in both the coverage and prominence of WNV-related issues by the *Winnipeg Free Press*. In terms of the use of sources by media, the provincial government was found to be the most commonly used source in this context. Reporting of WNV-related issues by the *Winnipeg Free Press* has been relatively clear and balanced despite some initial alarmist coverage surrounding the uncertainty of the arrival of WNV.

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Contents

List of Tables

List of Figures

List of Appendices

Chapter 1

Introduction

West Nile virus is a mosquito borne virus that has spread through most of North America (Huhn, Sejvar, Montgomery, & Dworkin, 2003). Communicating human health risks effectively can be a challenge and can be influenced by a number of factors, such as the news media reporting. In the case of West Nile virus (WNV), newspapers are one of the top sources of information for the general public, and therefore, play a role in the public understanding of WNV risk (Fox, Acerett, Hansen, & Neuberger, 2006; Ivan, Schopflocher, Svenson, Tilley, & Keays, 2005; Wilson, Varia, & Lior, 2005).

WNV made its debut in Manitoba in 2002. The 2007 Manitoba WNV season was the worst to date with 582 identified human cases and four deaths (Manitoba Health, 2007b). With the possibility of high levels of infection to occur in any given year, it is necessary to assess whether changes are needed to help better communicate the risk of WNV.

The purpose of this case study is to explore how WNV related risks were presented to the public via the *Winnipeg Free Press* from the discovery of the outbreak in 1999 through 2008. With the focus of this research on WNV, it is imperative to also explore messaging surrounding the use of mosquito abatement strategies, specifically the use of malathion, as these two issues are interrelated. This research is a case study of one Manitoba newspaper (the *Winnipeg Free Press*), government news releases, and interviews with key informants.

The definition of risk in this research relates to possible human health outcomes from WNV and human health outcomes related to the use of malathion. How these issues

of risk were presented either via public perception of risk or more technical definitions of risk were equally explored through the analysis. The way in which these health risks were communicated may have affected public perception of this risk, and therefore how members of the public may have reacted to the risk with action (using personal protection measures) or inaction (not using personal protection measures).

Purpose

The purpose of this case study is to explore how West Nile virus related risks were presented to the public via the *Winnipeg Free Press*.

Research Questions

1. How have the placement, length, and number of articles changed over time?

2. How does the tone of the headlines of the articles compare with the tone of the content of the associated articles?

3.a. How are information sources (such as government or the general public) used by the *Winnipeg Free Press*?

3.b. How are Manitoba Health communications (i.e., news releases) specifically used by the *Winnipeg Free Press*?

4.a. How have the descriptions of West Nile virus-related risks been presented to the public by the *Winnipeg Free Press*, and how have these descriptions changed over time?

4.b. How have the risk tradeoffs associated with the use of malathion been presented to the public, and how have these presentations changed over time?

Chapter Synopsis

Chapter 1
The focus of chapter one is to provide a brief introduction to this thesis. This includes introducing the research questions and reviewing the layout of this thesis.

Chapter 2

Chapter two is an in-depth discussion that provides the West Nile virus-related background for this thesis. This includes information about the virus itself, the ways in which an individual can become infected, and the possible health outcomes related to infection. The second focus of chapter two is to provide essential background information on personal protection measures against WNV, as well as information related to mosquito abatement strategies. The final section of this chapter provides the context for this thesis, and includes the history of mosquito control, the methods currently used in mosquito abatement strategies, and the issues of conflict surrounding mosquito abatement in Manitoba.

Chapter 3

The purpose of chapter three is to provide background into the role of the media broadly, and as relates to this case study. This chapter includes six types of information related to media. It begins with a discussion of agenda-setting research and how it is used to inform the study of issue salience within this research. This is followed by literature about media norms and values, providing the background of why some types of stories are covered by news media and others are not. In the third section of this chapter, the use of framing in media is presented. The use of the term *framing* throughout this thesis refers to framing theory and to Entman's (1993) definition of framing about what information is or is not included, and how an issue is defined in a communication text. The fourth section presents specific elements of the media, including the use of headlines, and elements of style, such as the use of metaphor, and how they may affect the communication of risk. Following the presentation of this material, these ideas and concepts are discussed within

the context of risk communication. The final section of this chapter presents previous studies that have been conducted about WNV and the media.

Chapter 4

Chapter four presents the design, methods, and analysis used to conduct this research. This case study includes several different types of data. The first and main data set is *Winnipeg Free Press* news articles. Articles from 1999-2008 were collected from the Factiva searchable database using the key word mosquitoes. Following a thorough review, all articles discussing WNV were included for analysis. The second data type is Manitoba Health WNV news releases from 1999-2008. The third type of data used is key informant interviews with Manitoba Health representatives and *Winnipeg Free Press* journalists.

The newspaper and news release data were imported and analyzed in *NVivo 8*™ qualitative analysis software. The analysis was a very iterative process that began by reviewing the data and developing key codes to guide the analysis. Codes were developed, deleted, or altered as the analysis progressed. The interview data in this thesis was used to provide background for both Manitoba Health and *Winnipeg Free Press* journalist perspectives, and also to provide commentary on the *Winnipeg Free Press* coverage of WNV.

Chapter 5

The focus of chapter five is to present the results from this research. The results from the full media data set are presented first. This is followed by a more nuanced analysis of the specific text/words used in the articles of the sample set data. This chapter concludes with a summary of comments from the key informant interviews. Overall, media coverage of

WNV decreased over time despite the increase in identified human cases in 2007. A number of frames were used in the articles, with a focus on conflict and risk frames. Initially, coverage was alarmist and focused on controversy, however, this focus decreased over the study period. Often, the language used to describe the issues surrounding WNV was negative with the metaphor of war used frequently throughout the articles. Government (federal, provincial, and municipal) sources were the most commonly cited source type, however, in the case of Manitoba Health communications, only 50% of the news releases were used overall.

Chapter 6

Chapter six provides the discussion section of this thesis. It addresses the results found in this research, and situates them in a broader context, comparing them with results from other studies. Included in this section is the role of media in agenda-setting for this case study and the ways in which different source types were used by journalists. It was found that the media did play a role in agenda-setting with WNV. In comparison to a study by Roche and Muskavitch (2003), the *Winnipeg Free Press* has done a superior job including specific types of risk information in the articles. Manitoba Health interviewees expressed that much of the coverage of WNV was reasonably well done, but that there was room for improvement. From the Journalist perspective the WNV coverage was described as balanced and that efforts were made to cover fresh angles, but that over time coverage has become relatively routine.

Chapter 7

The focus of chapter seven is to conclude this thesis by directly addressing the previously stated research questions. In response to question one it was found that there were

changes in both the volume and placement of the news articles over time. For question two it was found that there was often a difference between the tone of headlines and the tone of the text. For question three, differences between the ways in which different source types were used by media were found and that there was a decrease in the uptake of Manitoba Health news releases over time. In response to question four it was found that initial coverage of WNV was often alarmist, however, over time risk messaging became fairly clear and reasonably consistent. It was also found that the risk tradeoff issues of WNV and malathion were not very clearly communicated. This chapter concludes by addressing the policy implications and recommendations for further research based on the results of this study, in particular, how the normalization of risk over time may require new risk communication strategies to be developed to effectively communicate public health risks.

Chapter 2

West Nile Virus

Background

West Nile virus was first discovered in North America in 1999, following the observation of an unusual cluster of encephalitis cases in New York. In the initial stages of the outbreak, several of the individuals infected were believed to have atypical Guillain-Barré syndrome. Further testing ruled out the syndrome when it was identified as an arthropod-borne virus. It was originally considered to be St. Louis Encephalitis (SLE), which was already established in North America. As SLE does not kill its avian hosts, the increased numbers of avian deaths during this same time period were not considered related. Further study determined that WNV, which is part of the same serogroup of flavivirus as SLE, was causing encephalitis in both human and avian populations (Nash, et al., 2001; Sampathkumar, 2003).

In this chapter the background material and context relevant for this thesis are provided. Background information on West Nile virus and the ways in which the vectors of the disease (mosquitoes) can be controlled are described in the first section. The second section of this chapter provides the context of the case study.

Risk of infection with WNV is generally low and varies seasonally and geographically (Public Health Agency of Canada, 2010). In Canada as a whole, from 2002-2008, the number of annual identified infections have varied from as low as 38 in 2008, to as high as 2,401 in 2007[1]. In Manitoba specifically, the number of identified

[1] These values include clinical diagnoses of WNV Neurological Syndrome, WNV non-neurological syndrome, WNV unclassified/unspecified, and cases identified from blood donation screening (Public Health Agency of Canada, 2010)

human infections has ranged from zero in 2002, to 587 in 2007. The provinces most affected by WNV are Ontario, Manitoba, Saskatchewan, and Alberta, where Saskatchewan frequently reports higher rates than the rest of Canada (Public Health Agency of Canada, 2010). Other provinces and territories have reported human cases, however, the infections were credited to travel (Public Health Agency of Canada, 2010). According to Statistics Canada (2010), there were a total of 40 deaths attributed to West Nile virus infection in Canada, from 2002-2007[2,3].

Of those infected with WNV, approximately 80% are asymptomatic but build up immunity to the disease. Approximately 20% of cases present with a mild febrile illness (West Nile Fever) with fatigue, myalgia, and chills being the most commonly reported symptoms (Huhn, et al., 2003). Less than 1% of infections result in the more severe form which affects the central nervous system. The more severe WNV neuroinvasive disease includes meningitis, encephalitis, and acute flaccid paralysis/poliomyelitis. This more severe form can result in death (Davis, et al., 2006).

Age is a key risk factor for developing the more severe form of WNV. According to Sampathkumar (2003), individuals over 50 years of age have a ten times higher risk of developing the neurologic symptoms. Individuals over 80 years of age are at a 43 times higher risk of developing the neurologic symptoms of WNV. For elderly persons there are several factors that affect the infection progression, including those that disrupt the blood-brain barrier, such as hypertension, or those that increase the duration and level of viremia, such as immune dysfunction (Sampathkumar, 2003). A study by Murray et al.

[2] Data from 2008 not available.
[3] Details of WNV related deaths from 2002-2007 are as follows/per year: 7, 9, 1, 11, 4, 8 (Statistics Canada, 2010)

(2006), identified age, history of hypertension, taking hypertension-inducing drugs, and a history of cardiovascular disease as being key risk factors related to developing encephalitis. These risk factors were identified through a retrospective chart review of confirmed WNV cases from 2002-2004 (Murray, et al., 2006).

There is no treatment for WNV, however, there can be supportive care for symptoms. Most infected persons with mild illness will recover uneventfully. Individuals with the more severe form of WNV with neurological involvement will have a much longer recovery period. There is a mortality rate up to 10% for those with WNV neurological syndrome. Of the patients infected in the initial outbreak in 1999, 35% had a full recovery within one year. Others experienced varying degrees of morbidity including fatigue, headaches, memory loss, difficulty walking, muscle weakness, and depression that persisted at one year (Sampathkumar, 2003).

The primary transmission method of WNV to humans is through a bite from an infected mosquito. Other less common methods include blood transfusion with infected blood, organ transplant from an infected donor, occupational exposure, and possibly through breast-feeding and transplacental transfer (Sampathkumar, 2003). Policy changes and the institution of new testing measures have reduced the risk of infection through contaminated blood (Makar & Stowell, 2004). The limited research into congenital infection has found three possible cases, however, further research is required (O'Leary, et al., 2006). Transmission of WNV through breast milk is rare and no changes regarding breast-feeding from a WNV infected mother have been recommended at this time (Hinckley, O'Leary, & Hayes, 2007).

WNV is spread in two inter-connected cycles. Mosquito species that have roles in the primary or amplification cycle are those that often feed on avian hosts spreading the virus between avian species and mosquitoes. The secondary or bridging vectors are those that are more general feeders and feed on both avian hosts and humans, horses, or amphibians. The types of mosquitoes that follow each feeding pattern are generally known (Turell, Sardelis, Dohm, & O'Guinn, 2001), and it has been determined that *Culex tarsalis,* a secondary vector, is one type of mosquito responsible for the spread of WNV to humans. It is this particular vector that is responsible for human infections in Manitoba (Manitoba Health, 2007c).

WNV was a new and not well understood pathogen in 1999. Since that time it has become an annual concern in many communities, with varying numbers and severity of cases across Canada (Public Health Agency of Canada, 2010). As there is a level of concern associated with WNV, it is important to consider the ways in which risk levels can be reduced.

Personal Protection Methods and Mosquito Abatement Strategies

There are many ways to reduce the population's risk of WNV infection. Many of these options are personal protection measures to be undertaken by individuals to reduce personal risk. Examples of some of Manitoba Health's recommendations include:

- Reduce the time you spend outside between dusk and dawn.
- Apply an appropriate mosquito repellent.
- Wear light-coloured, loose-fitting clothing with long sleeves and pant legs.
- Make sure your door and window screens fit tightly and are free of holes.(Manitoba Health, 2011)

The Manitoba Health recommendations are consistent with literature and other organizations' advice including the City of Winnipeg, for reducing mosquito exposure (Alberta Health and Wellness, 2007b; City of Winnipeg, 2007a; Huhn, et al., 2003; Manitoba Health, 2007c; Sampathkumar, 2003). The Manitoba Health recommendations were made available to the public through a variety of means such as pamphlets, posters, public services announcements and the Manitoba Health website (Manitoba Health, 2009a).

Other more costly methods aimed at reducing overall mosquito populations in a city or town can be undertaken by governments (Manitoba Health, 2007a). As removing all standing water in a region is not generally feasible, other methods used to reduce mosquito populations at their various stages of development can be implemented (City of Winnipeg, 2007b; Manitoba Health, 2007a).

There are two main methods to lessen or manage mosquito populations at various stages of the mosquito life cycle. The first is through the use of larvicides, which are used during the egg and larval stages, and the second is the use of adulticides, which are aimed at winged mosquitoes. Larvicides are considered superior to adulticides for a number of reasons: (1) the larval habitat sites can be targeted, rather than a broader focus on entire areas/neighborhoods, as is required with adulticides; (2) larvicides can be created from biological and more eco-friendly products; (3) they often come in solid forms allowing for limited human exposure, and (4) some types have the ability to remain in standing water for up to one month (Shapiro & Micucci, 2003). *Bacillus thuringiensis israelensis* (Bti) is one type of larvicide that is a biological pest control agent found naturally in soils. Bti produces a protein crystal that is only lethal to black fly and mosquito larvae,

thus having less impact on the surrounding environment. Bti is applied directly to the water where insects consume the crystals. A few hours after consuming Bti, the insect will cease feeding due to destroyed stomach walls from the Bti, and will die within several days. According to the Pest Management Regulatory Agency (PMRA) in Canada, Bti poses little threat to human health or to the environment (Pest Management Regulatory Agency, 2004).

Malathion is one of the more commonly used types of adulticide (Government of Saskatchewan, 2007; Manitoba Health, 2007a; New York State Department of Health, 2000), and has been registered for use as an adulticide in Canada since 1953 (Pest Management Regulatory Agency, 2003a). In 1999, PMRA announced that it was going to re-evaluate organophosphate pesticides, of which malathion is one. The comprehensive evaluation of malathion, including its application as an adulticide, was thoroughly reviewed (Pest Management Regulatory Agency, 2010). It was determined that when used properly for mosquito control programs and sprayed at an ultra-low volume (ULV) as recommended, malathion does not pose a health concern. Nonetheless, the PMRA developed recommendations for minimizing exposure during residential mosquito abatement programs (Pest Management Regulatory Agency, 2003a, 2004)[4]. Although malathion has been rigorously re-evaluated, it is important to acknowledge that "(e)xposure to high amounts of malathion can cause difficulty breathing, chest tightness, vomiting, cramps, diarrhea, blurred vision, sweating, headaches, dizziness, loss of consciousness, and possibly death." (Agency for Toxic Substances and Disease Registry, 2003 p.1).

[4] For more information on the re-evaluation of malathion, or its use as an adulticide, see the PMRA website: http://www.hc-sc.gc.ca/cps-spc/pest/index-eng.php

Concern has been raised regarding the carcinogenetic risks of malathion for human health. According to the World Health Organization's International Agency for Research on Cancer (IARC), malathion has been assessed and assigned to Group 3. Group 3 chemicals are those that cannot be classified as carcinogenetic to humans, based on a lack of sufficient evidence (International Agency for Research on Cancer (IARC), 2009). According to an IARC report "the available data did not provide evidence that malathion or its metabolite malaoxon is carcinogenic to experimental animals" (International Agency for Reserach on Cancer (IARC), 1998 p.8) and no human data were available. In other words, the animal- based data that are currently available does not provide sufficient evidence that malathion is carcinogenic to humans (International Agency for Reserach on Cancer (IARC), 1998). Another contentious issue with the use of malathion is the potential environmental consequence, as it affects insects such as honey bees and can affect some aquatic species due to water run-off (Dutta, Nassar, Munshi, & Richmons, 1997; Pest Management Regulatory Agency, 2003b).

Although for some (in this case, the various level of government) this is not a risk tradeoff situation, for others (in this case, some members of the general public in Winnipeg) it is. Therefore, it is important to acknowledge a research paper focused on WNV and the use of malathion where Peterson, Macedo & Davis (2006) found that based on current scientific knowledge "human-health risks from residential exposure to mosquito insecticides are low and are not likely to exceed levels of concern" (p. 366). A risk-benefit scenario using malathion to lower WNV risk has not been completed, and thus it cannot be stated that one risk outweighs the other. However, based on WNV health risk data, it is anticipated that "the risks from WNV exceed the risks from

exposure to mosquito insecticides" (Peterson, Macedo, & Davis, 2006 p. 366). Therefore, in this context (i.e., when *Culex tarsalis* mosquito populations and mosquito infection rates are high), the use of malathion is *likely* to have a beneficial outcome, and thus is worth any possible negative health outcomes from ULV sprayed malathion. It is important to note that based on the PMRA recommendation, malathion does not pose a health concern when used properly (Pest Management Regulatory Agency, 2003b). Therefore, from the perspective of PMRA, this situation is not one of risk trade-offs (WNV vs. malathion), but rather one of risk (WNV) versus a method to reduce that risk (malathion). It is important to note that this distinction is not shared by everyone.

Although the purpose of this thesis is not to evaluate Manitoba Health's response to West Nile, it is important to acknowledge a paper by Tickner (2002). Tickner (2002) explored the challenges public health officials in the United States were faced with when forced to make decisions involving uncertain risks and risk trade-offs, within the context of the precautionary principle and WNV. Most simply, the precautionary principal is based on the premise that when a risk threatens human health or the environment, precautionary procedures should be taken even if there is still some uncertainty surrounding cause and effect (Tickner, 2002).

Tickner's (2002) paper was developed based on a meeting that included public health authorities, scientists, and advocates to discuss the "scientific understanding, uncertainties, and the policy dilemmas" associated with the response to WNV (Tickner, 2002 p.71). It is likely that many of the issues and challenges faced by public health officials in the United States were also faced by public health officials in Manitoba. Many issues and challenges were discussed in this paper, however, the key issues and

challenges anticipated to have been relevant to this Manitoba context are: “the political mandate to spray”, “bias toward addressing short-term, knowable risks”, “the no-win situation for public health officials”, and the idea that “the problem is not going away” (Tickner, 2002 p. 72-73). The paper also included a discussion of the lessons learned such as being explicit about uncertainties, include a broad public in the discussion, continuous monitoring and surveillance and the importance of evaluation. It is important to note that some of the recommendations included in the Tickner (2002) paper, such as the use of continuous surveillance and monitoring and to be explicit about uncertainties, had already been implemented by Manitoba Health prior to the publication of the paper.

Considering the human infection rates of 2007 and the possibility for such infection rates occurring again, Winnipeg is a prime location to the study risk communication messages concerning WNV and the use of the adulticide malathion. In the following section the context for this case study is provided.

Context of Case Study

The Province of Manitoba is well known for its vast numbers of mosquitoes and has been referred to colloquially as the “mosquito capitol of Canada”. In this section the history of mosquito control in Winnipeg, the roles played by the province and the city in mosquito control, and further details about the context of this case study are presented. The southern section of Manitoba (where the City of Winnipeg is located) is part of the Red River Valley. This low-lying area regularly floods with spring run-off from the thawing of the Red River, creating large amounts of standing water (Baker, 1979). Standing water combined with warm temperatures creates the perfect mosquito habitat (Manitoba Health, 2007c). Based on these naturally occurring prime larval development sites, the residents

of Manitoba have been attempting to control mosquito populations for decades (R. Mitchell, 1967).

History of Mosquito Control in Winnipeg

According to the Manitoba Historical Society, Winnipeg has a lengthy history of mosquito control. Based on examples of successful mosquito control in other parts of Canada and the world, the first anti-mosquito campaign was launched in Winnipeg in the spring of 1927 (R. Mitchell, 1967).

In the first year, a test area was selected to determine if the program would be successful. The focus of the program involved applying old crankcase oil to larval development sites. The public donated a total of $750.85 the first year. It was determined that the program helped to lessen the infestation in the test area. In the program's second year, a budget of $4000 was established and the treatment area expanded to include much of the city. The depression of the 1930s decreased financial support for the program, and in 1935 the annual fundraiser for the program was suspended. However, with the support of a separate fundraiser (in place of the one that had been suspended) held by the *Winnipeg Free Press* newspaper, the program continued. A very large mosquito population in 1936 was sufficient to trigger the reinstatement of the fundraiser. In 1940 the Winnipeg City Council agreed to support the mosquito control effort. By 1954 the Greater Winnipeg Mosquito Abatement District was officially created (R. Mitchell, 1967).

Beginning in 1949, the key element of the mosquito control program was the use of the insecticide dichlorodiphenyltrichloroethane or DDT. The use of DDT for mosquito control was banned in1972 in Canada and many other developed countries (Science and

Technology for Canadians, 2007). This likely had a great impact on the Winnipeg Mosquito Abatement District's mosquito control program. Although not explicitly stated, it is likely that it was around this time the city began to use the adulticide malathion.

Present Day Mosquito Control in Manitoba

In present day Manitoba there are two distinct mosquito control programs, one by the Province of Manitoba and one by the City of Winnipeg. In this section the roles of the Province of Manitoba and City of Winnipeg in mosquito control are presented. In addition, the legislative changes made to allow for a firm response to vector born diseases are discussed.

The Role of the Province of Manitoba in Mosquito Control

In Canada, provincial governments are constitutionally responsible for health in their respective provinces (Manitoba Health, 2011). Therefore, the Province of Manitoba has a key role in the control of WNV risk. Manitoba Health is the coordinator and major funder of WNV surveillance and control in the province (Manitoba Health, 2007c). In response to the arrival of WNV in North America, two key actions were taken by the Manitoba government: a program was created for surveillance and control of WNV, and new legislation was created to allow the province to enforce the spraying of malathion (Manitoba Health, 2001).

The Manitoba WNV Program is a comprehensive program that was established shortly after the arrival of WNV in North America. The program has several chief components: surveillance/monitoring, mosquito control, public education, and communication. An integral part of this program is the cost-share component whereby approved municipalities receive 75% of larviciding costs from the province, while

municipalities are responsible for the remaining 25% of associated costs (Manitoba Health and Healthy Living, 2009).

The provincial surveillance system includes mapping, larval sampling, adult mosquito surveillance, equine surveillance, human surveillance, and risk assessment. It is important to note that from 2003-2005 there was also corvid (e.g., crow and raven) surveillance. Mapping is mainly completed by the Field Surveillance Teams, with the exception of Winnipeg, which has its own field staff. Mapping of all standing water is imperative in order to identify the 20 to 25% of standing water that is used by mosquitoes (Manitoba Health and Healthy Living, 2009). Monitoring the areas where there are larvae allows for targeted and efficient use of larvicides. Larval sampling is an important component of the program as it allows for the identification of habitats where *Culex tarsalis* are found. Adult mosquito surveillance includes 37 permanent mosquito traps dispersed in southern Manitoba. Additional traps are implemented if increased surveillance is deemed necessary (Manitoba Health and Healthy Living, 2009).

Equine surveillance includes the collection of positive blood test results from the Veterinary Services Laboratory. Human surveillance is more complex and includes collecting positive test results from the Cadham Provincial Lab, where physicians send human samples for testing, and from Canadian Blood Services, where blood donations are screened for WNV (Manitoba Health and Healthy Living, 2009).

The second component of the provincial mosquito control strategy is composed of source reduction, larviciding, and adult mosquito control with a focus on *Culex tarsalis* mosquito species. Source reduction includes altering locations that allow for standing water by increasing drainage, and draining old tires and any other sites where reducing

standing water is possible. Larviciding is used in sites where reducing standing water is not possible. Larviciding is an integral component of the annual mosquito control strategy, while adult mosquito control is only used as part of an official health order in situations where “significant risk to human health due to WNV appears imminent” (Manitoba Health and Healthy Living, 2009 p.9).

The WNV Scientific Advisory Committee was created to conduct WNV risk assessments. Members of the committee are responsible for reviewing the surveillance data and providing the Chief Public Health Officer with recommendations of the risks to human health from WNV (Manitoba Health and Healthy Living, 2009).

The final component of the Manitoba WNV program is focused on public education and communication. According to the *Planning Document for Municipalities*, the education strategy is focused on informing the public about source reduction and personal protection (Manitoba Health and Healthy Living, 2009). Multiple methods are used to communicate the message, including “brochures, posters, on-line fact sheets, a website, regular media bulletins, print and radio ads and other community outreach activities“ (Manitoba Health and Healthy Living, 2009 p.11). In addition, this component includes the regular communication and sharing of surveillance information with municipalities (Manitoba Health and Healthy Living, 2009).

Manitoba Health plays a key role in both funding and coordinating the WNV response in Manitoba. Based on changes in legislation, Manitoba Health’s role in controlling mosquitoes due to public health risks was expanded.

Changes in Legislation

In Manitoba, sections of the Public Health Act and the Environment Act give the Minister of Health and the Minister of Conservation the authority to enact a response to a mosquito-related public health emergency or imminent risk situation. In the case of WNV, a sequence of interactions and recommendations allow for the health order, to spray ULV malathion throughout the city to be implemented. The order is initiated by a recommendation from the WNV Scientific Advisory Committee to the Chief Public Health Officer, with regard to WNV human health risks. The Chief Public Health Officer then consults with the Minister of Health (Manitoba Health, 2007c). The Minister of Health then decides to declare an order (or not) and alerts the Minister of Conservation. The Minister of Conservation then declares an order for the use of adulticides in an effort to immediately lessen infection risk through temporarily lessening the number of adult mosquitoes. This legislation falls under section 25.1(1) in the Environment Act (Manitoba Government, 1987).

The legislation was created to allow for a demonstrated response to a potential vector-based virus such as WNV. More specifically, this legislation allows for the use of malathion throughout a designated area (e.g., city or town) when deemed that a health hazard is emergent or imminent regardless of whether a homeowner would choose to have their home sprayed with malathion. This legislation also demonstrated a commitment by the provincial government to the potential (and at that time the not well understood) threat of WNV.

The Role of the City of Winnipeg in Mosquito Control

The City of Winnipeg program is responsible for nuisance mosquito control. The program includes mosquito surveillance and mosquito control. Surveillance of mosquito populations is conducted at larval stages in selected standing water sites, while adult mosquito populations are monitored through the use of mosquito traps placed throughout the city (City of Winnipeg, 2007b).

The mosquito control portion of the program includes four parts: source reduction, public awareness, larviciding, and the use of adulticides (when deemed necessary). Source reduction involves increasing drainage to reduce standing water. The goal of the public education component is to encourage residents to drain standing water on their property, with recommendations similar to those of the province, encouraging residents to wash out bird baths regularly, cover rain barrels, and ensure any containers or toys are turned over so they do not collect water. The use of larvicides are a key component of the city's strategy and are applied throughout the city and within 10 kilometers of city limits both by ground crew and by helicopter. Biological larvicides are used in residential areas, play grounds, parks, and other areas where people are likely to come into contact with the larvicides; while chemical larvicides are used in sites where direct public contact is not anticipated (City of Winnipeg, 2007b).

Adulticides are only used when deemed necessary by the Adulticiding Factor Analysis (AFA). The AFA is a comprehensive system of analysis that includes consideration of the following factors: soil moisture conditions, forecasted rainfall, mosquito trap counts, current status of adult mosquito population, average cumulative temperatures, and status of larval development sites. An accurate understanding of these

factors allows the mosquito situation to be classified into an AFA level of low, medium, or high (City of Winnipeg, 2007b). The use of adulticides within the city is only considered if the AFA level is high (City of Winnipeg, 2009). In accordance with the city's pesticide use permit, 48 hours notice before spraying ULV malathion is required (City of Winnipeg, 2007b). In addition to the 48 hours notice, a courtesy announcement indicating the areas of the city to be sprayed with malathion is usually given.

The use of pesticides can be a contentious issue. With this in mind, the City of Winnipeg created a program that allowed residents to register for a buffer zone; an option in which a City of Winnipeg resident can register to exempt malathion spraying within 100 meters of his/her property. With the option of buffer zones, residents who may be sensitive or opposed to the use of malathion can opt-out of having his/her property sprayed with malathion (City of Winnipeg, 2007b).

Sources of Conflict

The one key issue of controversy in this case study is the use of malathion. As previously mentioned, the adulticide malathion is used when deemed necessary by both the Provincial WNV Program and the City of Winnipeg. When malathion is used by the city, buffer zones are in effect, however, when used under a health order by the province, the buffer zones are not observed.

The conflict in this case study is between those who are vocally for the use of malathion and those who are against its use. For a number of years, a group of residents in the neighbourhood of Wolseley have gone door-to-door and encouraged residents to

register for buffer zones. Many residents have registered[5], essentially creating a neighbourhood-sized buffer zone. For years, there has been differing perspectives in the neighbourhood surrounding the use of malathion. It came to a head in 2002 when the first health order was enacted. Groups, both for and against the use of malathion, were outside at night in response. Those against the use of malathion blocked streets with people and dumpsters, while those in favour of the use of malathion attempted to move the other protesters out of the way to allow the malathion spray trucks to pass. The ongoing rift between the two groups in Wolseley is well documented via the news media in Winnipeg (Hendry, Rabson, & Welch, 2002; Martin, 2002; Owen, 2002; Rabson, Sanders, & Martin, 2002; Reporter, 2002).

The second area of conflict is related to the concept of risk tradeoffs. The risk tradeoff in this context is the use of one risk (the use of malathion) in an effort to reduce another (WNV health risk) (Roche, 2002). Whether the use of malathion as recommended for mosquito abatement constitutes a potential risk is not the focus of this research. However, it is important to consider this as a risk tradeoff issue, as it is a concern of some community members (Hendry, et al., 2002; P. Mitchell, 2000, 2002). Manitoba is one of the few provinces that uses the adulticide malathion as a method to control adult mosquitoes for WNV-related risk reasons (Alberta Health and Wellness, 2007a; Manitoba Health, 2007a; Schellenberg, et al., 2005). It can be generally stated that some members of the general public feel that the health risks related to malathion use outweigh the overall health risks from WNV, and thus the use of malathion is not justified. This is an ongoing conflict within the City of Winnipeg and is likely to continue

[5] Due to confidentiality, details regarding the precise number of residents in that neighbourhood who registered for buffer zones is not available.

in a similar fashion as long as the city and/or the province continue to use malathion as a method to decrease adult mosquito populations.

Residents of Manitoba have always been contending with large mosquito populations. Through the years several methods have been implemented to help control the mosquito populations, especially within the City of Winnipeg. With the emergence of a new vector-born disease, and the possibility for new and emergent diseases in the future, it is both a prime time and location for this study.

Chapter 3

News Media and Risk Communication

The majority of Canadians (89%), follow some type of news media (TV, newspapers, internet) regularly (daily or several times per week)(Keown, 2007). As such, it is important to note the often referenced quote that the press "may not be successful much of the time in telling people what to think, but it is stunningly successful in telling its readers what to think *about."* (Cohen, 1963 as cited in McCombs & Shaw, 1972). Studying the media is important to assess if and how risk information is presented, as the media can influence public understanding of risk (Coleman, 1993; Driedger & Eyles, 2003; Kahneman & Tversky, 1984).

The goal of this chapter is to explore the *if* (agenda-setting) (i.e. if the media choose to cover an issue) and the *how* (framing) (i.e. how the media choose to present an issue) of media coverage of an issue as it relates to risk communication. In this chapter, the concepts of agenda setting and media norms are explained, followed by a discussion of framing theory providing the background to the relevance of these topics in risk communication. This is supplemented by a presentation of other elements included in the analysis, such as the use of sources by newspaper journalists, the role of headlines, and issues related to the content and style. A review of previous WNV and media studies concludes the chapter.

Agenda-Setting and the Media

McCombs and Shaw (1972) are often credited as playing an integral role in early agenda-setting research (Driedger, 2008; Richard, 2008; Soroka, 2002). Their pivotal

study focused on what voters said were key issues compared with media content during the 1968 United Sates presidential campaign. Although not proven, the results suggested that the media play an agenda-setting function in terms of the issues that are covered by the media and what the public may consider to be important (McCombs & Shaw, 1972).

In the early 1980s, Lang and Lang (1981) criticized the initial agenda-setting research for the use of terminology and theory of *agenda-setting*, where "(t)he whole question of how issues originate is sidestepped", and therefore coined the term agenda-building where numerous factors were considered (Lang & Lang, 1981 p.448). Lang and Lang also argued that "issues have special attributes", and therefore, not all issues have the same impact on agendas (Lang & Lang, 1981 p.447). Over time, some of Lang and Lang's initial critiques of agenda-setting research have been addressed, and there is research that supports the principle that different types of issues variably affect the process of agenda-setting and that it is not always a media-led agenda (Soroka, 2002).

Soroka (2002) provides an in depth discussion of the progress of agenda-setting literature until 2002. He defines agenda-setting as "the study of issue salience"; or more specifically, "the study of rise and fall of issue salience over time" (p.5). In agreement with Lang and Lang, Soroka (2002) acknowledges the relevance that issue type plays in this process. Soroka (2002) reviews many definitions of the term *issue*, and concludes in agreement with the definition provided by Lang and Lang (1981) (p.451) in which an issue is "whatever is in contention among a relevant public". In other words, anything that is of conflict/discussion/concern among those such as the media, policy makers, and the public, including opinions measured by polls, is considered an *issue* (Soroka, 2002). Most simply, agendas are constructed based on issues, which are based on particular

events. For example, a number of robberies are events related to the larger *issue* of crime (Soroka, 2002).

A complex model was developed to describe the media, policy, and public agendas, and their interactions, to establish which force is setting the agenda for a particular issue (Soroka, 2002). It has been demonstrated that for different types of issues there are different forces (media, policy or public) driving the agenda. For issues such as unemployment and inflation, which affect the public on a more personal level, it is the public who drive the agenda. In the case of sensational issues such as AIDS, crime, and the environment, the media drive the agenda. For government issues such as debt and national unity, the policy agenda leads the media and the public agendas (Soroka, 2002).

The focus of agenda-setting research in politics and policy is to unravel the interwoven factors that affect policy (Soroka, 2002). The issue of WNV, its emergence as a new infectious disease, and its transition into normalcy, is of clear policy relevance.

The goal of agenda-setting research is to empirically and statistically demonstrate the relationships between the media, public, and policy agendas (Soroka, 2002). Dearing and Rogers (1996) state that "(t)he task of the scholar of agenda setting is to measure how the salience of an issue changes and why this change occurs" (as cited by Richard, 2008 p.51). The study of agenda-setting in this research is guided by that of Richard (2008) and is focused on the number (count of articles), type (news, editorial, brief, etc.), and prominence and placement (front page, second section, etc.) of articles as a method of understanding the issue salience.

Intertwined with politics at play, are the institutional norms that affect news media. The following section presents the role of media norms in the coverage of an issue.

Media Norms and Values

There are several perspectives of news norms and values, although many of the key concepts are the same (Boykoff & Boykoff, 2007; Lorimer & Gasher, 2004; Miller & Riechert, 2000; Richard, 2008). Mencher (2000) has identified "seven determinants of newsworthiness: timeliness (events that are immediate or recent); impact (events that affect many people); prominence (events involving well-known people or institutions); proximity (events that are geographically or 'emotionally close' to the audience); conflict (events pitting two sides against one another); peculiarity (events that deviate from the everyday); and currency (long-simmering events that suddenly emerge as objects of attention) (as cited in Lorimer & Gasher, 2004 p.220). News norms and values are logical in their roles of shaping news stories based on what the news outlet deems the public wants to know about and will therefore watch or read.

In addition to issues of agenda-setting and news norms affecting what is covered by news media, key factors also include who owns, edits, and writes for a news outlet. The owners of a particular news media outlet, and their ideological views, can have an impact on what is (or is not) published (Boyce, 2007). The editor of a newspaper and the editors of individual sections of the newspaper can play a key role in deciding what is covered based on their own perspective of what is or is not relevant, and how that issue should be presented (Boyce, 2007). Finally, the journalist him/herself also plays a large role in shaping a media article. The journalist's life experience, culture, and perceptions

can influence how s/he understands an issue, and therefore, can impact how the article is written (Bennett, 1999; Driedger, 2008; Slovic, 1987; van Dijk, 1991).

Understanding which factors contribute to the coverage of an issue is important in conducting a newspaper analysis. Following the many factors that can affect *if* an issue receives media coverage is the importance of *how* an issue is presented by the media. The following section discusses the *how* of media coverage through the concept of framing.

Framing Theory

The concept of framing, how framing functions in media, as well as the power of framing have been well-studied (Driedger & Eyles, 2003; Durfee, 2006; Entman, 1993, 2001; Kahneman & Tversky, 1984; Scheufele, 1999; Scheufele & Tewksbury, 2007). According to Scheufele (1999), framing and agenda-setting are theories of media effects that relate to the public's construction and perception of an issue. A key focus of this research was to determine how risk messages were framed by media. In this context, the types of sources used for information, the metaphors and rhetoric employed, and the specific word choice all contribute to how a risk message is framed and communicated to the public (Cappella & Jamieson, 1997; Durfee, 2006; Kahneman & Tversky, 1984; Kasperson, Kasperson, Pidgeon, & Slovic, 2003; Patton, 2000; van Dijk, 1991).

Entman (1993) defined framing as "to select some aspects of a perceived reality and make them more salient in a communication text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation" (Entman, 1993 p. 52). In the words of Cappella and Jamieson (1997) "framing determines what is included and excluded, what is salient and what is unimportant." (p. 38).

Framing serves an important cognitive function, making it very relevant to incorporate in research. Kahnerman & Tversky (1984) proved that framing a message in terms of gains or losses yielded different responses from participants in reaction to the number of people living or dying in a story. This study demonstrated the role framing plays in communication (Kahneman & Tversky, 1984).

In an effort to clarify framing as a theory, Scheufele (1999) created a model based on the frames of political communication, which includes concepts applicable in the WNV public health context. The model is pertinent in how it recognizes the interaction between audiences and the mass media, the role of this interaction, and how it contributes to the development of framing theory. In order to examine the interplay between the audiences and the media, previous studies were classified into the type of frame and how they were operationalized. Two types of frames were identified, individual or audience frames, and media frames. Individual or audience frames focus on how an individual or audience makes sense of and perceives a message, while media frames serve as an organizing idea that allow journalists to classify and package information for their audiences. For a journalist, the motives to use a particular frame may be conscious or unconscious (Scheufele, 1999). Although public and individual perceptions are important, they are beyond the scope of this study; this research will focus on media frames.

According to the Sheufele's (1999) model, framing studies can be further classified based on their examination of independent or dependent variables. Studies using frames as independent variables examine the effect of framing, for example, the effect of different types of frames on an audience. Studies using frames as dependent

variables focus on “the role of various factors in influencing the creation or modification of frames” (Scheufele, 1999 p. 107). At the media level, this means acknowledging that the way a journalist frames an issue may be influenced by a variety of factors, including social-structural, organizational, and ideological variables (Scheufele, 1999).

A number of studies have focused on the framing of media messaging within the context of various health issues (Boyd, Jardine, & Driedger, 2009; Driedger & Eyles, 2003; Driedger, Jardine, Boyd, & Mistry, 2009; Durfee, 2006; Menashe & Siegel, 1998; Richard, 2008; Shih, Wijaya, & Brossard, 2008; Wakefield, Smith, & Chapman, 2005; Yeo, Park, & Arabi, 2007). Despite attempts to clarify framing theory (Scheufele, 1999; Scheufele & Tewksbury, 2007), there are still some differences in how framing is operationalized within research (Boyd, et al., 2009; Wakefield, et al., 2005). In some studies frames have been developed based on key content areas in terms of how a risk issue is presented, such as a focus on economy, health, blame, or government (Boyd, et al., 2009; Driedger, et al., 2009), while others use frames that are more descriptive, such as “smoking as a societal problem” or “tobacco industry as evil” (Wakefield, et al., 2005).

In this research, the study of the frames of media articles will include reviewing, what information is (not) included and salient, and how the issues are defined,. The complex task of risk communication can be helped or hindered by the media; how a message is framed (i.e., as a health risk or as an issue of conflict, or as gains or losses) can influence the public perception of a risk issue (Durfee, 2006; Kahneman & Tversky, 1984).

Key Elements of Print Media

In the context of framing, it is important to consider the overall message as well as specific aspects of the message, such as the use of sources, headlines, and metaphor, as these factors can influence the development of one type of message over another. In this section several key elements in media are discussed in terms of how they relate to message construction and communication to the public.

In a media analysis, it is not only what has been said about what, when, and how, but also *by whom*. It is essential to understand what types of sources that are used by journalists, as they may be used for different reasons (van Dijk, 1991). The use of sources for information and quotes is a key way for a journalist to legitimize an article and distance a reporter from it, making it appear more objective (Bishop, 2001; Ericson, Baranek, & Chan, 1989; van Dijk, 1988, 1991). According to van Dijk (1991), quotes in articles may serve several functions. For example, a quote from a prominent news actor may be news in its own right, but quotes can also make an article more lively, enhance credibility, and provide a subjective interpretation of an event without separating fact from opinion (van Dijk, 1991).

Journalists will frequently look to sources who have proven themselves to be reliable. In other words, sources "who can be trusted, who command respect, and who can present information in a packaged, easy-to-edit-and-digest fashion" are more likely to be used by journalists (Bishop, 2001 p. 25). In many cases, this may mean a frequent reliance on elite types of sources. Elite sources generally include large institutions and organizations (e.g., government and big business), as these are the source types that have the ability (e.g., hire a communications expert) to create the 'digestible' (Bishop, 2001)

materials for media use (van Dijk, 1991). This can mean other types of sources with different viewpoints may be less likely to be used as sources, thereby contributing to the creation of one type of message over another (Miller & Riechert, 2000).

It has been established that for decades government officials (an elite source type) have been key sources for journalists (Miller & Riechert, 2000; Richard, 2008; van Dijk, 1991). According to Miller and Riechert (2000), there are several reasons for this: (1) government sources are readily available, (2) they are generally thought to be credible, and (3) in dangerous situations (e.g., toxic spill) they generally have control of both the physical area and the informed personnel. One focus of this research is to analyze how government sources have been used by the news media in presenting stories of WNV risk. Despite frequent reliance on elite source types, journalists note the importance of including a wide range of sources, regardless of the opinion of the source and whether it aligns with the journalist's personal view point (Richard, 2008).

In this case study, a second relevant source type is the environmental source. According to Miller and Riechert (2000), in some cases environmental sources are groups of unorganized residents or ad-hoc citizen groups, and in some cases can be considered less credible sources of information. Government sources regularly contrast these types of environmental sources (Miller & Riechert, 2000). Environmental groups as sources seldom garner the same type of media attention that government sources do, therefore, in order to receive some form of media attention, sources may have "to choose between making reasoned arguments and being ignored, (or) attracting media attention via dramatic or illegal activities and being delegitimized" (Miller & Riechert, 2000 p. 52). Although the environmental/activist sources used in this data set focus on health more

than the environment, their organization, actions, and the way they are presented by media is often similar to that of environmental sources as described by Miller and Reichert (2000).

The ordering of sources in a news article is also significant. It is a common assumption that readers may not read a full print media article, depending on their interest level in a topic (Driedger, 2008). Therefore, the person/organization cited first in an article is given prominence as a source (Driedger, 2008; Richard, 2008). The second source used in an article is in a position of either refuting the first source, or reinforcing the first source's perspective (Sampert, 2006 as cited in Richard, 2008). The order of sources is included in this research to aid in understanding how sources were used to shape the story of WNV risk.

Headlines are an important component of newspapers. According to van Dijk (1991), a headline provides both textual and cognitive functions. The textual function is straight forward as it is at the top of the article and frequently in larger and/or bold type. The key function of a headline is to summarize the most important information from an article. The cognitive function of a headline is that "they are usually read first and the information expressed in the headline is strategically used by the reader during the process of understanding in order to construct the overall meaning, or the main topics, of the rest of the text before the text itself is even read" (van Dijk, 1991 p. 50). For example, describing an event as a 'riot' rather than as a 'disturbance' or a 'protest' may influence the reader's interpretation of the article (van Dijk, 1991). Headlines are often written by an editor, and not by the author of the article. In some cases, the editor may not be completely familiar with the article and may choose to include only small pieces (perhaps

not even the most relevant information) to form a ‘catchy’ title. For readers, the headline is what will encourage them to continue reading an article. Headlines have also been found to be the most memorable part of an article for a reader (van Dijk, 1991). The purpose of the study of headlines in this research was to explore how the tone of the headlines compared with the tone of the leads of the articles to assess consistency, if any, between the two. As headlines can be more dramatic and memorable than the associated article text (van Dijk, 1991) if headlines are written in a particularly alarmist tone, this could lead to a reader remembering a statement that may not be consistent with the text of the article.

Issues of structure are also important to consider. News articles are written in an inverted pyramid style. The goal is to incorporate the information that is judged to be the most important elements (who, what, where, when, why) at the beginning, or lead, of the article, with increasing detail as the article progresses (Lorimer & Gasher, 2004). With this format, readers are able to quickly ascertain what a journalist has determined to be the key elements of the article, and can then decide if they should read further to gain more information.

Other key elements to consider in a media analysis are the concepts of style and rhetoric. According to van Dijk (1991), style refers to the choice and variation in word use by journalists and the social context of language use, while rhetoric is described as “special verbal ploys, such as alliterations and metaphors that help capture the reader’s attention” (van Dijk, 1991 p. 209). One clear difference in styles is evident when comparing ‘quality’ press and tabloids. These issues of style and rhetoric further relate to framing in how they affect the final article text. Van Dijk (1991) uses the example of the

way in which in one newspaper there may have been a “disturbance”, while in another newspaper there maybe have been a “murderous looting spree” (p.209). A number of factors that influence style, such as “the text genre as well as with the opinions, the social situation, group membership or culture of the writer” (van Dijk, 1991 p. 210). For this thesis, consideration of the use of style in the media analysis will include reviewing the type of language used in the media articles as it relates to the framing and construction of WNV and mosquito abatement strategy risk messaging in the newspaper articles.

In accordance with van Dijk (1991), rhetoric is considered in terms of structures and the specific language used within the text that may draw attention to some aspects over others. Several such structural and semantic issues are considered in this thesis, including alliteration, hyperbole, and the use of metaphor. In media, alliteration may be used in a title to make it more ‘catchy’. An example of alliteration is the tongue twister of Peter Piper picked a peck of pickled peppers. Alliteration is frequently used to emphasize the negative issues within a media story (van Dijk, 1991). As such, this is an important component to consider in a newspaper analysis about health risk communication, because if used regularly it could have an impact on the risk messaging delivered to the public. Hyperbole is the use of exaggeration (van Dijk, 1991) (e.g., “these books weigh a ton” means that the books are very heavy). These types of literary devices are important to consider as they contribute not only the emphasis of a particular aspect of an article, but also to the way in which they contribute to the article overall.

Metaphors are concepts that are often used in daily life. According to Lackoff and Johnson (2003), “(t)he essence of the metaphor is understanding and experiencing one kind of thing in terms of another”, like the idea that a person is ‘solid as a rock’ (p. 5).

One key metaphor that is regularly used is the concept of arguments as war (Lackoff & Johnson, 2003; van Dijk, 1991). Arguments are often expressed in terms used to describe war. For example, one person *attacks* the other's position on an issue, placing the other person in a position of needing to *defend* themselves, and in the end there is likely to be a *winner* and a *loser* (Lackoff & Johnson, 2003). In this context the metaphor of war was extended beyond arguments to consider how opposing 'sides' were pitted against the other: humans versus the mosquitoes, humans versus the use of malathion, and humans versus humans.

Lackoff and Johnson (2003) have identified many different types of metaphors. For example, a structural metaphor is "where one concept is metaphorically structured in terms of another" (p.14), like the idea that *time is money*, and therefore, time can be *spent, wasted*, and *saved.* Time cannot literally be spent, however, this is how the concept of time is commonly understood. As mentioned, there are many different types of metaphors including orientational, ontological, and container metaphors, to name a few (Lackoff and Johnson, 2003). Metaphors are said to be "rare in standard reporting, but often show up in editorials, columns, and background features" (van Dijk, 1991 p. 221). It is important to understand metaphors as they relate to the construction of a media message. The use of metaphor was explored, and in particular, the use of the metaphor of war, while the use of hyperbole and alliteration were incorporated into the study of frames.

All of the issues related to style and rhetoric, including alliteration, hyperbole, and the use of metaphors, influence how a news article is framed, and therefore, how an issue is presented to the public. Not only is it important to understand these components (e.g.,

framing, agenda-setting, style, and rhetoric) individually, but also to understand how these components are relevant in risk communication.

Risk Communication

Risk communication has been defined as "information exchange about health risk caused by environmental, industrial, or agricultural, processes, policies or products among individuals, groups, and institutions" (Glik, 2007 p. 34). *Risk Communication* as a method is used to aid in effective communication in situations of concern, and includes a set of tools and principles to guide the process (Lundgren & McMakin, 2004). Good risk communication practices can be effective in achieving three key objectives, "providing the knowledge needed for informed decision making about risks; building or rebuilding trust among stakeholders; and engaging stakeholders in dialogue" (Covello, Peters, Wojtecki, & Hyde, 2005 p. 383). The importance of risk communication and the complexity and challenge of the task have been generally acknowledged (Bennett, 1999; Covello, et al., 2005; Johnson, 1999; Lundgren & McMakin, 2004; Slovic, 1986).

There are numerous methods of communicating risk to the public, including newsletters, pamphlets, posters, and public service announcements. However, a significant method is through the media (Lundgren & McMakin, 2004). As discussed, a number of factors influence not only if an issue is covered (agenda-setting), but also how that issue is covered by media (framing).

There are many challenges in communicating risk to the public. Regardless of risk messaging, not all members of the public will understand or perceive a risk in the same way (Slovic, 1986, 1987). Most simply, *risk perception* is how a risk is actually understood or perceived by the public generally, or by an individual (Slovic, 1987).

Numerous factors influence how an individual or a society understands or perceives a risk. For example, personal beliefs, trust, the presentation, and framing of risk can all shape risk perception (Bennett, 1999; Covello, et al., 2005; Johnson, 1999; Proortinga & Pidgeon, 2003; Slovic, 1986, 1987).. *Personal beliefs* can affect how an individual perceives a risk, as evidence presented in communications is more likely to be perceived as reliable if it aligns with an individual's beliefs, while evidence in opposition to an individual's beliefs may be perceived as unreliable or wrong (Slovic, 1986). The public or an individual's level of trust of those managing risks can also be integral to how a risk is perceived. For example, mistrust can be associated with a negative public reaction, such as with nuclear power (Proortinga & Pidgeon, 2003).

An individual lacking strong opinions on an issue is more likely to be swayed based on the framing of a risk issue. For example, framing a disaster as the number of people who survived instead of the number who died can elicit a different response from an individual (Kahneman & Tversky, 1984; Slovic, 1986). Moreover, experts and the general public often understand risk differently. Experts are more likely to judge risk based on annual fatalities and more technically, while lay judgments of risk are usually more closely related to other hazard characteristics, such as catastrophic potential (i.e. the potential that a nuclear reaction could explode) (Slovic, 1987; Slovic, Fischoff, & Lichtenstein, 1980).

Risk perception is a complex area of research, and understanding public perceptions of a risk issue is integral in risk communication. The extensive focus groups and/or surveys required to gain an understanding of the public perception of WNV risk

are well beyond the capacity of this project, however, it is important to consider risk perception and the role that the media can play in shaping public perception of risk.

Studies have reviewed the magnitude of a risk issue and the amount of media coverage an issue receives. A study by Frost, et al. (1997) found that there was a substantial difference between the amount of text in print news devoted to a particular cause of death, and the number of attributable deaths. Specifically, tobacco and heart disease were underrepresented in the media when compared to the actual number of deaths, while illicit drug use, car accidents, and toxic agents were over-represented in the media, compared to the actual number of deaths suffered (Frost, Frank, & Maibach, 1997; Nicol, Hurrell, McDowall, Bartlett, & Elmich, 2008). The implication is that, as a reader, it may appear as though more deaths are caused by illicit drug use than actually occur based on the number of times the issue is encountered in the media and the sheer volume of text devoted to the story.

A recent Ryerson Review article by Kiedan (2010), discussed how reporters have covered disease outbreaks, and how over-coverage and the type of coverage can relate to public over-reaction or apathy towards a disease outbreak. The article describes how some journalists acknowledged that while there may have been gaps in their previous reporting with regard to the level of detail included, they are trying to ensure that their current and future articles provide the appropriate context (i.e., number of people who died compared to the number that got sick and recovered) for their articles (Keidan, 2010). Although the idea of accountability is not new, it is important to consider it as it relates to new and emerging infectious diseases and the public perception of risk.

The media play an integral role in communicating risk, and factors such as agenda-setting, news norms and values, framing, and stylistic issues can all shape the way in which a public health risk is communicated to the public. These concepts inform and guide this thesis in an effort to understand how the issues of risk related to WNV were communicated via the *Winnipeg Free Press* in Manitoba. The following section presents previous WNV and media studies, which are used to further inform and guide this research.

West Nile Virus and Media

To date, several studies have been conducted on WNV in the media in North America. Roche (2002) determined the type of information provided by major North American newspapers and magazines in terms of the risk tradeoffs associated with pesticide use and West Nile Encephalitis. The results of the study indicated that the media were generally ineffective in providing information concerning pesticide risks, both alone and in comparison with the risk of West Nile Encephalitis (WNE). It was also found that limited information was provided by the print media regarding the efficacy and/or the economic costs of using pesticides versus the costs of treating WNE (Roche, 2002).

A study by Roche & Muskavitch (2003) was conducted to determine the precision of the risk information about WNV/E provided by North American media. Several levels of information were determined to be relevant for the general public in understanding the risks. Firstly, the way in which the risk was described using qualitative language (e.g., the risk is high or low), whether the use of a numerator (e.g., a total of 5 cases) or a number per population (e.g., 6 in 100, 000 infected or 6 in New York City) was included, and if the risk was compared to another risk (e.g., WNV risk compared to flu risk). Secondly,

the authors studied whether the symptoms of WNV were presented. And finally, they studied whether personal protection measures for WNV were presented by the media. The authors determined that much of the information presented about WNV was at a low level of precision and did not include comparisons to other types of risk. They also found that the media were intermediately successful in presenting information about symptoms, but were less successful in presenting precautionary measures (Roche & Muskavitch, 2003). Although these studies are not replicated in this thesis, some of the key concepts, such as the level of precision of information, information regarding symptoms, personal protection measures, and risk tradeoffs, are included in this analysis.

Yeo, Park and Arabi (2007) conducted a media analysis of three American newspapers (New York Times, New York Post and New York Daily) reviewing news frames and West Nile virus. Their study was conducted as a computer mediated content analysis using clusters and network analysis of words. The authors concluded that the media had framed the articles in two distinct ways, diagnostic and prognostic. The main features of the diagnostic frame were diagnosing the problem and determining blame and causality, while the prognostic frame focused on discussing a proposed solution to the problem. Therefore, this study is relevant in the finding that "not all (of) the news coverage of health risk issues emphasizes the hazardous aspect of the issue" (Yeo, et al., 2007 p.11).

Although not a media study, it is important to acknowledge a survey completed in 2008 by Probe Research Inc., on behalf of Manitoba Health. The research included a telephone survey of 800 Manitobans. Overall, almost all Manitobans (98%) had heard about WNV and 95% knew its main transmission methods, however, there was still a gap

in knowledge related to symptoms. It was also found that the majority of participants did not practice personal protection measures regularly, where less than 16% of participants 'always' wore mosquito repellent and only 24% of participants used mosquito repellent 'more than half of the time'. Broadly, there are still some knowledge gaps surrounding WNV, however, participants did state their desire for more information about specific aspects of WNV (symptom recognition, risk information, etc) (Probe Reserach Inc., 2008). The implication of this study within this research is addressed within the discussion section.

In addition, Decima Research, on behalf of the Public Health Agency of Canada, conducted a study about Canadian perceptions of risk regarding WNV and Lyme disease. This study found that awareness of WNV was high and the majority of participants did not feel they were at a high risk for contracting WNV. A key finding was that "to accept information as credible and a threat or risk as being real, Canadians need to see consistent and regular communications about the issue"(Decima Research, 2006). The implications of this finding in terms of message consistencies and regularity is considered within this work.

Several studies focused on WNV and the media have been conducted to date. These studies were completed using quantitative and computer-assisted methods. The use of both qualitative and quantitative methods in this research, in addition to the concepts of agenda-setting and framing used to inform this work further strengthen and differentiate this study from previous work on WNV and the media. In the following chapter the methods used to conduct this research, including data collection and analysis, are described in detail.

Chapter 4

Methods

Design and Methods

This study has been designed in a case study format, which is a research approach that involves the in-depth study of a particular phenomenon (Blatter, 2008). As case studies are used in a variety of research areas, there has been no clear consensus on the required elements (Blatter, 2008; Creswell, 2003; Stake, 2000). This research adopts the Creswell (2003) definition, which states that a case study is an in-depth exploration of a particular topic within a specified timeline, and generally involves multiple data types (e.g., focus groups and surveys). The aim of this research is to develop an in-depth understanding of the communication of WNV risk issues within Winnipeg, Manitoba using the *Winnipeg Free Press* daily newspaper, news releases from Manitoba Health, and key informant interviews as data sources. Based on these criteria, a case study was considered the most appropriate research design for this project.

This study began with the collection of the *Winnipeg Free Press* articles, followed by the collection of Manitoba Health news releases, and finally key informant interviews were held with some *Winnipeg Free Press* journalists and health officials working in Manitoba Health.

This study includes both quantitative and qualitative components. The quantitative component included a content analysis of the full ten-year dataset, with increased focus on the sample years, while the qualitative component included a nuanced interpretation of the media frames from sample years within the larger newspaper and news release dataset in addition to qualitative interviews. The integration of these

methods adds to the strength of the analysis because emerging patterns could be verified through the different analyses.

The *Winnipeg Free Press* and the *Winnipeg Sun* are the two largest daily newspapers in the Manitoba. The *Winnipeg Free Press* was selected over the *Winnipeg Sun* for a two reasons. Firstly, the *Winnipeg Free Press* has a much larger daily circulation than the *Winnipeg Sun*. According to the Audit Bureau of Circulation, 2010 data show *Winnipeg Free Press* subscriptions are 116,505 Monday to Friday and Saturday subscriptions are 157,409 (Audit Bureau of Circulations, 2010), while the *Winnipeg Sun* prints between 41,000 to 43,000 copies daily (LeBlanc, 2010). It is important to note that only subscription data was available for the *Winnipeg Free Press*, rather than the number of copies printed daily, therefore, the difference between the two papers is likely more substantial. The number of printed copies on Saturday was not available for the *Winnipeg Sun*. Secondly, of the two newspapers, the *Winnipeg Free Press* is the only newspaper available in online searchable databases accessible by the author including Factiva and Canadian Newsstand at the time of data collection. The use of databases are more reliable as articles could be missed if reviewed manually. It is important to note that while some limitations in the use of databases exist due to cataloguing errors, they are more consistent than less automated search strategies. Moreover, the decision was made to focus on newspaper stories instead of also including television transcripts as it has been found elsewhere that "newspaper broadsheets may provide a better measure of media coverage of a risk event than televised coverage" (Driedger, 2007 p.775). In addition, the more comprehensive coverage of risk issues by print media also permits a greater focus on process oriented issues than televised

coverage because of the nature of the different mediums; there is often more space in a newspaper to cover many different types of stories, even on the same topic, than there is time in a televised broadcast that needs to cover many discrete news items (Driedger, 2007).

The *Winnipeg Free Press* data were collected from the Factiva searchable database. All *Winnipeg Free Press* articles from January 1, 1999, through December 31, 2008, were searched using the key word 'mosquito'. WNV was first discovered in North America in 1999, and therefore, 1999 serves as a logical start date for this case study. In order to conduct a longitudinal examination of how the presentation of the risk issues had changed over time, a full ten years of data were collected. It is important to note that this time period includes the identification of WNV in Manitoba (2002) and the season of the highest number of WNV infections identified to date (2007). Low levels of WNV infected mosquitoes were identified in 2009-2010, with only two human cases identified in 2009 and none in 2010 (Manitoba Health, 2009b). Therefore, it is unlikely that new insights would be gained if more than ten years of data were included.

The key word 'mosquito' was used to ensure all mosquito related articles in the context of nuisance mosquitoes and WNV mosquitoes, both individually and combined, were collected. The search term generated a very large data set. Mosquitoes are a common topic of discussion in Manitoba, and as such, the search yielded just shy of 1,600 results. A manual review was completed, and each article was read fully. Articles were excluded if they did not directly discuss WNV or mosquito abatement strategies. Examples of data that were excluded are an article concerning a celebrity coming to Winnipeg, with WNV discussed in a comical way, and an editorial about mosquitoes at

the author's cabin. Articles that discussed mosquito abatement for both WNV and nuisance mosquitoes were included in the initial review (n=576) to allow for a broad understanding of the context of mosquito abatement in Manitoba. Of those articles (n=576), it was determined that all articles that referenced WNV, for a total of 357 articles, would be included in the final data set. Including only articles with WNV content prevented the data set from being skewed by the inclusion of all of the nuisance mosquito articles with no connection to WNV risks. Table 1 includes details of the 357 *Winnipeg Free Press* articles included in this thesis.

Table 1:

Details of *Winnipeg Free Press* Data

Year	Number of Articles	First Article	Last Article
1999	1	October 1, 1999	October 1, 1999
2000	12	May 10, 2000	August 31, 2000
2001	14	March 13, 2001	December 5, 2001
2002	81	April 13, 2002	December 24, 2002
2003	86	January 3, 2003	December 22, 2003
2004	61	January 3, 2004	December 29, 2004
2005	53	March 28, 2005	September 30, 2005
2006	20	April 18, 2006	November 12, 2006
2007	14	April 25, 2007	September 26, 2007
2008	15	April 13, 2008	September 4, 2008

The data used in this thesis were analyzed using *NVivo 8*™ qualitative data analysis and management software (Bazeley, 2007). Each article was formatted individually using headings in *Microsoft Word*™ as required for efficient use of *NVivo*™ capabilities. All 357 *Winnipeg Free Press* articles were formatted and imported into *NVivo*™. Given the total number of articles included it was not feasible for in-depth, nuanced analysis to be conducted on the full data set. The full data set was reviewed to provide a broader context for the case study, and to allow for a presentation of some key aspects of how the issue of WNV was presented over the time period. Following the

review and basic coding of all of the *Winnipeg Free Press* data, sample years were selected for a more in-depth analysis.

Following careful consideration it was determined that the 2002, 2004, and 2007 data would serve as the sample years for the data set. Data from 2002 were selected as it was the year that WNV was discovered in Manitoba (Manitoba Health, 2009b), and consequently, the risk of WNV was made more 'real' to Manitobans. As the starting point for in-depth analysis, the 2002 data allowed for the exploration of how initial messaging surrounding WNV and the use of mosquito abatement programs in the context of WNV were formed. Data from 2004 were selected as the second year for in-depth analysis as it served as a reasonable mid-point in the data set. Although WNV received higher media coverage in 2003 than in 2004, much of the 2003 coverage was similar to that of 2002. The purpose of selecting sample years was to determine how the coverage changed over time. Therefore, following the review of the articles it was determined that the decrease in coverage that occurred in 2004 was worthy of more in-depth analysis to assess if this decrease influenced how WNV risk was being presented and communicated. Finally, the 2007 *Winnipeg Free Press* data were chosen as that year represented the highest number of identified human cases (582) in Manitoba to date (Manitoba Health, 2007b). As 2007 received considerably lower coverage in the *Winnipeg Free Press,* with only 14 articles, it was considered an important year to further explore the changes in the level of coverage despite the increased number of identified human WNV cases. While the 2008 WNV season included one more article than 2007, the WNV season was considerably less severe with only 12 identified human cases, thereby providing less

insight (Manitoba Health, 2009b). A total of 156 *Winnipeg Free Press* articles were analyzed in-depth in an effort to respond to the previously stated research questions.

The second key data type used in this study was the WNV-related news releases created by Manitoba Health. All WNV related news releases were collected from 1999-2008 (n=183). The news releases were freely available from the Manitoba Health website. They were copied and pasted into *Microsoft Word*™ documents, formatted with headings, and imported into *NVivo 8*™. Basic analysis was completed on the full data set of news releases. Focus was placed on the corresponding years of in-depth study of the *Winnipeg Free Press* data, enabling the news releases from 2002 (35), 2004 (20), and 2007 (22) to be analyzed more thoroughly.

Key informants are persons who are particularly knowledgeable about a specific topic (Fetterman, 2008; Patton, 2000). As such, key informant interviews were held with four individuals, two *Winnipeg Free Press* journalists and two Manitoba Health representatives. The interviewees were purposefully sampled based on their involvement in the issues of WNV in Winnipeg. Efforts made to obtain other government representation were unsuccessful. The interviews conducted as part of this thesis were used to provide background information and commentary from the two perspectives (Manitoba Health and journalist) to further inform the research. The interviews were audio recorded, but they were not transcribed as it was determined that the detailed notes taken during the interviews and the additional notes taken while reviewing the recordings provided the required information.

Ethical Considerations

Approval from the University of Manitoba Health Research Ethics Board was received prior to conducting the key informant interviews. In an effort to ensure confidentiality, informants are referenced generally as journalist or Manitoba Health representative. As participants are associated with specific organizations, confidentiality was not guaranteed. (See Appendix A for a copy of the ethics approval certificate)

Analysis

Content analysis is a well-known method of analysis, and has been used for a variety of research purposes (Berger, 1998; Driedger, 2007; Julien, 2008; Menashe & Siegel, 1998; Riffe, Lacy, & Fico, 1998; Wakefield, et al., 2005). Content analysis is a predominantly quantitative method, however, it is an established research method in both qualitative (Ellingson, 2011; Julien, 2008; Patton, 2002) and quantitative research (Krippendorff, 2004; Roche, 2002; Roche & Muskavitch, 2003; Yeo, et al., 2007). A key difference between qualitative and quantitative content analysis is how the coding categories are created. According to Patton (2002), the term content analysis "is used to refer to any qualitative data reduction and sense-making effort that takes a volume of qualitative material and attempts to identify core consistencies and meanings" (p. 453) and is generally conducted using inductive methods, at least in initial review (Patton, 2002). Quantitative content analysis is generally more deductive, where coding categories are generally pre-determined based on the research questions before data collection takes place. Roche (2002) describes a process as applied to one of his studies: "a check sheet [is] designed prior to data collection" and then tested and "fine tuned" using a pilot study (p. 484). Another key difference between qualitative and quantitative content analysis is

that all utterances of selected information are not always treated equally (Driedger, 2007), while in quantitative content analyses it can be (Roche, 2002). In this research, the codes for content categories and frames were developed through an inductive, iterative process of reviewing the data multiple times, reviewing codes as they emerged from the data. Following the inductive identification of content codes, the content codes were then systematically applied focused on the surface meaning of content, also known as manifest content analysis (Krippendorff, 2004). The frame analysis focused on latent content, which is defined as the underlying or implicit meaning behind a text (Krippendorff, 2004), consisted of identifying broader frames and coding the text accordingly. While operational definitions were used in the identification of frames, there was more interpretation involved in examining the rhetoric, metaphors, and emotive language used in the individual media stories. The data were again systematically reviewed and the text coded accordingly.

Coding is a process whereby a selection of text is assigned to a particular *code,* such as a content category or frame. Data can be coded in as many different ways as necessary. For example, a particular selection of text can be coded for its basic content, frame, and tone (Bazeley, 2007). This analysis involved many layers of coding (See Appendix C for a copy of the *NVivo*™ coding tree).

Results from the content analysis are presented in two ways. Firstly, the results of the content analysis, such as the identification of source types, were quantified and are presented in the form of charts. The use of charts to present data allowed for clear support of findings identified early on by the researcher during the inductive iterative analysis. More nuanced and interpretive analysis was conducted to identify the tone of article

content and more complex concepts such as the exploration of the use of frames in the data set. The majority of the nuanced results are discussed using textual examples in lieu of graphical representation of results.

Manitoba Health News Release Analysis

One focus of this thesis was to gain an understanding of how information sources were used by media, and in particular to understand how government messaging was used by journalists at the *Winnipeg Free Press*. In order to analyze how government messaging was used, it was important to first identify the key elements of government messaging as presented through news releases. Following a thorough review, four content categories were determined to be the key areas present in nearly all of the news releases. The content areas identified were: new information, background information, action, and recommendations for the public. The news releases were further explored to ascertain the key personal protection recommendations and how these messages changed over time.

The uptake of Manitoba Health news releases was reviewed by comparing them with the *Winnipeg Free Press* articles to determine if information from the news releases was included in the newspaper. The analysis was conducted through a process of reviewing each news release from the sample data set (2002, 2004, and 2007) and examining the *Winnipeg Free Press* data for an article published the date following the news release. It is important to acknowledge the limitation that only articles from the date following the news release were reviewed. This decision was made on the assumption that if the information of the news release was relevant it would have been included in the following day's paper.

In conducting the analysis to determine the uptake of news releases by the *Winnipeg Free Press*, it was determined that a broad concept of *matching content* would be required to ensure that all possible news release data would be included. A news release and a *Winnipeg Free Press* article were coded as having *matching content* when any similar information, such as the same values of mosquito counts, recommendations for the public, or government action, was included in both the news release and the article. If there were no articles from the date following the news release, or if there was no matching content, the news release was coded as *no matching content.* An important confounding factor is that there were often quotes from press conferences within the same article. The assumption was made that the quotes were used to add personality and colour to articles, while concrete details about the issue were used from the news releases. The assumption of the use of facts from news releases was confirmed by one of the journalist interviewees (Journalist 1, 2010)

Winnipeg Free Press Article Analysis

The full media data set was coded for basic content (manifest content), while the sample data set was coded in a more nuanced method (latent content) building on the initial basic content analysis. The goal of the coding on the full data set was to develop an understanding of the main content areas in the *Winnipeg Free Press*.

The analysis of the structural aspects of the full data set included reviewing word counts and article placement as they related to agenda-setting. In addition, the mean, median, highest, and lowest word counts for each year were calculated. Placement analysis involved categorizing the page numbers of the articles into A1, A, B1, B, and other. Articles on *A1* were on the front page of the newspaper, while the rest of the

articles in the first section, excluding the front page, were coded as *A*. Placement on *B1* was the front page of the City & Business section, while *B* referred to all articles printed in the City & Business section, excluding those on the front page of that section. Front pages of the sections were separated, as these articles were given increased prominence in the newspaper. As few articles were found in other parts of the paper, a generic *other* category was created to capture those instances. An example of an article in the *other* category was one in which there was mention of how to ensure garden water features do not allow for mosquito larva growth. The analysis of the full data set (all of the media articles and news releases) was used to gain a broad understanding of how the WNV risk issues were presented by the *Winnipeg Free Press* across the full time period.

The sample data (2002, 2004, and 2007) were analyzed for many different concepts and frames in a more in-depth fashion expanding on the previously completed analysis of the full data set. Indentifying the tone of an article was an integral part of this interpretive analysis. Each article was reviewed, and the tone of the headline was coded separately from the body of the article. Within in the body of the article, sections of text were coded according to the tone. Leads were coded within the context of the full article. The lead was defined as the first paragraph or four sentences, whichever was longer, in each of the sample set articles. Sections of articles were coded as positive when it could be interpreted as being reassuring or positive in some way, neutral when it was factual or not particularly positive or negative, and negative if it was alarmist or fear-inducing. Although the results of tone were quantified, it is important to acknowledge the interpretive nature of assigning tone. Using headlines as succinct examples of tone, an example of a positive or reassuring headline is "'Worst is behind us' in bug battle

(m)osquito count plunges by half" (Welch, 2002d). An example of a neutral or factual headline is "Wet August kept mosquito crews busy in the city" (Santin, 2002). Examples of negative or alarmist headlines are "Virus deaths moving closer West Nile fatality hits Grand Forks" (Welch, 2002c) and "West Nile threat rises (p)opulation of mosquitoes that carry virus is soaring" (Rabson, 2004a). Some articles presented more than one tone. In these cases, the separate sections of text were assigned different tones as necessary, therefore, some articles are coded with having more than one tone

Frames were identified by reviewing the articles for both explicit (surface meaning or manifest content) and implicit (nuanced interpretation or latent content) ideas and concepts. In the process of the identification and analysis of frames some sections of text were assigned to the various frames based on surface content meaning while in other instances the analysis was far more interpretive and nuanced. The key frames were concepts of *controversy*, *rights and fairness*, *blame*, *uncertainty*, and *risk*.

Content was coded as the frame *controversy* when the article discussed disagreeing points of view on an issue, or during events wrought with controversy. The frame of *rights and fairness* was tied to the use of malathion. This frame focused on individuals or groups cited as expressing concerns that their rights were not being respected, or when the public or the media were expressing their concern over the 'fairness' of a situation. In the case of this frame, the text often used the words 'rights' or 'fair'. *Blame* was an easily identifiable frame in which a person or group was blamed for some kind of action or inaction on an issue The frame of *uncertainty* was mainly identified in the early years of the data set when much was unknown about WNV, and there was still a great deal of uncertainty. Text was coded with the frame of uncertainty

any time there was a lack of clarity in a situation due to a lack of information, or if there were many *unknowns* about an issue.

The *risk* frame was very broad, encompassing several ideas. Content included in this frame pertained to all text where risk-related information was conveyed, such as the number of infections of WNV in mosquitoes or humans, the symptoms of WNV, or ways to minimize or reduce personal risk for both WNV and malathion. To allow for broad comparisons with the previously described Roche and Muskavitch (2003) paper, part of the risk frame was further coded to identify specific types of risk information. According to Roche and Muskavitch (2003) the inclusion of different types of data such a denominator may help readers better understand the risks. Therefore, the articles were analyzed to identify how the risk was described, such as 'high' or 'low', and whether it was described as a numerator (e.g., a total of 5 cases) or if a numerator and denominator (e.g., 6 in 100, 000 infected or 6 in Winnipeg) were included. In addition, the descriptions were analyzed to determine if risk comparisons (e.g., WNV risk compared to flu risk) were included, and if the symptoms of WNV and/or personal protection measures for WNV were presented in the articles. Data included in the *risk* frame in some cases was very clear, such as when the word *risk* was used, however, in some cases, risks were described without the use of the word *risk*. For example, when health risks related to WNV were described as: "Most people – as many as 80 per cent – bitten by a West Nile-infected mosquito will not get sick."(Rabson, 2004b). This statement does not use the word 'risk' but describes the potential health risks in terms of the percentage of those people who are infected by WNV but who are likely to remain asymptomatic. All details

related to risk were coded separately to allow for clarity in the types of risk messaging included in the *Winnipeg Free Press* articles.

All direct and indirect quotes clearly attributed to a source were coded into the appropriate source type category. Direct quotes were clearly identifiable based on the use of quotation marks, while indirect quotes include all instances where a statement like, "Kettner said he wouldn't be surprised if the number of human cases is higher this summer" (Falding, 2004b) In this case the statement is attributed to a specific person, however, it is not a direct quote. A total of seven broad categories were developed, and included academic or specialist, activists, American, general public, government (federal, provincial, and municipal), other provinces, and other.

After source material was coded into broad categories, some were further coded to gain a more in-depth understanding. *Academic or specialist* sources were easily identifiable as sources and were described in the story as being part of an academic institution or as part of a particular research group.

Activist was an umbrella code for those sources cited who were participating in either petitions, blockades, or other types of vocal activity for or against the use of malathion. This source was further coded into two groups, those for the use of malathion and those opposed to its use.

All information from American sources was coded into the *American* code. This text was further coded into whether the source was from government or from the general public. To understand the context in Manitoba it was important to be able to identify sources and articles from contexts outside of Canada.

The *general public* code included individuals who were cited as sources but were not directly related to any kind of activist activity. Individuals who were from a business (e.g., a big-box store) were further identified within the general public code. It was important to further identify employees, as in some cases they were presented as 'experts' in the way they described the general public as being "really worried about WNV" because they had sold out of bug spray at the store.

Any source identified as a government employee or representative was coded as *government.* Sources coded as a *government* source type were further coded into the various levels of government including federal, provincial, and municipal. Federal sources were further sorted into Environment Canada, Health Canada, and federal other. Provincial sources where classified into Health Minister, Manitoba Health (MB WNV Program), and Manitoba other. Municipal sources were sorted into City of Winnipeg and Manitoba municipal (which included all municipalities in Manitoba other than Winnipeg).

The code *other provinces* included any citations to persons or groups from other provinces in Canada. It was important to be able to identify sources from contexts other than Manitoba to enable the identification of coverage from other jurisdictions presented in the *Winnipeg Free Press*. A generic *other* category was created for any miscellaneous sources that were cited in the articles, but not captured within the existing categories. An example of an *other* source is when it was noted that articles were written using information from other *Winnipeg Free Press* journalists.

To better understand how sources were used in shaping stories, they were coded as the first cited or second cited source in an article. Articles were coded as having the

same first and second source when both sources were from the same organization (e.g., two medical officers of health from Manitoba Health). To allow for further insight into the use of sources, article types were identified. Five different types of articles were found column, editorial, human interest article, briefs, and news articles. Identifying article type is important as sources are not used in the same way in all article types (Richard, 2008). For example, often no sources were cited 'In Brief' articles.

As previously discussed, headlines are a key component of newspapers (van Dijk, 1991). The analysis of the headlines included comparing their tone with how it coincided (or not) with the tone of the article leads. Headlines were separated from their associated text when they were coded. The separation of the headlines from the associated articles allowed for the headlines to be analyzed without any potential influence from the associated article.

Key Informant Interviews

The key information interviews conducted as part of this thesis were used to provide background and commentary of the coverage of WNV by the *Winnipeg Free Press*. The interviews were not analyzed in-depth, but rather were reviewed to develop a better understanding of the perspective of each of the interviewees. More specifically, the journalist interviews were reviewed to allow for a more thorough understanding of how decisions were made regarding source selection and aspects related to the inner-workings of print media outlets. For the Manitoba Health representatives the focus was to understand how they communicated their risk messages and how some decisions (such as the use of malathion under a health order) were made. In addition, a large focus of the

interviews with both the journalists and Manitoba Health representatives was to understand their perspectives of the *Winnipeg Free Press* coverage of WNV over time.

Validity

Validity is integral in all types of research. Numerous methods were used in this research to help contribute to the validity of results. In terms of quantitative validity, the definitions of content categories were clear and were applied consistently throughout the analysis. As analysis was conducted using computer software (*Nivo* 8™), the counts used in results are accurate based on the number of times a particular content area was coded within the data

There are numerous established procedures or techniques to ensure validity within qualitative research, such as triangulating multiple data sources, member-checking with participants, memoing, and keeping an audit trail (Creswell, 2003; Whittemore, Chase, & Mandel, 2001). For the purpose of this research, techniques were selected based on their feasibility and appropriateness within this study. In this research the techniques used included keeping an audit trail, memoing, and triangulating multiple data sources and different types of analysis. An audit trail is described as a thorough documentation of all aspects of the research (Rodgers, 2008). In this study an audit trail was used to keep track of decisions related to the selection and analysis of data. The purpose of memos is to keep notes about what the researcher is thinking and learning about in relation to the data (Groenewald, 2008). In this data set, aspects of the audit trail and memos were combined. In terms of triangulation, the results generated by the different data methods (quantitative content analysis of manifest content, qualitative content analysis of latent content informed by framing theory, and the use of purposively sampled qualitative interviews)

were integrated to aid appropriate interpretation of data (Creswell, 2007). Data method triangulation can help protect against the premature closure of analysis (i.e., where analysis ends with a mere description of the data), and serves to direct the researcher to try and disprove emerging patterns (i.e., where efforts are made to constantly challenge what is coming out of the data by seeking alternate explanations) (Creswell, 2007; Farmer, 2006). It is through these combined ways that the credibility of the results and the rigor of the data analysis were met.

Limitations

As with any study, there are important limitations to acknowledge. It is important to note, that although efforts were made to be consistent and thorough, it is possible some text that could have been coded in a potential category or frame could have been missed. Moreover, only one newspaper was included for analysis. The inclusion of multiple news sources would have provided a more developed picture of how risks were presented across different media sources. Furthermore, only four key informant interviews were conducted. Conversations with individuals working in communications at Manitoba Health and with newspaper editors would have been of value. All technical risk information about WNV and the use of malathion was obtained from government (PMRA, Manitoba Health and the City of Winnipeg) and is accepted as truth by this researcher; however, some may disagree with this decision. Assessing the appropriateness of various methods of mosquito control, such as the use of malathion and associated risks, is well beyond the scope of this research. In comparing Manitoba Health news releases to the *Winnipeg Free Press* articles, only articles from the day following the news release were reviewed. Therefore, any future articles using news release data

were not considered. Finally, only one individual coded the data, however, triangulation with self-reported Manitoba Health and journalistic assessments, and in some instances discussions with fellow researchers, ensured relevancy and accuracy. Efforts were made to be as consistent as possible and much of the coding was reviewed for consistency, with changes made where necessary.

The purpose of this case study was to explore how the risks of, and related to West Nile virus were presented to the public via the *Winnipeg Free Press*, therefore, the use of Factiva searchable database allowed for a very thorough search and collection of all of the relevant *Winnipeg Free Press* articles. The complex analysis completed on both the *Winnipeg Free Press* articles and the Manitoba Health news releases, as described in this chapter, provided the results relevant to enable a response to the previously stated research questions. The results of the analysis completed for this thesis are presented in the following chapter.

Chapter 5

Results

The in-depth analysis completed for this thesis yielded a great number of results, the most relevant of which are presented in this section. The specific set of data included in the results (i.e., full data set, sample data set, and/or news releases) is clarified section by section, with some comments from the interviews intertwined. The values and structural results of the manifest content analysis are presented first, forming the basis for the latent analysis results that follow, and concluding with a summary of comments from the key informant interviews.

Volume of Coverage: Number, Placement, and Length

The volume of WNV-related coverage changed dramatically over the study period. Figure 1 illustrates that the coverage of West Nile was not aligned with the number of identified human cases.

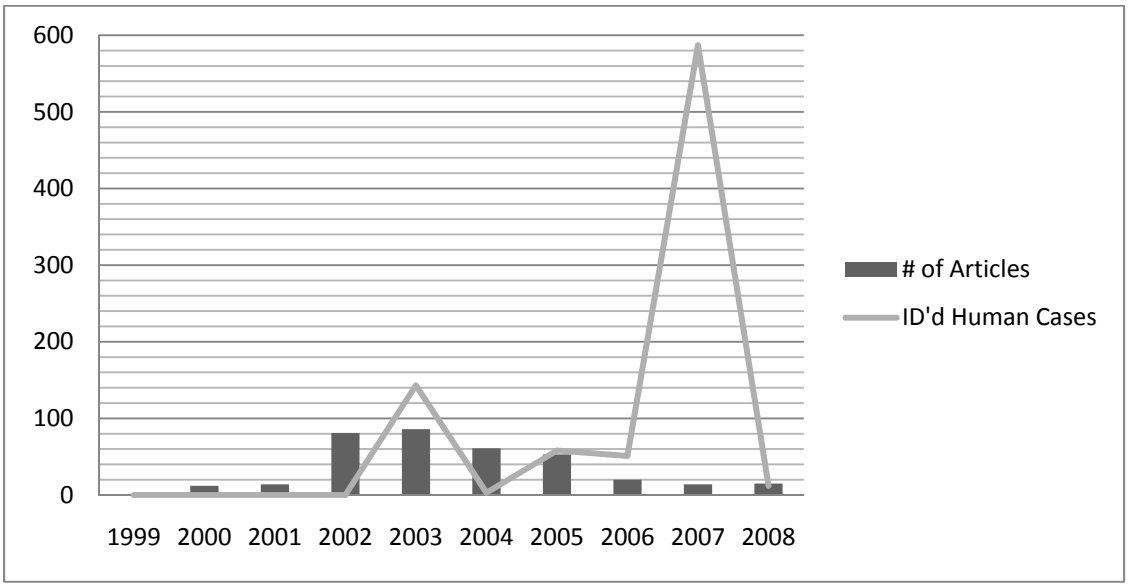

Figure 1: Volume of *Winnipeg Free Press* Coverage and Identified Human WNV Cases

The second highest number of media articles of this data set occurred in 2002, yet there were no identified human WNV cases that year. The main topics of this high level of coverage were the initial discovery of WNV in Manitoba and the first implementation of a health order for spraying malathion within the City of Winnipeg without observing the buffer zones. The controversy, protests, and politics that ensued provided the content for a number of articles in 2002. There were 143 identified human cases of WNV in Manitoba in 2003. The coverage that year included a number of articles about the virus, the first human cases, and infection rates in Manitoba, Canada and United States . While the highest number of identified WNV human cases occurred in 2007 (582), the number of articles that year (14) was the lowest since 2001. The change in the coverage of the issue of WNV exhibits the agenda-setting function of the media whereby despite increased identified human WNV cases there was decreased coverage of the issue over time. One government representative commented on the fact that WNV was not receiving the same coverage as it had previously, and felt that the basic messages were not being covered as well as they had been in the past (Manitoba Health Representative 2, 2009).

Article Placement

Article placement within a newspaper is one indication of the media's role in agenda-setting. In this section, the results of where articles were placed within the newspaper are presented. As illustrated in Figure 2, there were clear changes in the placement of the articles over the time period. The highest frequency of front-page news, including both front page and front section coverage, occurred in 2002 (74). Notably, 2003 and 2005 also had high numbers of front section articles, 47 and 32 articles respectively. The highest number of articles in section B (32), the City & Business section, occurred in

2004, although there was a substantial variation of article placement in 2004. Articles from 2006-2008 were spread across the placements with more articles in the front section (7, 5, 7) than the other sections, although not as front page news.

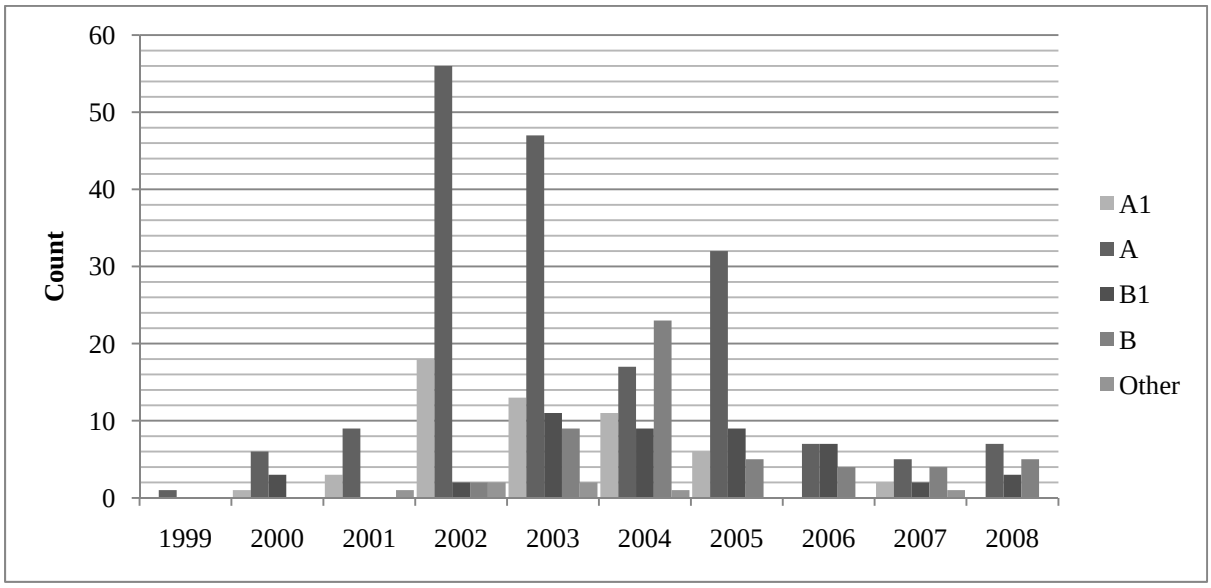

Figure 2: Placement of Articles by Year

Figure 2 further illustrates not only the decrease in coverage over time, but also the decrease in the prominence of the coverage over time. These decreases are linked to news norms as well as agenda-setting based on editorial decisions as to the relevance and importance of the articles. More specifically, in addition to the decrease in WNV related coverage, the articles that were included were given decreased prominence as they were placed further from the front page of the newspaper.

Length

The length of the articles is important to consider as it relates to agenda-setting in terms of the amount of coverage an issue receives. The length of these articles varied both within each year and across the ten years of data. The results presented in Table 2 include

the lowest, highest, average, and median word counts for the 357 articles printed from 1999-2008.

Table 2:

Word Counts of Articles

Measure	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Lowest	462	207	141	102	142	172	151	214	197	96
Highest	462	898	965	1398	3908	1050	2388	2421	1138	3479
Average	462	480	510	665	590	549	605	660	470	530
Median	462	455	466	603	501	505	525	601	419	339

The lowest number of words for an article (96) was found in 2008, while the highest was 3,908 words in 2003. The lowest number of words for each year is likely to be an 'In Brief' type of article, which presents a very short summary of an issue, while the highest word count articles are various in-depth pieces.

Although there is some dissimilarity in the average number of words per article across the time period, it is relatively steady overall. Nonetheless, given the high variability among the number of words per article within each year, the average may be misleading. Median values are included in Table 2 to provide context for the average word counts. In general, the averages and the medians are similar, with the exception of 2008. It was an exceptional year as the lowest number of words per article was 96, while the highest was 3,479. Given the limited number articles (15) in 2008, the average was skewed by one exceptionally long article.

Considering both the mean and median number of words per article it can be said that there is a low level of dissimilarity across the number of words per articles. There are limited differences across the data set in the average word counts per article. It can be inferred from the limited change in article length that while occurrence of coverage

decreased over time, a similar dedication in terms of agenda-setting remained based on the amount of text space made available for WNV coverage despite the decrease in coverage overall and the change in placement of articles. More specifically these results demonstrate that despite decreases in coverage and placement, there was not a change in the types of articles included, for example a change to solely in brief types of coverage.

Headlines

Headlines are an integral part of print media, and as such, require specific analysis. Only the *Winnipeg Free Press* sample data set is used in this section. It was found that more than half of the headlines (54%) had a negative or alarmist tone, while 38% were neutral, and only 8% of headlines were interpreted as positive. As headlines are often written by an editor and not the authors themselves, it is important to compare the tone of the headline to the tone of the article. As many articles included more than one tone, the tone of the lead was used as the comparison. As Figure 3 demonstrates, there were more negative toned headlines (24%) than associated content. The comparison between the headline and the lead is not meant to be all-encompassing, but rather, to demonstrate that headlines, when read independently of the articles, frequently have a more negative or alarmist tone than the article content.

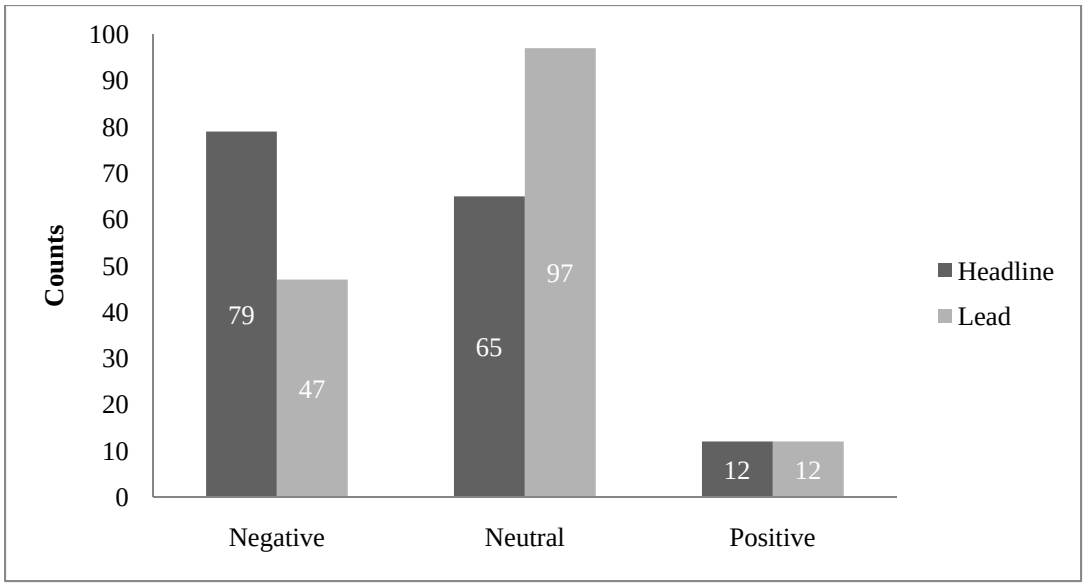

Figure 3: Tone of Headlines Compared with Tone of the Lead of Articles

The sense of mismatch between headlines and content was also commented on by one of the Manitoba Health interviewees stating that government was "usually less than happy with the headline", but found that the content of the articles was generally accurate (Manitoba Health Representative 1, 2009).

It is not only the tone of the headlines, but also the types of words used in headlines and in text that may affect the presentation of a risk issue. An example is the word usage in the headline "Lurking West Nile mosquitoes still a threat" (Falding, 2004a). The use of the word *lurking* implies that the mosquitoes are intentionally *lying in wait* to *attack innocent* people. Using the headline 'West Nile mosquitoes still a threat', would also be negative, however, it would not carry the additional negativity that is suggested by a word such as *lurking*. The use of alliteration in the title "Bug blitz blasted Sneak fogging attack enrages Wolseley" (Welch, Rabson, & Hendry, 2002), also adds a different connotation of negativity. It is important to acknowledge that the use of the words *blitz* and *attack* and the metaphorical connotations of war that these types of words carry.

Metaphors

A number of different metaphors were used in the *Winnipeg Free Press* sample data, however, by far the most common was *war*. On a number of occasions, the city was *at war*, *attacking* the mosquitoes, in an attempt to *defend* the public from the *enemy* mosquito. In one instance, when protesters were blocking trucks that were to spray malathion, the situation was described as "it's becoming neighbour versus neighbour" in "(w)hat's rapidly approaching a civil war over anti-mosquito fogging" (Martin, 2002). Similarly, the war metaphor took on a 'frontline' position describing "Winnipeg's bug-fighting brigade" (Welch, 2002d).

Table 3 documents the number of times words related to concepts of war were used in the sample data. As can be discerned from the table, numerous words with connotations of war were used. In total these *words of war* were used 733 times in the 156 articles included in the sample data.

Words like *attack*, *battle*, and *combat* have very clear connotations of war. These types of words were often used to describe the *us* (people) versus *them* (mosquitoes) war rhetoric where people were required to *attack* the mosquitoes and win the *war*. Another key element of the metaphor of war is that there is a *winner* and *loser*. Some years the war was won, while others years, when there were high numbers of mosquitoes, the war on mosquitoes was lost, and the mosquitoes *won* the war.

Table 3:

Words of War

Word	Number of Times Used
die, died, deadly, death, dead, fatal	301
control	220
kill, kills, killing, killed	107
battle, combat	35
attack	26
fight, fighting	26
war	18

The use of a metaphor of war in the context of mosquito control is not particularly surprising as it is a clear way to describe the efforts of the city and the province to decrease mosquito populations. Furthermore, the issue of opposing sides of the malathion debate also lends itself to a metaphor of war. Although individuals may not be acutely aware of this issue being described in the context of war, as it is an engrained way of thinking about the 'us' and 'them' in the mosquito context, it is relevant as it relates to shaping the issue of WNV risk from mosquitoes.

Major Frames and Issues

Description of West Nile virus risks are not straight forward, but rather are intertwined with other events and issues. This section presents the key frames and issues, including how the actual issue of risk was articulated and the description of the coverage of personal protection measures. Multiple frames were present throughout the *Winnipeg Free Press* data, including controversy, rights and fairness, blame, uncertainty, and risk. The results in this section include the *Winnipeg Free Press* sample data set only.

The frame of *controversy* in this case study is both an overarching frame and a focus of much of the content of the coverage in relation to WNV. The first and main issue of *controversy* in this case study is the use of malathion as a method to reduce mosquito populations, especially during a health order when buffer zones are not observed. Malathion use is presented as a controversial issue and is, in fact, described as "the controversial chemical malathion" (Falding, 2004d), alluding to the relevance of this frame in these data.

The primary issue of *controversy* is the conflict between two opposing groups of citizens: (1) those who are in favour of the use of malathion and feel the risks related to WNV exceed any potential risks from malathion, and (2) those who are opposed to the use of malathion under any circumstances and feel that risks related to WNV are low and do not exceed the risks posed by using malathion. A particular incident in 2002 was laden with controversy. During the first enforcement of a health order to spray malathion for the entire city of Winnipeg without observing buffer zones, a series of blockades and protests were established in the neighbourhood of Wolseley (Welch, 2002a). The situation was described in one article where "(a)bout 50 activists donned gas masks and bandanas and biked or walked around the neighbourhood hoping to intercept the four trucks on fog patrol and force them out of Wolseley" (Welch, 2002a).

Following several attempts to spray with the usual notifications by the city and the province (courtesy updates of which areas of the city will be sprayed that night), and failures to do so as a result of blockades and protests, the city opted to spray the neighbourhood without releasing a courtesy announcement. Based on this incident, the

province and the city were accused of a ‘sneak attack’ on Wolseley (Reynolds, 2002; Welch, et al., 2002).

This incident garnered a great deal of media attention. There were articles supporting both sides of the issue, those opposed to as well as those in favour of the way in which Wolseley was sprayed. One columnist began her article positioning herself in favour of the use of malathion, however, critiqued the city stating that they “lied by omission” by not clarifying where they would be ‘fogging’ that evening. Moreover, the decision to spray “not only wouldn’t allow Wolseley residents to protest but also prevented them from closing their windows against the bug poison”. She further indicated that “(a)gainst my general nature, I feel sorry not only for the people with legitimate illness but for those would simply would rather not be sprayed in their beds” (Reynolds, 2002).

In favour of the spraying, one city councilor (Peter De Smedt) was quoted, “Did they suspect the city was going to call and say, ‘OK, put up the barricades, we’re coming’?”(Welch, et al., 2002). This was a significant incident for many where “Outraged Wolseley residents say yesterday’s covert pesticide blitz of their neighbourhood at 3 a.m. was a cowardly act that breached the public trust.”(Welch, et al., 2002). In an interview with a Manitoba Health representative, there was explicit commentary about the importance of the role of trust in communication with the public, as well as the importance of trying to maintain trust, however, no specific question about this incident was asked by the researcher (Manitoba Health Representative 1, 2009). This incident triggered a great deal of controversy, as one general idea through this particular

incident was that many residents felt betrayed by the lack of notification to which they were accustomed.

This same incident of controversy overlaps with the frame of *blame*, which was a relatively minor frame in this data set. The blame frame was clearly articulated in the above incident where in the majority of articles the city and province were blamed for not following the usual notification pattern. One editorial presented the opinion that had the protesters not interrupted the malathion spraying, it would have occurred on a night when normal notifications were given allowing the public the opportunity to close their windows (Editorial Staff, 2002). This position on the issue was in the minority.

The particular issue of controversy where the use of malathion, both as method to reduce WNV risk generally and more specifically in the 'sneak attack', is a key component of the *rights and fairness* frame. Although the *rights and fairness* frame was not quite as common as the controversy frame, the two frames often overlapped. The manner in which the *rights and fairness* frame is discussed in this data focuses on voluntary versus involuntary exposure to malathion. The majority of the general public were not outspoken for or against the use of the health order legislation. However, as previously described, there were two vocal groups of citizens. Based on the media coverage, one group holds the position that removing their choice to control their pesticide exposure and being involuntarily sprayed with malathion infringes on their rights as citizens. Additionally, previously less vocal residents joined this group after they felt their rights and ideas of fairness had been ignored following the 'sneak attack' incident. By contrast, the group of vocal residents in favour of the use of malathion felt that their rights were impeded when their community was not sprayed with malathion due

to the protests, as health orders are carried out in the interest of public health. This frame of *rights and fairness* in relation to the use of malathion is a prevailing concept, particularly in relation to the use of the health orders (Reynolds, 2002; Welch, 2002a; Welch, et al., 2002).

A second issue of *controversy* that received surprisingly little coverage occurred when it was announced that the former lead entomologist with the city was no longer going to be in that position. The exact reasoning for his departure was not revealed, however, it was portrayed as though it was under suspicious circumstances. It was mentioned that it may have been related to "his management style and practices" and that it was an "audit that led to Gadawski's departure" (Welch, 2004a), but that he left as a result of a "mutual agreement" with the city (Welch, 2004a). It was surprising that this did not receive more coverage, as until his departure this particular individual was frequently cited by media. This issue was intertwined with frames of *controversy* and *blame*. In terms of *blame*, it was not clear who was at fault or why the reasoning behind his departure was not made public. This was an interesting event particularly because it was a very short lived story with only a few articles commenting on the issue even though it had to do with the previous year's "Civic hero" (Welch, 2004a), due to his role in nuisance mosquito control within the City of Winnipeg.

The arrival of West Nile virus to Manitoba was considered to be inevitable by many, particularly those in Public Health. However, the where, how, and when were still very uncertain prior to its arrival. The *uncertainty* frame was identified in a number of the *Winnipeg Free Press* articles. Shortly after WNV was discovered in Manitoba the concept of uncertainty was shared by government: "The concern is because there is some

uncertainty," Kettner said. "We don't know if our experience will be the same as elsewhere or not." (Rabson, 2002)

As WNV continued to return annually the level of uncertainly decreased but it did not disappear, as echoed in the statement, "The province's scientists say they can't yet predict whether West Nile will be a greater threat than last summer, when it claimed the lives of two Manitobans" (Welch, 2004b). By 2007, many issues of *uncertainty* had further diminished. Although the *uncertainty* frame was not employed a great deal following the annual reoccurrence of WNV, it was relevant to the construction of the WNV risk issue.

Descriptions of West Nile Virus Risk

A key part of understanding how this risk issue was communicated is to explore the methods used to describe the risks. In numerous articles, the overarching frame is risk regardless of whether or not the word *risk* was actually used. The concepts of risk are woven throughout the articles, overlapping with the frames of controversy, blame, and uncertainty. The results presented in this section include the *Winnipeg Free Press* sample data.

Figure 4 demonstrates how often the issue of risk is discussed in comparison to the number of articles. In Figure 3, each article containing risk information is counted only once regardless of how many different types of risk information were included. The percentage of articles containing risk information was 80% in 2002, 85% in 2004 and 92% in 2007. There was an increase in the percentage of articles containing information about risk over the time period. This could be indicative of an editorial commitment to ensuring that a reminder of WNV risk is included in an article regardless of the focus of

the article (e.g., discussing WNV risk issues in the context of an article focused on nuisance mosquitoes).

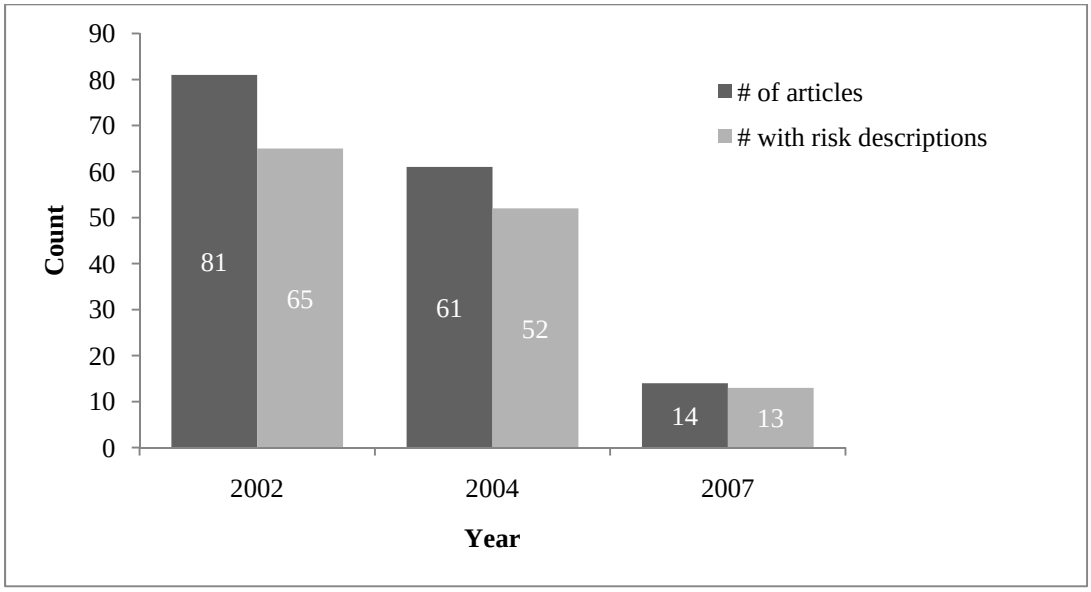

Figure 4: Number of Articles by Year Compared with the Number of Articles with Descriptions of Risk

In Figure 5 the number of occurrences where WNV risk is discussed is presented by the tone in which risk issues were discussed. The values total much more than the number of articles for each year, as risk was often discussed more than once per article and often in a different tone. Therefore, Figure 5 demonstrates that *risks* were discussed 71 times within the articles from 2004, and that in 18 (14%) of those instances, the discussion was in a negative tone. In the initial stages of the discovery of WNV in Manitoba (2002) there were 34 (33%) instances of coverage about issues of risk that were negative or alarmist. The presentation of risk issues of WNV and/or malathion risk in a negative tone decreased over the time period, while the level of neutral or factual coverage increased. This finding demonstrates a shift in the coverage of WNV from more

negative initially to more neutral or factual coverage over time. This finding is not overwhelmingly surprising considering the decrease in controversy surrounding WNV.

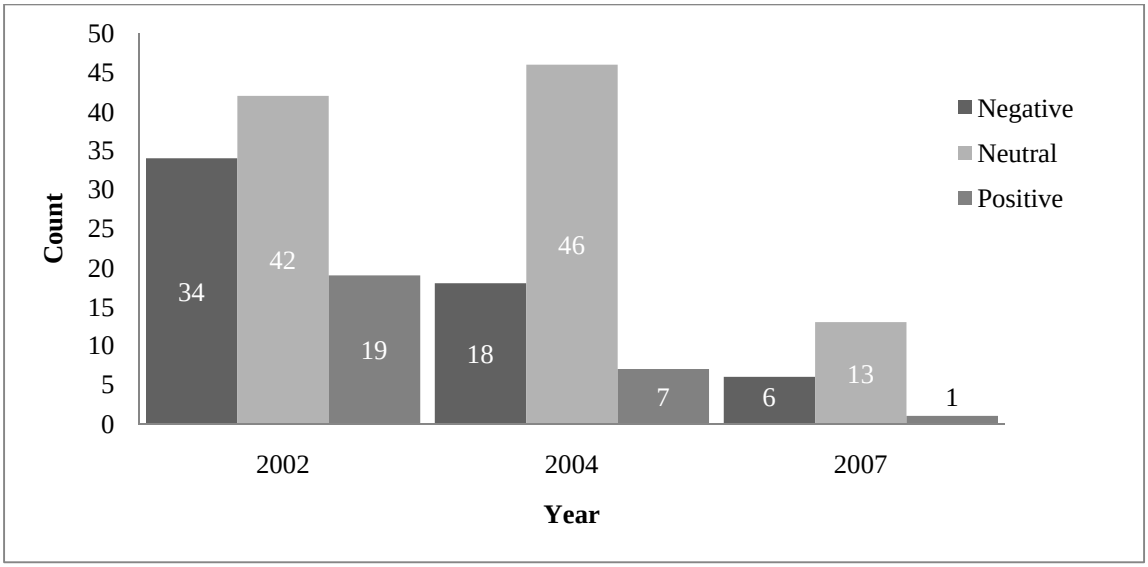

Figure 5: Tone of Descriptions of Risk

It is important to present not only basic figures of how risk issues were discussed, but also concrete examples of discussions of risk. An example of the discussion of risk from an official during the pre-WNV discovery time period is from a press conference in response to WNV in the United States, where the official is cited as saying "'What I'm hoping is this will make people sit up, but not bring them so far to their feet that they fall over,' he said. 'It's not a cause for panic or alarm.'" (Rabson, 2002). This is an example of a positive or reassuring description of risk as it focuses on how people should pay attention without being overly concerned. It also uses a metaphor that may help some people understand and relate to the risk issue.

In later years the risk is described as:

> While the virus is taken seriously, officials advise the public not to panic. More than 99 per cent of mosquitoes in Manitoba don't carry the virus. For every one person who gets sick from the virus, there are another 100 to 150 people who get bitten by an infected mosquito but display no symptoms. Of people who display

symptoms, the vast majority are no stronger than a mild flu.
(Welch, 2004b)

Instances where the discussions of risk were coded as negative include the numerous occasions in which the virus is described as the "potentially deadly virus" (Anthony, 2002). Although this description is inherently factual, it adds a level of alarm concerning the virus.

To further understand how risks of WNV were communicated, an analysis was conducted to discern the level of detail in which the risks were described. This analysis involved identifying phrases, exploring whether or not numerators or numerators and denominators, information on symptoms, and/or recommendations for personal protection were used, as per Roche and Muskavitch (2003). It is important to note that the values presented in Figure 6 total more than the number of articles included in the sample set (n=156), as risk was often described in more than one way and contained more than one type of information in an article.

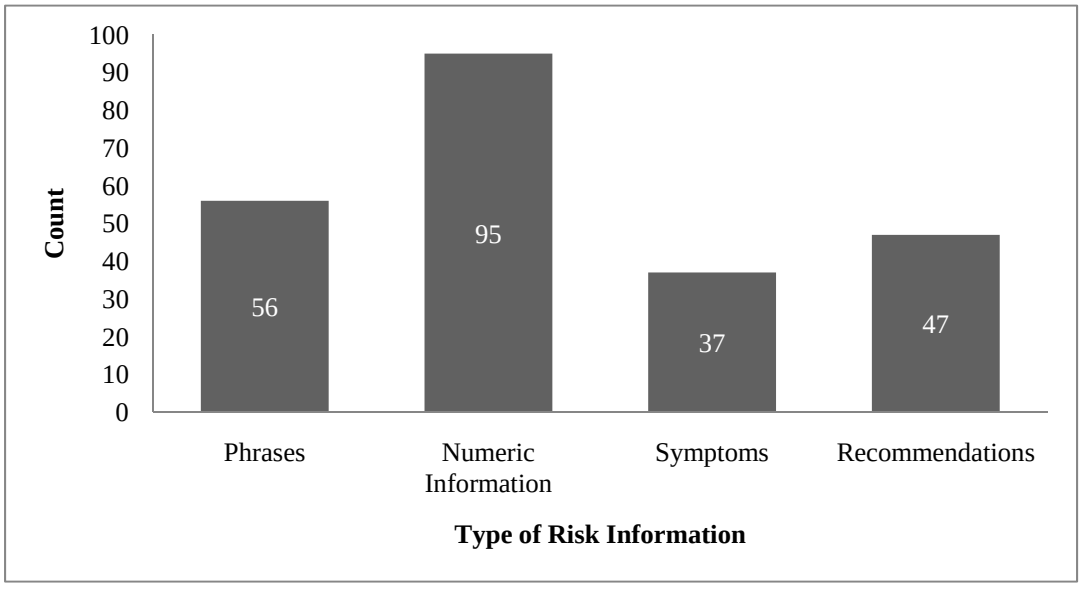

Figure 6: Details of Risk Information Presented

In total, 56 of the sample articles included a description of risk using a phrase, for example, “The risk of becoming ill from West Nile virus is low but is expected to increase in the coming weeks.” (Staff Reporter, 2007). Numeric information was used in 95 of the sample set articles. In many cases a denominator of some type was included, for example, “In the last week, 17 more Manitobans tested positive for West Nile virus – bringing the total number of positive test results to 42 this year.” (Hinds, 2007). In this example it is clear that in total 42 people in all of Manitoba had been identified as positive for WNV. Although no numerical denominator (e.g., number of Manitoba residents) is included, the use of the word Manitoba may help put the risk in context for some readers. In total, 37 of the articles included information about symptoms and 47 contained recommendations about personal protection measures.

More than one of the above-mentioned details about risk was often included in the same article. For example, an article could include a phrase about risk from someone at Manitoba Health, followed by the number of new human cases, recommendations for personal protection measures, and a list of symptoms that the public should consider. The highest level of overlap of any two messages occurred in 36 of the articles, in which both messages containing numbers in reference to the risk as well as phrases about risk were included in the same articles[6].

Descriptions of Malathion

As described, the use of malathion is a contentious topic in Manitoba with vocal groups of citizens both for and against its use. There are many factors related to this issue,

[6] See Appendix D for further details.

including the previously described frames of controversy and rights and fairness. In this section the results include the *Winnipeg Free Press* sample data (n=156).

The word *malathion* is used 233 times, *fog* is used 62 times, *fogging* 451 times, and *fogged* 75 times. Therefore, words related to malathion use were used a total 821 times in the 156 articles in the sample data set. Often more than one term was used to discuss malathion use in an article. There is a technical difference between spraying *malathion* and *fogging*, however, the terms are used interchangeably within the articles. Although the issues of malathion use may not be the focus of all of the articles, it is mentioned in some way in the majority of them, contributing to the overall discussion of West Nile virus, as demonstrated in Figure 7.

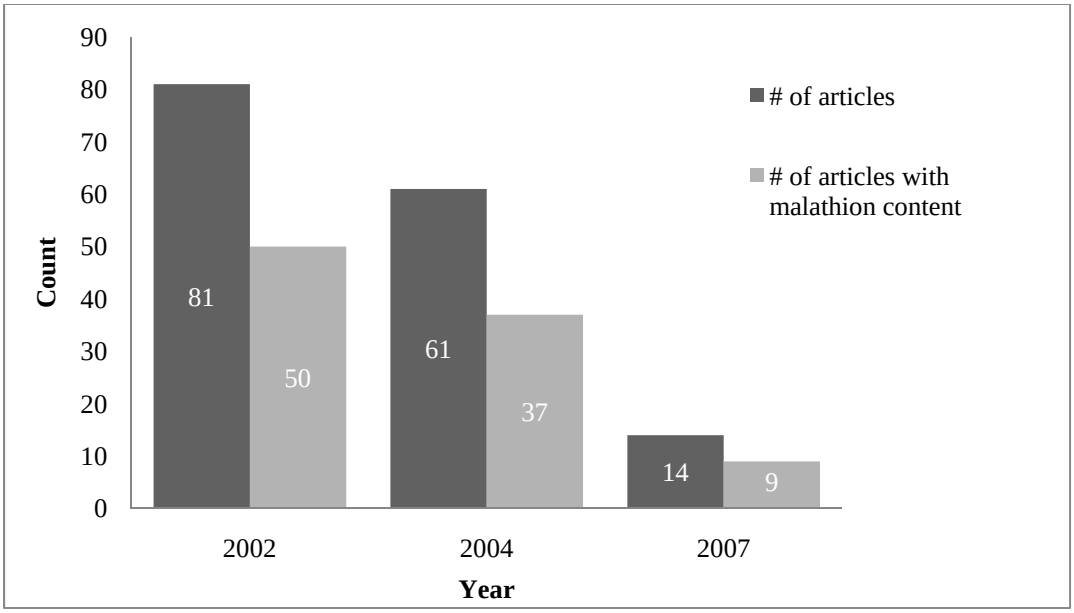

Figure 7: Total Number of Articles by Year Compared with the Number of Articles with Malathion Content

Figure 7 illustrates the number of articles that used the words malathion, fog, fogging, or fogged. Regardless of the number of times any combination of these words was used within an article, this figure includes each article only once. The proportion of articles with discussions of malathion ranges from 61-64% from 2002 to 2007. The

minimal change over the time period demonstrates that the use of malathion was of ongoing news value in this context. Nonetheless, the tone of the discussions of malathion changed over time as demonstrated in Figure 8. The tone of the coverage varied in 2002 and 2004, however, by 2007 the vast majority of the coverage was neutral or factual.

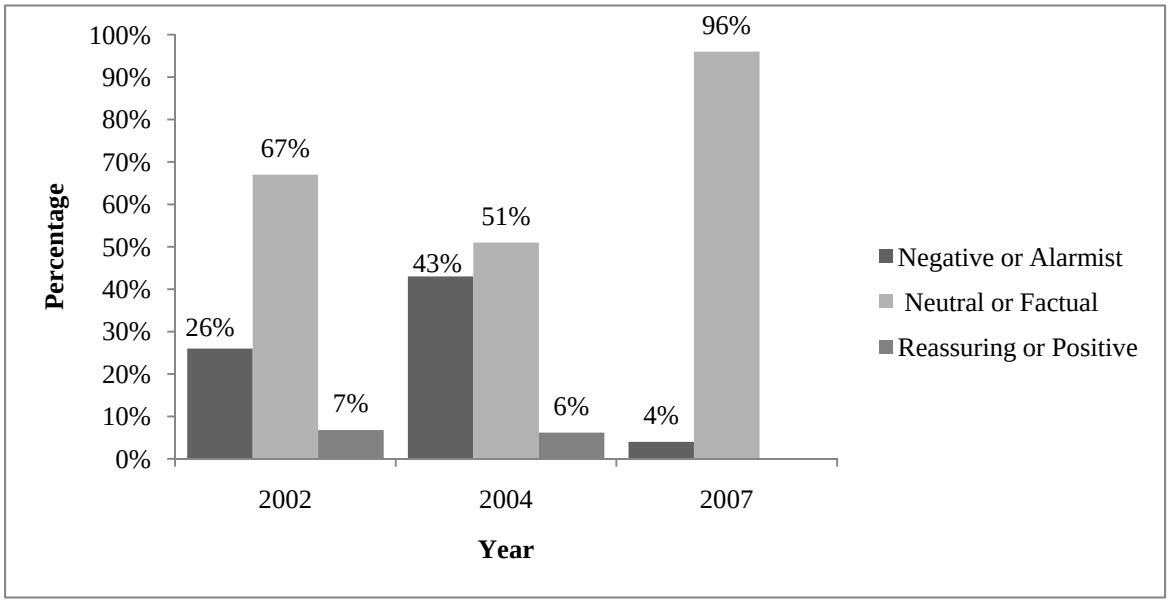

Figure 8: Tone of the Text Where Malathion was Mentioned

In most cases when the topic of malathion was in the newspaper it was for one of two reasons. Most often, coverage began based on an announcement that the city or the province was going to be using malathion, followed by coverage related to the controversy, and conflict surrounding the use of malathion. There are a few exceptions, one exception occurred in 2002 when an in-depth article on malathion was published (Welch, 2002b). Other exceptions followed the reevaluation of malathion by the PMRA in 2004 when there was some renewed commentary about malathion. The majority of the coverage related to malathion was focused on the controversy surrounding its use in mosquito abatement.

Risk Tradeoffs: Presentations of West Nile Virus and Malathion in the Media

In some cases the risks of WNV versus the use of malathion are presented as a risk tradeoff. This section includes the *Winnipeg Free Press* sample set data from 2002, 2004 and 2007. As previously described, those opposed to the use of malathion hold the position that the risks associated with the use of malathion exceed WNV risks, and therefore, malathion should not be used.

By contrast, the position of the provincial government (Manitoba Health), in agreement with that of the PMRA, is that when used properly for mosquito abatement malathion does not pose a health concern, and therefore, it is not a 'risk tradeoff' situation. Although this position is discernable in the media articles, it is not overwhelmingly clear. Rather, the issue is vaguely presented as, malathion is a method available to reduce WNV risk, and therefore, it will be used when deemed necessary. There is limited discussion from the provincial government position about the use of malathion.

Figure 9 illustrates the high level of overlap between descriptions of WNV risk and discussions of malathion. The overlap of discussions ranges from 49% in 2002 to 57% in 2007. In some articles the two issues are discussed as risk tradeoffs, while others may begin with a discussion of the use of malathion for nuisance mosquito control and end with a reminder about WNV risk.

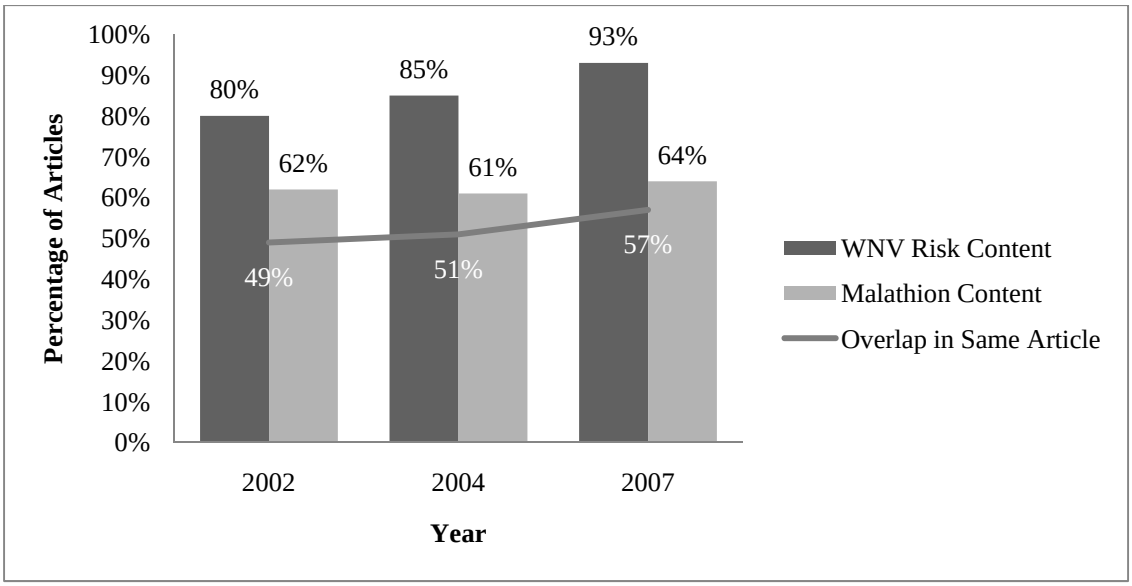

Figure 9: Percentage of Articles with WNV Risk Content Compared to the Percentage of Articles with Malathion Content.

The main issues surrounding WNV risks and the use of malathion are summed up well in one article, which stated that:

> Some residents of Wolseley object to malathion because they say it causes cancer, damages immune systems and harms those with chemical sensitivities. Pro-fogging residents say they are more worried about West Nile virus which is transmitted by mosquitoes, than any questionable effects from low doses of the pesticide. (Welch, 2002a).

In some instances WNV risk and the use of malathion are explained within the context of legislation. One resident is cited as stating:

> Our province has passed a law saying fogging had to be done because it's a health issue. The city is upholding that law by doing the fogging...The fact of the matter is that we live in a democracy. The majority rules I want my street fogged. (Owen, 2002)

The use of malathion for nuisance mosquitoes management is not often treated separately from when it is used under a health order by the province. These issues are often deeply intertwined. For example: "I'm sick of mosquitoes and angry that a handful of advocates could hold part of the city hostage. The threat of West Nile virus, no matter how remote,

was the final straw" (Reynolds, 2002). In the previous example, the author shares her intertwined frustrations of the high level of nuisance mosquitoes as a result of an area not being sprayed with malathion due to the activists, and how a change in the role of the mosquito from nuisance to potential health risk alters the role of malathion as well.

In another example, in an effort to clarify the use of malathion, one journalist wrote: "What's the difference between nuisance-mosquito fogging and West Nile fogging? Nothing, except that West Nile fogging does not respect malathion-free buffer zones." (Kives, 2007). Initially, WNV and the use of malathion, and the different roles of malathion used for nuisance mosquito control and when it was used under a health order were not always clear, however, the issue was discussed with more clarity in subsequent media coverage.

How Information Sources were Used in the *Winnipeg Free Press*

As previously described, the types of sources and the order in which they were used relate to the way a risk issue is communicated by media. These results include the *Winnipeg Free Press* sample data set. In total, 137 of the 156, or 88% of the sample set articles, included at least one type of source.

The categories of sources used in the sample data set include academic or specialist, activists, American, general public, government (federal, provincial and municipal), other provinces, and other. Figure 10 demonstrates the number of times the different source types are used. There is a distinct difference is usage of different source types.

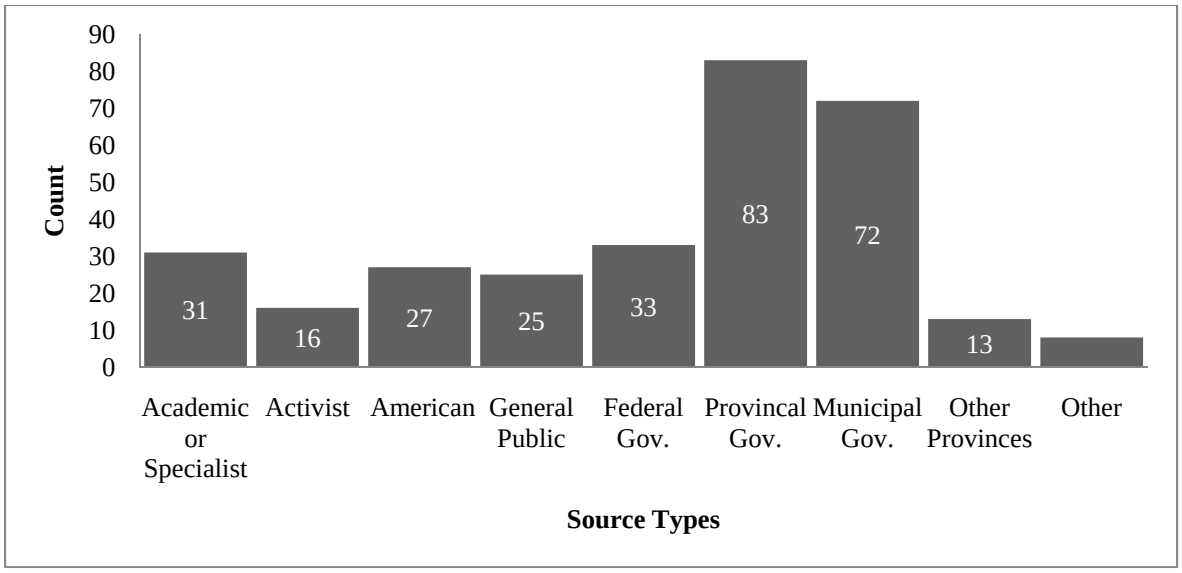

Figure 10: Presence of Source Type in Article

The levels of government individually are the top three most commonly used source types in this data, and therefore, government as a whole is the most commonly cited source type. It is important to reiterate that each level of government cited represents different roles and responsibilities. In this case, the municipal level of government generally represents discussions of nuisance mosquitoes. The provincial level of government represents health, or more specifically Manitoba Health and its responsibility for issues related to health within the province. The majority of federal citations represent Health Canada, with a focus on lab results from the federal virology lab in Winnipeg, as well as some information from the federal level about the status of WNV issues in other provinces. It is important to note that there is overlap with some individuals from the city as they are also part of the provincial WNV team, and therefore, there are some instances where City of Winnipeg references do not represent nuisance mosquitoes. For the purpose of these results, further clarification of the types of sources

from the City of Winnipeg for example, such as whether a source was a city councilor or part of the Insect Control Branch will not be further explored here.

Following the high usage of government as sources are the academic or specialist-type sources. These sources were generally used to provide more information about a topic, or in some instances, as another opinion about an issue. This is followed by sources of the general public, American, and the activists. The general public is often cited to the opinion of general citizens. In some cases, people who worked at various stores were cited discussing their sales of items such as mosquito repellent or fogging machines. American sources were used to provide more removed commentary about the situation in Manitoba, and also to discuss the status of WNV in the United States. Although activists were not cited as often as other source types, their comments were frequently quite memorable.

Figure 11 demonstrates the frequency of use of a source type as a percentage of all of the source types used per year. The percentage of source use allows for a clear demonstration of the distribution of the use of sources in each year. While a variety of source types were used in 2002, the provincial and municipal sources were used most often representing 27% and 23% of all source types, respectively. Of note is the change in proportion of the use of activist sources across the time period where there was a dramatic change from nearly 10% of all source use in 2002 to zero in 2007. This change was related to the activist reaction to the use of malathion under a health order for the first time in 2002, and the surrounding controversy, of which there was still some in 2004, but by 2007 there was no coverage involving the activists due to the decreased controversy over time. These results support the normalization of WNV in Manitoba and

the increased reliance on government sources in comparison to a reliance on other source types. In effect, while activist sources may have helped to drive part of the agenda by contributing to the newsworthiness of WNV and malathion controversy when WNV was a novel risk, the greater reliance on government sources over the length of the time period shows that media reliance on these sources helped to contribute to the normalization of the risk.

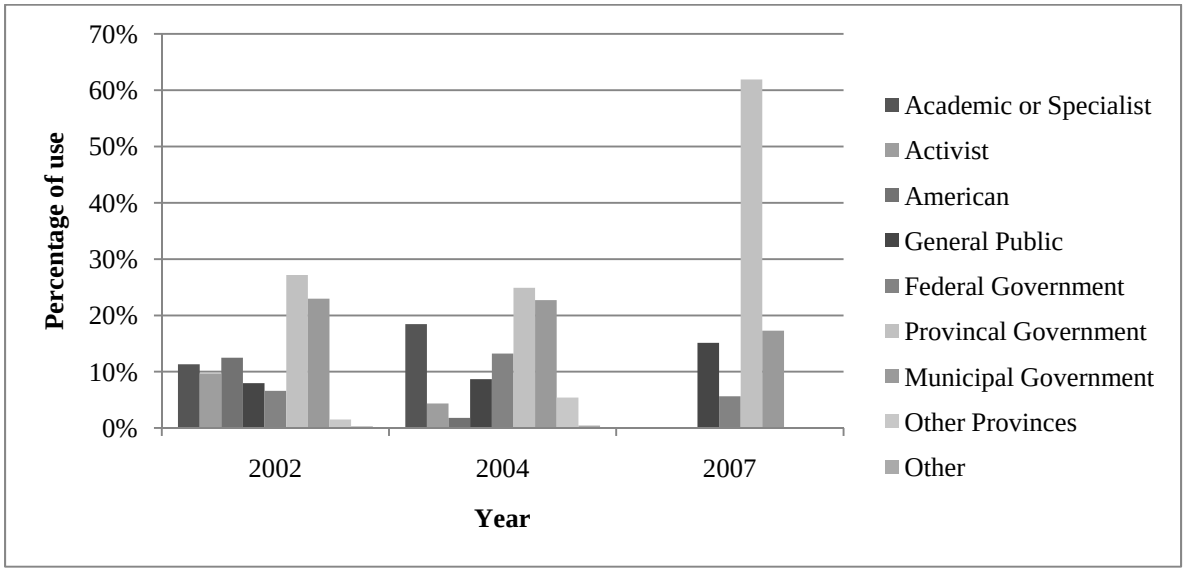

Figure 11: Use of Sources Over Time

As discussed, the person who is cited first in an article, versus second, is relevant in shaping an issue in the media. Figure 12 presents the number of occurrences in which each source type is cited first or second within an article. The percentages shown are based on the total of first placements or second placements (e.g., 11% of all of the first placements in articles were academic sources). It is important to note that the provincial government was cited first in 34% of the articles, and cited second in 41%. In some of these cases there is overlap, and both the first and second sources are provincial government. For example, the first reference may be general, stating “Mosquitoes carrying West Nile virus have been found in Killarney, Manitoba Health reported

yesterday" (Falding, 2004c), which is followed by "Deputy chief medical officer of health said" (Falding, 2004c) later in the article. As many articles are not exclusively about WNV, in other instances a first source may be from the provincial government, and it may be followed by a statement about nuisance mosquitoes and a citation from a representative of the City of Winnipeg.

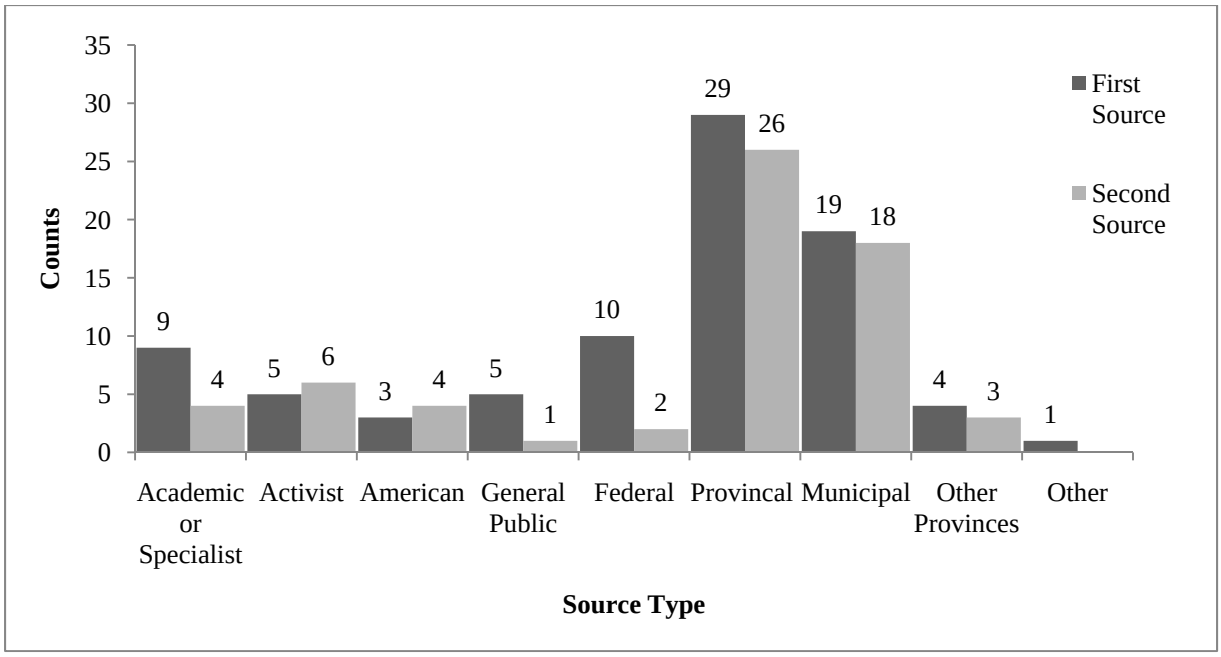

Figure 12: Number of Times Each Source Type is in a Position of First or Second Source

Whether a source is used in the context of a story as positive, negative, or neutral may relate not only to what the source is actually cited as saying, but also the way in which that source is portrayed by media. Figure 13 demonstrates the main source types and whether their citations were coded as positive, negative, or neutral. Sources quotes were not coded for tone separately, rather they were coded as part of the full paragraph in which they were cited. As illustrated, the majority of sources were presented as neutral upwards of 60% of the time they were cited, with the clear exception of activists. The activists were often cited in contexts in which they are presented as being

overwhelmingly negative or alarmist. For example, in one article a particularly well known activist is cited in the context of: "'I'm not going to stop,' said Whiteman, close to tears. "Somebody has to be willing to stand up and defend the rights of everybody." (Hendry, et al., 2002) In this example, the additional information reporting that it was said while close to tears, demonstrates the woman's passion for the issue, but perhaps also lessened the credibility of the source by portraying her as overly emotional. Moreover, it is the types of quotes selected to be included in an article, in addition to the description used within the context of the full article that can influence the way in which risk issues are communicated.

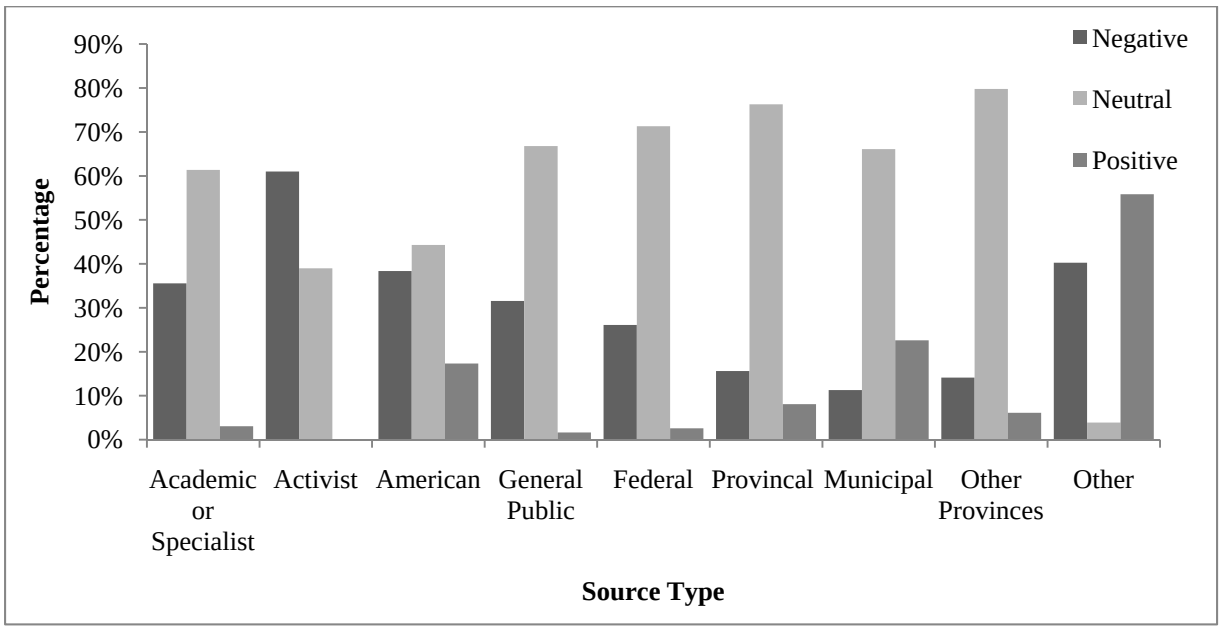

Figure 13: Tone of Text where Source was Used

Some sources used by the *Winnipeg Free Press* shared their feelings of distaste with regard to the way in which they were cited and described, as demonstrated by: "One man said the Free Press had burned its bridges with the Wolseley community through its coverage of the issue, and a woman accused the newspaper of sensationalizing potential violence" (Rabson, et al., 2002).

For citations from all levels of government, the majority of quotes used were neutral or factual, and in some cases reassuring or positive. References to government information was often factual in content: “Earlier this week, Manitoba Health announced the first dead crow had been found this year carrying the West Nile virus.” (Staff Reporter, 2004). In addition to the factual quotes, there were also more conversational or commentary types of quotes. An example of a more reassuring quote from a government representative is: “I don’t want people hiding in basements. Go on with your every-day life because the risk to any individual is low” (Paul, 2002). An example of the negative context of an article where a reference to a government source was made in an editorial:

> Manitoba deputy chief medical health officer Dr. Susan Roberecki said that one dead bird shouldn’t be cause for alarm, but one was a high enough number to scare Health Minister David Chomiak into declaring the same day that ‘an imminent health hazard is possible’(P. Mitchell, 2002).

This editorial was concerning the use of malathion as a way of reducing WNV risk. Different types of sources were used and presented differently within the articles, with the majority of government source types presented as neutral or factual, while activist source types were more often presented in a negative or alarmist tone. This demonstrates the use of elite source types in one way, and activist source types in a very different way.

The Use of Manitoba Health Information in the *Winnipeg Free Press*

In order to better understand how Manitoba Health messaging is used by the *Winnipeg Free Press*, a specific analysis was conducted to determine the uptake of news releases by the newspaper. Of the 156 *Winnipeg Free Press* articles in the sample data set, only those published on dates following the release of the news releases are included. Therefore, the results presented in this section pertain to 130 of the *Winnipeg Free Press* Articles, and include the total 77 news releases from 2002, 2004, and 2007. In total, 39 or

50% of the sample set news releases contained some type of matching content within a *Winnipeg Free Press* article published the day following the release. Therefore, half of the news releases were likely used by the *Winnipeg Free Press*.

Figure 14 demonstrates that there was variation in the uptake of Manitoba Health news releases over time. In 2002, the first sample year, slightly more than half of the news release had some type of matching content within the *Winnipeg Free Press*, while in 2004, nearly 80% of the news releases had matching content. There was a reversal in 2007 when close to 70% of news releases had no matching content within the *Winnipeg Free Press*. Overall it can be said that the news releases were used approximately 50% of the time, however, the uptake of news releases varied substantially over time. The change in the uptake of news releases demonstrates the agenda-setting function of the media whereby although Manitoba Health was releasing updates about WNV, particularly in 2007, the *Winnipeg Free Press* chose not to cover them as closely as they did in 2004, and to a lesser degree in 2002.

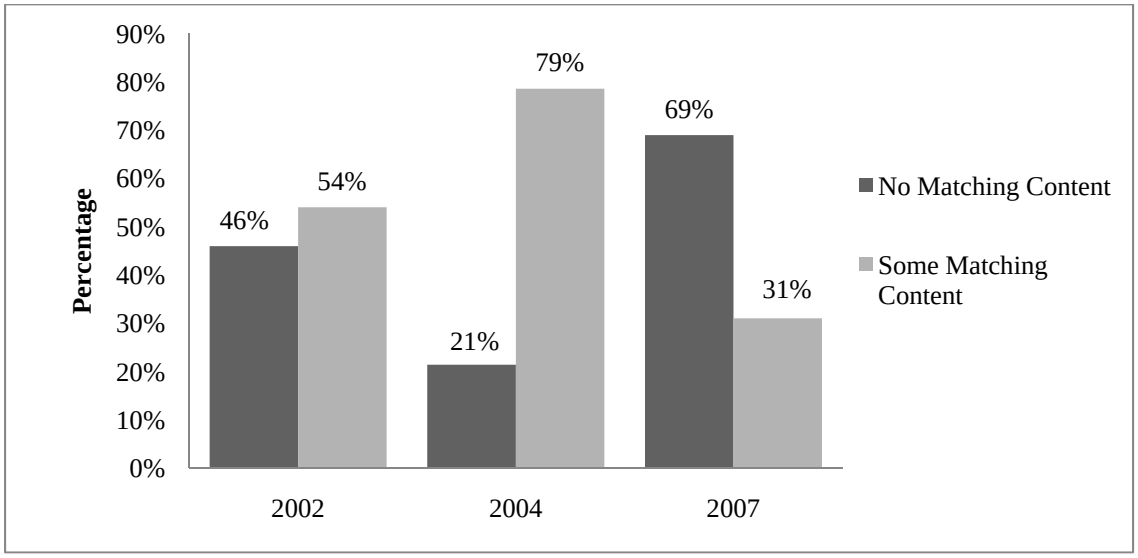

Figure 14: Uptake of Manitoba Health News Releases by Year

Presentation of Manitoba Health Recommendations

Integral to the way in which the risk is described, are the recommendations to assist people in avoiding or decreasing their risk. In total, a level of advice for the public was included in 30% of the sample set articles. This is perhaps lower than could be beneficial for the public in terms of repeated reminders about the ways to protect oneself. Initially, the messaging surrounding personal protection measures were less succinct, sporadic, worded differently, and containing selective bits of information from article to article.

The wording of the personal protection messaging from Manitoba Health presented in the news releases varied over the ten years, however, there was a level of consistency. One key wording change occurred in 2005, where the news releases began to specify 'appropriate mosquito repellent', rather than "mosquito repellent containing DEET', as they had in previous years. The justification for the change was unclear, however, the altered wording remained consistent from 2005 forward. An example of some of the advice for the public from a news release from 2004 is:

> To reduce the risk of West Nile virus infection, Manitobans can protect themselves against mosquito bites. This includes:
> - wearing light-coloured, loose-fitting clothing, long-sleeved tops and longs pants;
> - using mosquito repellent containing DEET;
> - reducing the amount of time spent outdoors during peak mosquito hours between dusk and dawn
>
> (Manitoba Health, 2004)

The advice for the public, as printed in the *Winnipeg Free Press* articles, varied from personal protection measures (i.e., wearing light-coloured long, sleeves and pants, avoiding dusk and dawn, and using repellent that contains DEET), to methods aimed at reducing larval habitat (i.e., dumping standing water, cleaning birdbaths regularly, and

ensuring wading pools and wheelbarrows are drained). Other recommendations included in the *Winnipeg Free Press* suggested reducing exposure to malathion.

As with the news releases, the recommendations presented in articles varied both within and between years. For example, recommendations in one article were:

> Eliminate conditions that attract mosquitoes. Drain any stagnant water; drill holes in containers left outside; turn over plastic wading pools; clean and chlorinate swimming pools; use DEET insect repellent but not on children under age two. Avoid perfume, hairspray and cologne (Reporter, 2002).

While in another it was described "Stefaniuk said he hopes local residents will follow the province's recommended precaution, including putting on mosquito repellent with DEET and wearing light-coloured, loose-fitting clothing" (Spiers & Rollason, 2002). Although the exact same section of text was not used repeatedly, the following excerpt contains much of the standard recommendation information as presented in the media articles, for example, "wearing DEET-based repellent, avoiding the outdoors between dusk and dawn and wearing long-sleeved, light-coloured clothing are the three main ways to protect yourself from mosquitoes (Rabson, 2004b).

It was found that a number of articles focused solely on reducing mosquito habitat and did not include other personal protection measures, indicating a lack of coverage of some key personal protection recommendations.

Key Informant Interview Comments

Broadly, the key informants felt that the coverage of WNV over the time period was fairly good, using words like "balanced" to describe the coverage (Journalist 1, 2010; Manitoba Health Representative 2, 2009). One Manitoba Health representative felt that the initial coverage of WNV was more scientific in content, and that as the situation

progressed, and with different reporters, the coverage was more sensational and more focused on the controversy rather than the risk issue. Of some concern was the decrease in the level of coverage of WNV related issues, however, the normalization of risk was seen as positive. It was understood that something new or different (i.e., new type of 'mosquito magnet') was required for the issue to have any news value, and that this allowed for some reminders of WNV risk (Government Representative 2, 2009).

In terms of coverage over time, one of the *Winnipeg Free Press* journalists commented on how it really was the controversy that drove the issue initially, and that as time progressed they were always looking for fresh angles to cover the story (Journalist 1, 2010). Journalist 2 described the way in which writing WNV-related articles had become more or less routine over time, but added the comment that they were unsure as to why there was the decrease in coverage despite the increase in WNV cases in 2007 (Journalist 2, 2010).

In discussing the use of sources, one journalist commented on the fact that in addition to using different types of sources, it was also important to be a bit skeptical and question the validity of a source's comments. Nonetheless, in the end it was important to trust the person with the PhD in terms of understanding scientific information (Journalist 1, 2010). With respect to the use of government sources broadly, one journalist commented on the fact that he would rather be given all of the details of an issue, rather than packaged information, thus allowing the reporters to make the decision as to what should be covered. This reporter further commented on the struggle in communicating the difference between WNV and nuisance mosquito control, when the only difference was the consideration of buffer zones (Journalist 2, 2010).

When the Manitoba Health representatives were asked how they felt about the way in which their messaging was covered, the response was that the coverage was reasonably good (Manitoba Health Representative 2, 2009), but that there was room for improvement (Manitoba Health Representative 1, 2009). One Manitoba Health representative discussed the difference between communicating fact and communicating understanding. He felt that the understanding around the issues was not very well-communicated, indicating that the government "could do better in explaining facts in a way that reaches public understanding" (Manitoba Health Representative 1, 2009). Communicating understanding was further described as helping people comprehend the issues, for example, if a person was ever going to change their behaviours in response to WNV risk, there is a time during the season that this should be done. Moreover, it was felt that there should be greater investment in evaluating public understanding of risk communication, but that improvements were underway in this respect (Manitoba Health Representative 1, 2009).

Coverage of WNV dropped substantially over the time period, despite a year of a record number of human cases. The tone of the coverage was largely neutral, with a reliance on elite sources in the majority of articles. In terms of agenda-setting, the decline in coverage, despite the increase in human WNV cases, demonstrated the role of the media in decreasing issue salience. Certain frames were found to be very relevant in this data, with the most common frames being risk, controversy and rights, and fairness. Over the course of the sample data, there were changes in the uptake of the Manitoba Health news releases, with approximately 50% of the news releases used overall. The next chapter discusses some of these results in a broader context.

Chapter 6

Discussion

The purpose of this case study is to explore how West Nile virus related risks were presented to the public via the *Winnipeg Free Press*. In an effort to determine how the issues of risk were presented, many different levels of analysis were undertaken. In this section the results are discussed in a broader context and compared with results from previous studies.

The media were key players in terms of agenda-setting, however, the reactions from policy makers and the general public were very relevant. Although it is expected that the media led the agenda much of the time, it is important to acknowledge the role that government and the general public (including activists) had in this issue. It is difficult to ascertain who was leading whom. The WNV issue began as a potential and uncertain health risk, requiring a level of policy response. It is important to note that early on there was political pressure to spray malathion based on initial public reaction to WNV, and perhaps this was fueled by media coverage. The change in legislation allowing for the use of malathion to supersede the observation of buffer zones refocused this issue from being about health risks to being fraught with concern about public rights, thereby creating an issue of controversy. Furthermore, the imposition of a health order by government gave activists a reason to protest. This provided the media with a new angle, leading to increased media coverage of the issue. The interactions between media, public and government, although not proven in this work, are supported by the findings from the media and interview data.

Given media trends, it is not surprising that media interest in WNV waned over time (Bennett, 1999; Boykoff & Boykoff, 2007; Lorimer & Gasher, 2004; Major & Atwood, 2004). This relevant trend is most likely related to agenda-setting and news norms and values: (1) news needs to be new, (2) by 2007 WNV was no longer a novel threat, and (3) the level of politics and controversy surrounding WNV decreased over time. It can be speculated that with the annual return of the virus, it has become normalized in the minds of many, and therefore, is no longer identified as newsworthy on its own, despite the increase in identified cases in 2007. As the issue normalized for the public it is likely that they became less interested in WNV as a whole, further decreasing the desire by the print media to provide more coverage of WNV. Although there was a decrease in coverage over time, it is important to acknowledge that the coverage did not drop off completely and there was still some agenda-setting value to the issue and relevance in terms of reminding the public of this potential health risk.

Framing is relevant to how a risk message is presented by the media. A number of key frames were used in this data, including conflict and risk. Conflict was both a key frame and focus of much of the initial coverage. In a number of instances the focus and driver for the articles was related to the intertwined issues of conflict and controversy. Although there continues to be ongoing conflict over the use of malathion for adulticiding, the issue became slightly less newsworthy over time. A study conducted by Probe Research Inc. found that 67% of Manitobans agreed that “mosquito fogging reduces my chances of getting West Nile virus”, 12% disagreed with the statement, while 21% said they were neutral or unsure (Probe Reserach Inc., 2008). In other words, according to the Probe (2008) study, the majority of Manitoban adults agreed to the use

of malathion as a method to reduce WNV risk. Therefore, in terms of agenda-setting, after the main instances of controversy subsided there was a decrease in the overall coverage of WNV-related issues.

Integral to the conflict was the concept of voluntary versus involuntary exposure to malathion. The language used to describe this concept had some very strong connotations. Generally, the use of malathion was described as being used to reduce nuisance mosquitoes or WNV mosquitoes, followed by the corresponding statement that buffer zones would or would not be respected. This description of the use of malathion, with a word that carries connotations, such as *respect,* is likely to have hindered rather than helped public perception of 'fogging'. Although measuring public perception was beyond the scope of this project, it is anticipated that emotive language was likely to have played a role in shaping public opinion.

In communicating risk it is important to be cognizant of the specific type and level of detail of information that is presented to the public. Roche and Muskavitch (2003) found that there was limited precision of information in the print media coverage of West Nile virus. They quantitatively studied how WNV risk was described in media stories with statements such as "somewhat risky", "five people died", or with further detail such as "five out of one hundred thousand people died" (Roche & Muskavitch, 2003). The authors' position is that increased detail (i.e., numerator and denominator) enhances how helpful the information is in increasing public understanding of risk. They argue that there are three relevant categories of information, what is the risk (i.e., probability), symptoms of the risk, and how risk can be reduced. All of the above-mentioned levels of description of risk were present within the *Winnipeg Free Press* data

set. Direct comparisons should be interpreted with caution as some of the methods used by Roche and Muskavitch (2003) are not quite clear enough to allow for exact replication. Roche and Muskavitch (2003) found that the majority of articles (89%) contained no information at the number/population level. In this data set, this was true for only half of the sample articles. It is unclear exactly why the dramatic difference was found. It is possible that the *Winnipeg Free Press* simply did a superior job including this type of information, compared to the newspapers included in the Roche and Muskavitch (2003) study.

Another aspect of the Roche and Muskavitch (2003) study was the lack of use of risk comparisons (i.e., the risk of WNV compared with flu risks) in news articles. Similar to the Roche and Muskavitch (2003) study, this case study found limited comparison of WNV to other risks. While there were some examples of comparisons to the flu or other larger risks, as there were so few examples, they were unlikely to have resonated with the public or aided the public in understanding the risk.

Another focus of this study was to determine how the risks associated with WNV and malathion were presented by the *Winnipeg Free Press*. Roche (2002) examined the print media coverage of the risk-risk tradeoffs associated with pesticide use in response to West Nile Encephalitis. Roche reviewed the frequency of the occurrence of various categories of risk issues, such as short-term and long-term health effects, pesticide spraying risk versus WNV risk, efficacy of spraying, and economic costs between spraying and infection as described in the media. He also reviewed whether the risk information was described or if numerical or numerical per population information was used. It was found that the media were “generally ineffective in providing precise

information about pesticide risks and in comparing risks of pesticide exposure with those of West Nile encephalitis", and "in mentioning the efficacy of pesticide spraying or comparing the economic costs of pesticide spraying with those of West Nile encephalitis" (Roche, 2002 p. 482).

In this data set, the question of how the issues of these risk tradeoffs were presented proved interesting based on the provincial government's and the general public's perspectives on the issue. The concept of risk tradeoffs from the perspective of the Provincial Government, in agreement with the Pest Management Regulatory Agency, is that when used properly for mosquito abatement malathion does not pose a health concern. Therefore, WNV and malathion use is not viewed as a risk tradeoff situation, but rather it is viewed as the use of a product to reduce the risk from WNV. The Manitoba Health messaging did not generally include information about the use of malathion. Following the reassessment of malathion by PMRA in 2004, as part of its communication strategy, the Province began to include recommendations on how to reduce exposure to malathion, such as ensuring that windows are closed, turning off air conditioners, and washing any toys that were outside. This was followed with coverage in the *Winnipeg Free Press.*

In this data set, the discussion about WNV and malathion, although about health risks, was more focused on conflict and the components of risk of voluntary versus involuntariness of malathion exposure and not the concept of risk tradeoffs of malathion and WNV. As there is a lengthy history of opposition to malathion in some neighbourhoods, this opposition would not likely be changed through community consultation if the end result continued to be malathion usage. However, it would be

interesting to consider if or how any of this conflict could have been lessened if more information on malathion had been made more clear to the public. Few articles published in the *Winnipeg Free Press* were focused on more technical discussions of malathion.

The use of sources, and particularly the use of government sources, was a key focus of this study. As anticipated based on the literature (Bishop, 2001; Miller & Riechert, 2000; van Dijk, 1991), government/elite source types proved to be a key source type in this data set. Although many different types of sources were used throughout this data set, government was unquestionably the most heavily used source type. The majority of government information and citations were presented in a factual or reassuring tone. Despite the reliance on government sources, it is interesting to note that only approximately 50% of the Manitoba Health news releases were used overall, and that only 31% of news releases were used in 2007. This is particularly relevant in terms of agenda-setting and how regardless of the availability of updated WNV information, it was not covered by media.

A second key source type that was very relevant in shaping issues surrounding WNV and the use of malathion were the activists. The use of environmental or activist type sources in this study aligned with the literature, which described environmental sources as ad-hoc citizen groups, and indicated that in some cases the only way to garner press coverage was through activities such as protests (Miller & Riechert, 2000). This proved to be an accurate description of the activist/environmental type sources in this study, despite their greater focus on health than the environment.

The interview data collected for this thesis was used to provide background information and commentary on the coverage of WNV by the *Winnipeg Free Press* from

the perspectives of Manitoba Health and *Winnipeg Free Press* journalists. Broadly, the Manitoba Health perspective was that coverage was good, but there was room for improvement, both from the government in terms of communicating about risk issues, and from the media in terms of ensuring that 'understanding' is communicated in addition to merely presenting the facts. From the media perspective, it was said that government could improve by making some issues more clear, and it would be preferable for journalists to be given all of the details trusting that they are capable of presenting the necessary information. It would seem, in this case, that the journalist interviewed wanted less packaged material and more freedom to make appropriate decisions related to the information to include in telling the WNV story.

The results of this research further demonstrate the agenda-setting role of the media in the case of public health risks. However, the *Winnipeg Free Press* did a fair job in covering issues surrounding WNV, despite the alarmist coverage related to the use of malathion. In addition, it is interesting to note the high level of information provided by the *Winnipeg Free Press* when compared to the Roche and Muskavitch (2003) study. Despite what appeared to be a good level of information communicated, 60% of Manitobans disagreed with the statement that they "know everything about WNV" (Probe Reserach Inc., 2008). Therefore, although there was a good deal of coverage of WNV-related issues, there is still a desire by the public for more knowledge about WNV, revealing room for improvement in communicating this risk issue.

Chapter 7

Conclusions

The purpose of this case study is to explore how West Nile virus related risks were presented to the public via the *Winnipeg Free Press*. Overall, it has been determined that the communication of risk in the case of WNV was fairly clear, despite some of the earlier focus on alarmism and controversy. Through various levels of analysis of the news media articles, news releases, and key informant interviews this research has been able to answer the previously stated research questions.

The first question in this research was about the structural issues of the data relating to article volume, placement, and length, and the use of headlines in the *Winnipeg Free Press* articles. It was determined that there was a decrease in the volume of coverage over time despite the increase in indentified WNV human cases in 2007. Overall, it would be expected that coverage would decrease over time as a risk issue normalizes, however, regardless of normalization it is still surprising that there was not even a minimal increase in coverage in 2007. In addition, the change in the placement of articles was also anticipated as the risk normalized, but again, the issue of the high number of WNV cases in 2007 and the lack of front page news is somewhat surprising. In terms of article length, substantial differences were not found. With respect to agenda-setting, the decrease in coverage of WNV demonstrates the abilities of the media to decrease issue salience despite the availability of new information to present.

Question two focused on the tone of headlines and the tone of leads. The results of the analysis identified a level of disconnect between the tone of the headlines and the tone of the leads of the articles. This finding was not overwhelmingly surprising as

headlines are often written in a way that is attention getting (van Dijk, 1991) and therefore not necessarily written in a way that most clearly represents the full story.

The third research question focused on the use of sources by the *Winnipeg Free Press* journalists, including a specific review of the way that Manitoba Health information was used. Many different types of sources were used in this data set, and they were used in different ways. The most commonly used source type was Government. Federal, provincial, and municipal governments were individually the top three sources types. Government sources were often presented in a neutral or positive tone and were generally cited first within an article, demonstrating the use of these sources in framing the articles. Another important source type was the activists who were not cited as regularly but were the instigators of much of the controversy surrounding the use of malathion, particularly in 2002, and were often presented in a negative tone. Other source types were used to provide different perspectives on local issues, such as the case with the use of academic and general public sources. Sources from other provinces and American sources were used to discuss the issues from an external perspective as well as to provide updates on WNV in other areas.

The uptake of Manitoba Health news releases also changed over time. The decrease in the use of news releases was particularly relevant in 2007 when the lowest number of news releases (31%) was covered by the *Winnipeg Free Press,* despite the increase in human cases. The implications of this are not only in terms of agenda-setting by the media, but also suggest that if WNV becomes an issue of increased concern for public health, a new method of engaging the media may be necessary.

The final and most broad research question was, how have the descriptions of West Nile virus-related risks been presented to the public by the *Winnipeg Free Press,* and how have these descriptions changed over time. Initially, some descriptions were alarming and focused on the uncertainty surrounding the arrival of the virus, however, over time risk messages became fairly standard. This is an important consideration in relation to the Decima Research (2006) finding that consistency was important in trust and recognition of a risk as 'real' by the general public.

In 2002 much of the coverage focused on the controversy of the arrival of the virus and the decision and implementation of a health order to use malathion, rather than specifically on the risk issues. The media coverage of these issues is easily understood considering the role of conflict in newsworthiness. It is important to note, that intertwined in these messages about the controversy were still some messages about WNV and the use of personal protection measures, which are a key component from a public health perspective. In the final years of the data, when WNV was determined not to be newsworthy on its own, there was still some messaging encouraging the public to be conscious of the risks related to WNV, and demonstrating the effort made by journalists to keep some information about WNV in the media.

Along with the way that risks were described, is how they were framed. Overall, risk and conflict were the two dominant frames. It was found that the metaphor of war was used throughout this data set. The use of this metaphor was not overwhelmingly surprising as situations of humans against nature are often described in this way. Moreover, that there were two vocal and opposing sides of the malathion debate also lend themselves to the metaphor of war.

From a Manitoba Health perspective, although having WNV risk normalized is good, there was some concern that some of the basic messages were no longer communicated as well as they had been previously. From the perspective of the journalists, conflict was driving the coverage, particularly early on in WNV coverage, although attempts were made to gain an understanding of the true danger of WNV. Moreover, journalists tried to present all of the sides of the issues, and to be cautious in terms of how the 'angles' of risk were presented.

The second part of question three focused on understanding the presentation of the issues of WNV and malathion as risk tradeoffs. Communication about the use of malathion in an effort to reduce WNV risk was presented in the media. However, this topic was overrun with conflict and therefore communications about risk issues were often unclear. It is worth questioning if perhaps clearer messaging from Manitoba Health could have lessened some level of the conflict. In other words, perhaps this aspect of communication (i.e., helping the public to understand the issue of the 'tradeoffs') was not communicated as clearly as it perhaps could have been. While the majority of Manitoba residents are not opposed to the use of malathion in an effort to reduce WNV risk (Probe Reserach Inc., 2008), they could perhaps be better informed about the 'tradeoffs'.

Broadly, the coverage of WNV-related issues by the *Winnipeg Free Press* was fairly straight forward. Although slightly alarmist, the coverage fit well within the expectations of news norms and values, including addressing the issue of balance. The coverage of all of the controversy surrounding the use of malathion was slightly negative and alarmist, however, it is important to present opposing sides to allow members of the public to form their own opinions on issues that affect them.

Policy Relevance and Recommendations

As communicating public health risk is of policy relevance, it is important to discuss these results in terms of their application to policy. This research establishes the way in which an initially new and emerging health risk with varying levels uncertainty attached to it was communicated through the media, and how that presentation changed as the risk became normalized over time. Although in this particular case increased media attention was not likely required, it is important to maintain some level coverage to ensure the public is alert and aware that a risk still exists. Should the risks related to WNV change, or a particularly severe season occur, a more multi-faceted communication plan may be required to garner increased media attention. Therefore, it is recommended that an updated communication plan be developed to address future, potential changes in risk levels of WNV or other similar normalized risks. One journalist commented on how government messaging was not always clear. Therefore, attempts to further increase clarity of messaging could also be of value. In addition, ongoing evaluation of risk communication efforts is recommended. Although the Probe (2008) study was completed, it could perhaps have been beneficial to gage public understanding earlier on so that appropriate changes could have been made to the communication strategy.

This research contributes to the ongoing research about the role of media in agenda-setting, and also risk communication research. As was demonstrated by these results, the media played a role in agenda-setting for this issue, keeping it relatively high on the agenda initially, and allowing the issue salience to decrease and remain low over time. This is of clear policy relevance from the perspective of the health risk

communicators in terms of communication strategies and policies, therefore, this case study serves as an example on which to build future risk communication strategies.

Recommendations for Future Research

In terms of further study, several areas would likely prove to be interesting lines of inquiry. It would be very interesting to involve the activists in a study to collect insight into their perspective of the issue and how they were portrayed in the media, not via the mediated news. It would also be of value to further explore the inner workings of the newspaper, particularly the perspectives of the editors and how they decide when a WNV story is worth covering, as well as to explore the relationship between news releases, press conferences, and the likelihood of coverage by news media. As the presentation of risks and risk issues may vary from media outlet to media outlet, it would be of value to complete similar analyses with the inclusion of other local newspapers or media types to gain a more thorough understanding of the full picture of how WNV risk issues were presented to the public in Manitoba. In addition further study to explore how the content of headlines, in addition to tone, compared with the text of articles could be of value.

A public perception component using focus groups to collect the perspectives and level of understanding from the public could be very informative. Although some research in this area has been done, it would be interesting to further study how the public understands the issues related to WNV and the use of malathion.

This research contributes to an understanding of how the *Winnipeg Free Press* presented Manitoba Health and other risk communication messages surrounding WNV risk issues. It has shown how coverage of WNV risk has changed over time. In terms of agenda-setting issues, it represents a case study analysis of how different actors have

been given prominence in driving the focus. In the early days, the controversy brought on by the use of malathion as a public health protection measure was less a case of people versus malathion as it was a case of how citizens were not allowed to exercise their democratic rights of protest against the use of malathion. The 'sneak attack' served to be much more newsworthy a focus by the media than the social debate issues that activists were trying to promote: the opposition to malathion. In a sense, the *Winnipeg Free Press* drove the early agenda because WNV was a new and novel risk issue, which became animated by a combination of activist controversy and a fair reliance on Manitoba Health and other elite sources, like academics, to help explain the nature of the risk itself. By 2004, Manitoba Health could be seen to drive the media agenda more, at least through the greater reliance on content from its news releases being found in *Winnipeg Free Press* stories. However, as the risk normalized, even the 'drama' of a higher-than-before-seen number of cases in 2007 was insufficient to garner more than a blip in the media agenda. This trend, while not altogether surprising, signals the need for public health agencies to shift their communications strategies should the nature of the WNV risk change or new messaging is required.

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Appendices

Appendix A: Copy of Ethics Approval Certificate

UNIVERSITY OF MANITOBA

BANNATYNE CAMPUS
Research Ethics Boards

P126-770 Bannatyne Avenue
Winnipeg, Manitoba
Canada R3E 0W3
Tel: (204) 789-3255
Fax: (204) 789-3414

APPROVAL FORM

Principal Investigator: Ms. D. Watts
Supervisor: Dr. M. Driedger

Ethics Reference Number: H2008:284
Date of Approval: October 27, 2010
Date of Expiry: October 27, 2011

Protocol Title: Risk Communication of West Nile Virus in Manitoba

The following is/are approved for use:

- **Annual Approval**

The above was approved by Dr. John Arnett, Ph.D., C. Psych., Chair, Health Research Ethics Board, Bannatyne Campus, University of Manitoba on behalf of the committee per your submission dated October 12, 2010. The Research Ethics Board is organized and operates according to Health Canada/ICH Good Clinical Practices, Tri-Council Policy Statement, and the applicable laws and regulations of Manitoba. The membership of this Research Ethics Board complies with the membership requirements for Research Ethics Boards defined in Division 5 of the *Food and Drug Regulations of Canada.*

This approval is valid until the expiry date only. A study status report must be submitted annually and must accompany your request for re-approval. Any significant changes of the protocol and informed consent form should be reported to the Chair for consideration in advance of implementation of such changes. The REB must be notified regarding discontinuation or study closure.

This approval is for the ethics of human use only. For the logistics of performing the study, approval must be sought from the relevant institution, if required.

Sincerely yours,

[redacted]

John Arnett, PhD., C. Psych.
Chair, Health Research Ethics Board
Bannatyne Campus

Please quote the above Ethics Reference Number on all correspondence.
Inquiries should be directed to the REB Secretary **Telephone**: (204) 789-3255 / Fax: (204) 789-3414

Appendix B: Copy of Consent Form

UNIVERSITY OF MANITOBA | Faculty of Medicine

Department of
Community Health Sciences
750 Bannatyne Avenue
Winnipeg, Manitoba
Canada R3E 0W3
Telephone: (204) 789-3473
Fax: (204) 789-3905

RESEARCH PARTICIPANT INFORMATION AND CONSENT FORM

Title of Study: Risk Communication of West Nile Virus in Manitoba

Principal Investigator: Dorian Watts
S113-750 Bannatyne Ave.
Winnipeg, MB R3E 0W3
Phone: 272-3106
Email: umwatts5@cc.umanitoba.ca

Co-Investigator: Michelle Driedger, Ph.D.
S113-750 Bannatyne Ave.
Winnipeg, MB R3E 0W3
Phone: 789-3936
Email: michelle_driedger@umanitoba.ca

Sponsor: N/A

You are being asked to participate in a research study. Please take your time to review this consent form and discuss any questions you may have with the study staff. You may take your time to make your decision about participating in this study and you may discuss it with your supervisor or others in your organization before you make your decision. This consent form may contain words that you do not understand. Please ask the investigator to explain any words or information that you do not clearly understand.

Purpose of Study

This purpose of this research study to gain a better understanding of the risk communication methods and messages used to communicate the risks of West Nile Virus and malathion application to the general public. The main objective of the study is to determine how the risks of West Nile Virus and malathion, and the tradeoff between the two are presented to the public.

A total of 5-10 participants will be included in this study.

Study procedures

Data collection for this study is twofold. Firstly, published documents were collected from government (Manitoba Health and the City of Winnipeg), the Winnipeg Free Press and coalition groups. Secondly, interview data will be collected. The participants in this study have been sought out based on their participation as authors of written material collected for this project or are serving as representatives from various organizations.

Participation in this study includes a one-on-one interview with the primary investigator of the study (Dorian Watts). The interview questions may address topics such as how the research concerning West Nile Virus and malathion was conducted, and what types of evidence and sources were used. The interview will be audio recorded, with consent. The audio files will be securely stored for seven years, after which point the files will be destroyed. The interview will take place at The University of Manitoba, Bannatyne Campus in room P220 Pathology Building, or in your organization's office at a date and time convenient for you. It is expected that the interview will last approximately 30-60 minutes.

You can stop participating at any time. However, if you decide to stop participating in the study, you are encouraged to talk to the Primary Investigator (Dorian Watts) first. There will be no ramifications should you choose to stop participating.

A brief report of the findings of the study will be sent to you via your preferred choice of mail (email or hard copy). A copy of the full report will be available upon request.

Risks and Discomforts

There are no anticipated physical risks from participating in this study. It is possible that due to the small sample size, local people very familiar with the organizational structure in Winnipeg may be able to identify study participants despite the fact that only generic references (e.g. government representative, industry representative, coalition group member, etc) will be used in any written documents produced from this study. However, as only your experiences from working within your organization (and/or your organizational perspective) is being sought we expect this risk to be minimal.

Benefits

There may or may not be a direct benefit to you from participating in this study. We hope the information learned from this study will benefit risk communication methods in the future.

Costs

There are no costs for you to participate in this study.

Payment for participation

You will receive no payment or reimbursement for any expenses related to taking part in this study.

Confidentiality

Information gathered in this research study may be published or presented in public forums, however, your name and other identifying information will not be used or revealed. Despite efforts to keep your personal information confidential, absolute confidentiality cannot be guaranteed. Your personal information may be disclosed if required by law. Your name will be removed from the data and a code inserted, however, as you are affiliated with a specific organization, confidentiality cannot be guaranteed.

The University of Manitoba Health Research Ethics Board may review records related to the study for quality assurance purposes.

All records will be kept in a locked secure area and only those persons identified will have access to these records. If any of your research records need to be copied to any of the above your name and all identifying information will be removed. No information revealing any personal information such as your name, address or telephone number will leave The University of Manitoba.

Voluntary Participation/Withdrawal from the Study

Your decision to take part in this study is voluntary. You may refuse to participate or you may withdraw from the study at any time

Questions

You are free to ask any questions that you may have about your treatment and your rights as a research participant. If any questions come up during or after the study please contact the primary investigator: Dorian Watts, phone: 272-3106

For questions about your rights as a research participant, you may contact the University of Manitoba, Bannatyne Campus Research Ethics Board Office at (204) 789-3389

Do not sign this consent form unless you have had a chance to ask questions and have received satisfactory answers to all of your questions.

Statement of Consent

I have read this consent form. I have had the opportunity to discuss this research study with Dorian Watts or her study staff. I have had my questions answered by them in language I understand. The risks and benefits have been explained to me. I believe that I have not been unduly influenced by any study team member to participate in the research study by any statements or implied statements. Any relationship (such as employer, supervisor or family member) I may have with the study team has not affected my decision to participate. I understand that I will be given a copy of this consent form after signing it. I understand that my participation in this study is voluntary and that I may choose to withdraw at any time. I freely agree to participate in this research study.

I understand that information regarding my personal identity will be kept confidential, but that confidentiality is not guaranteed. I authorize the inspection of any of my records that relate to this study by The University of Manitoba Research Ethics Board, for quality assurance purposes.

By signing this consent form, I have not waived any of the legal rights that I have as a participant in a research study.

Participant signature: _____
Date: _____**(day/month/year)**
Participant printed name: _____

I, the undersigned, have fully explained the relevant details of this research study to the participant named above and believe that the participant has understood and has knowingly given their consent

Printed Name: Dorian Watts
Date: _____(day/month/year)
Signature: _____

Role in the study: Principle Investigator
Relationship (if any) to study team members:_____

Appendix C: *NVivo*™ Coding Tree

Appendix 3: Nvivo Coding Tree

- **Content**
  - *Action*
    - Non-Government Action
    - Other Surveillance
  - *Activists*
  - *Advice for the Public*
  - *Cost*
  - *Counts*
  - *'Fogging' or malathion*
  - *For Further Info*
  - *Horses*
  - *Larviciding*
  - *New Info*
    - American Info
    - Bakground AND Historical
  - *Nuisance*
  - *Mosquitoes*
  - *Opinion*
  - *Other*
  - *Politics*
  - *Sensationalist*
  - *Unhappy Residents*
  - *West Nile Virus*
- **Good Quotes**
- **Good to Know**
- **Headings**
  - *AUTHOR*
  - *AUTHOR 2*
  - *AUTHOR 3*
  - *DATE*
  - *DATE_N*
  - *LANGUAGE*
  - *PAGE*
  - *PLACEMENT*
  - *SOURCE*
  - *TITLE*
  - *TITLE_N*
  - *Type*
  - *WORD COUNT*
- **Lead**
- **Malathion Info**
- **Page No.**

Appendix 3: Nvivo Coding Tree

- *A*
- *A1*
- *B*
- *B1*
- *Other*

Source Level

- *First Source*
- *Same First & Second Source*
- *Second Source*

Sources

- *Academic or Specialist*
- *Activists*
  - Anti-pesticide use
    - Campaign for Pesticide Reduction
    - CROW
  - Pro-fogging
- *American*
  - General Public
  - Government
- *General Public*
  - Businesses
    - Wolseley
- *Government*
  - Federal Government
    - Environment
    - Federal Other
    - Health Canada
      - PMRA
  - Municipal
    - City of Winnipeg
      - City Councilors
      - Insect Control Branch
      - Mayor
    - MB municipal
  - Provincal Government
    - Health Minister
    - MB Other
    - MB Health
      - MB Health WNV
- *Not Clearly Stated as Sources*

Appendix 3: Nvivo Coding Tree

- Likely City
- Likely Provincial
- *Other*
- *Other Provinces*

Story Type

- *Column*
- *Editorial*
  - Letters to the Editor
- *Human Interest Story*
- *In Brief*
- *News Article*
  - Canadian Press or Newswire

Style & Rhetoric

- *Hyperbole*
- *Metaphors*

Themes

- *Blame*
- *Controversy*
- *Rights and Fairness*
- *Risk*
  - Descriptions of Risk
    - Deaths Or Cases
    - Number of Cases
    - Phrases
    - Symptoms
  - Environment
  - Health
- *Unknown or Uncertainty*
- *War*

Tone

- *Negative or Alarmist*
- *Neutral or Reassuring or Positive*

WNV & Malathion

WPF vs NR

- *Cite a Person*
- *No Matching Content*
- *Some Matching Content*
  - Facts wrong

Appendix D: Matrix of Overlapping Article Content

	Advice for the Public	Deaths Or Cases Per	Number of Cases	Phrases	Symptoms
Advice for the Public	47	31	5	24	20
Deaths Or Cases Per	31	71	5	36	31
Number of Cases	5	5	13	9	6
Phrases	24	36	9	53	19
Symptoms	20	31	6	19	35
Total	127	174	38	141	111