

### **News Framing West Nile Virus – an Outbreak of New Health Hazard**

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#### **Abstract**

The current study examines the pattern of media coverage on a health hazard issue, West Nile Virus, at its outbreak. To examine how media depicted West Nile Vile issue, news articles addressing this issue are run by computer mediated content analysis. 466 news articles published from September 25<sup>th</sup>, 1999 to October 31<sup>st</sup>, 2000 in three major newspapers around New York City area are put to content analysis. Based on semantic network, cluster analysis is performed to find news frames in the depiction of West Nile Virus. The result of cluster analysis shows the depiction of this new health hazard contains two distinct words clusters, Prognostics and Diagnostics, which are not uncommon in news coverage of health issue.

#### **Introduction**

West Nile Virus appeared in New York City in the summer of 1999. The outbreak of this virus caught scientists and government agencies by surprise since it had never before been detected in the Americas. Steinhauer (1999) reported;

The mosquito-borne illness that has killed three people in New York City may not be St. Louis encephalitis, as experts have thought, but rather a similar disease that has never been diagnosed in the Western Hemisphere, Government scientists said yesterday. The disease, West Nile virus, was discovered this week in dozens of birds that died in and around the Bronx Zoo this summer. The virus is indigenous to Asia and northern and eastern Africa and occasionally makes its way to Europe, but has never been found in birds or people in this hemisphere, said Duane Gubler, the director of the division of vector-borne infectious disease at the Federal Centers for Disease Control and Prevention (A1).

Subsequently, government agencies at all levels, environmental advocacy organizations, and educational institutions sought ways to stop the spread and overwintering of the disease. However, in 2000, it was found that the virus recurred and spread from New Hampshire to North Carolina (Levitan, 2001). Recent reports about West Nile Virus indicate that this health issue has begun to be recognized as a potential health threat throughout the United States.

While the disease resulted in many scientific uncertainties, media coverage continued to gain momentum. Public health officials recommended a variety of strategies from avoiding mosquito bites to spraying entire cities.

Many risk communication researchers have asserted the power of news media in its persuasive influence particularly about risk issues. Kasperon (1992) has argued that institutions such as the news media act as “amplification stations,” creating interpretations of hazards and providing rules of “how to select, order, and explain signals from the physical world”(p.159). The social amplification of risk is based on the proposition that mass media, in its news production process, selects and emphasizes certain aspects of a risk issue.

In early mass communication research, the news media were considered to offer a direct picture, or a mirror image of reality. News text was perceived as a replacement of the town crier who orally announced the simple facts such as time of day, children's birth, etc (Park, 1940). Although delivering facts in a fair way is still considered as one of the most important functions of news media, contemporary media scholars question the news media's ability to represent reality (Glasgow University Media Group, 1976; Hall, 1979). News is more likely to be viewed as the manufactured product shaped by a complex process (Carey, 1986; Darnton, 1975; Fowler, 1991; Gans, 1979; Hall, 1979; Tuchman, 1978), and thus is defined as a social construction (Berger & Luckmann, 1966; Fowler, 1991; Tuchman, 1978). During the past two decades, media researchers have reached a consensus that the mass media interpret and thus construct a reality as a part of the process of disseminating information. As Shields and Dunwoody (1986) note, news is seen as "a reconstruction of reality, a deliberately constructed product that reflects the world views of the news producers themselves"(p. 43).

It was sociological studies on news gathering and reporting that claimed news as constructed reality in the field of communication research. Tuchman (1978), one of the prominent scholars in this research stream stated that news provides an ideological frame through which perception of public events are filtered and contained in place of projecting an objective picture of reality. For example, news production can be described as a process occurring between three parties, the news source, the news organization, and the reporters. When a reporter gets information, his or her personal interpretation influences the process. He might focus on political aspect of a certain risk issue. Or he might focus on economic issues of that issue. The reporter, here, gathers a lot of raw material for the next process, packaged by the news organization. News organizations purposely select events among numerous daily occurrences so that news articles may fit into their routine news framework (Fishman, 1980).

Stream of discourse analysis also finds a contradiction in the notion that media deliver facts per se. According to discourse analysis, news is considered as a special type of narrative discourse. The narrative discourse, with language of news, emphasizes and underscores a certain aspect of the reality. Thus, language usage in the news serves as a tool to articulate ideology (Hodge & Kress, 1993). For example, in reporting the death caused by West Nile Virus, the causal concept of West Nile Virus can be eliminated in the sentence. The usual sentence would be "An elderly man died from West Nile Virus," while it can be rewritten as "An elderly man of infection." The second sentence downplays the role of the cause of the event, West Nile Virus. In the rewriting, the nature of the causal relation in the event (i.e. dead by new virus) is eliminated and the effect of the event, death, remains. Fowler (1991), after examining the language use in news coverage concluded that language shapes the representation of events in news discourse. Also, Van Dijk (1991), after analyzing the language structure of racial news coverage, draws similar conclusions.

How a certain risk concept is socially constructed through mass media is also well studied in the field of risk communication. Although risk is generally defined as "the probability of experiencing harm" (Kates et al. 1985, 21), there is great disjuncture between the "technical" and the "social or perceptual" definition (Freudenburg, 1992). According to the technical view of risk, the concept of risk is focused on the *probability of the event* and the *magnitude of the negative consequence*. Risk is merely defined as the multiplication of the two terms – the probability of the events times the consequences.

Over the years, scholars in risk communication have emphasized the importance of social dynamics in interpreting risk issues (Short, 1984; Freudenburg, 1992). These scholars assert that risk is often defined as mere probability and magnitude without considering values, attitudes, social influences, and cultural identity. Institutions such as news media act as "amplification stations," which provides interpretations of hazards and rules of "how to select, order, and explain signals from the physical world" (Kasperson, 1992, 159). Hall (1979) suggests that the mass media serve three major functions in our society. First, the media

selectively construct social knowledge. Second, the mass media not only reflect diverse aspects of our society but also selectively rank and arrange social knowledge, offering preferred meanings and interpretations. In other words, the mass media provide tools of interpretation, or frames. Third, through the process of argument, exchange, debate, consultation and speculation, the mass media leads social consensus on a specific social issue. Although news media try to achieve principles of objectivity, neutrality, impartiality, and balance in reporting, some events, particularly risk issues, are inherently dramatic, sensational and thus newsworthy (Molotch & Lester, 1974). For example, reporting crisis events such as nuclear power incidents always emphasize the negative, the unexpected, and the rare aspect of the incident (Galtung & Ruge, 1973; Gamson & Modigliani, 1989).

The concept of frame, or framing, provides a helpful tool to analyze the commonplace practice of journalists and their impact on the public's understanding of the world. News fame is the result of the news production process that forces the journalists to “come to closure quickly on the meaning of news – to determine what the story is about” (Griffin & Dunwoody, 1997, p 363). The combination of words or specific language used in the news media frames reconstruct the reality and brings the interpretation of the world to the consumers of the news media (Gitlin, 1980). In the process of representing reality by organizing concepts, the news organization arbitrarily slices and strips from the stream of ongoing activity (Goffman, 1974) and transforms the non-recognizable happenings into comprehensible events (Tuchman, 1978). Although frames are largely unspoken and unacknowledged (Gitlin, 1980), news frames have become the “part and parcel” of reality as portrayed by the mass media (Tuchman, 1978).

Media frames have been defined as an organizing idea or story line in news coverage that provides meaning to the event (Gamson & Modigliani, 1989). The frame provides the interpretation for understanding what a certain controversy is about and what the essence of the issue is about. Since the process of news production involves the mechanism of how mass media select and organize the reality, the concept of frame is important in investigating how media depict West Nile Virus. The process of selection, which is the central concept in media frames, delimits the scope of a news story. In addition, the same elements of news may tell different stories depending on the way of organizing. According to Entman (1993), framing involves selection and salience. Thus, to frame is to select some aspects of a perceived reality and make them more salient.

Two distinct concepts of frame have been adopted among scholars who investigate media frame. One interpretation of frame is the central theme of an object by attributes. This definition of frame depends on the work of Tankard et al.(1991) who describes a media frame as the central organizing idea for news content. Another interpretation is that frame stems from the definition by Entman (1993) who emphasizes a frame that highlights various aspects of the message. Although traditional framing research has been based on the definition of frame as a central organizing idea or story line that provides a dominating pattern of interpretation, some recent studies of news frame such as Kline et al. (2006) are more focused on defining the various attributes in relation to a particular subject. In their study, Kline et al. investigated the pattern of co-occurrence between the adoptive family or adoptive parents and the attributes that were used to depict them, thus, conceptualized as the criterion of framing. The current study is an extension of media framing research with content analysis based on the co-occurrence between the main concept and its various attributes depicted in the news media. Specifically, the authors investigated media frames on the West Nile Virus by content analyzing the relationships between the main concept, West Nile Virus, and its attributes depicted in the news media.

## Data

To analyze how mass media depicted West Nile Virus at its outbreak and to investigate attribute salience in the news coverage for the issue, Lexis-Nexis was used as the database for the three major newspapers in the New York Area; New York Times, New York Post, and New York Daily. The date of articles ranged from September 25<sup>th</sup>, 1999 when the virus was identified to October 31<sup>st</sup>, 2000 when the news articles were gathered by the author. The total number of articles used in the analysis was 466. These articles include 172 from New York Times, 89 from New York Post, and 205 from New York Daily.

## Analysis

Semetko and Valkenburg (2000) assert that there are two possible ways of content analyzing frames in the news: inductive and deductive. The inductive approach focuses on analyzing a news story without any concrete preconceptions of these frames. On the other hand, the deductive approach is related to predefining certain frames as content analytic variables to verify the extent to which these frames occur in the news coverage. The deductive approach requires a clear idea of the kinds of frames likely to be in the news, because the frames that are not defined can be overlooked in the process of content analysis. A number of studies have identified the importance of certain frames in news coverage by focusing on their consequences for the public's interpretation of the events and issues (i.e., Graber, 1988; Hannah et al., 2006, Iyengar & Simon, 1993). The current study, involving the inductive approach of content analysis, does not postulate any hypothesis in relation to any predefined frames. Instead, the current study examines the various aspects that were made salient in the depiction of West Nile Virus in the news coverage.

To find frames in the news stories regarding West Nile Virus outbreak, cluster analysis based on the co-occurrence between the term "West Nile Virus" and other words in the news stories. To prepare for the cluster analyses, the combined news articles were run through CATPAC to produce a *Weight Input Network* file. The word by word association matrix data, then, were then put into the UCINET program, a statistical program specially designed for analysis of network data.

The results from CATPAC cluster analysis was examined as an illustration of relationships between words used by the newspapers. It is not unusual that clusters found from semantic network analysis data have been identified as frames (Murphy & Maynard, 2000; Pompper, 2001). The word clusters identified in this study, then were interpreted as frames, in the sense that frames "are manifested by the presence or absence of certain key words, stock phrases, stereotyped images, sources of information, and sentences that provide thematically reinforcing clusters of facts or judgments" (Entman, 1993, 52). In turn, these representations are dependent upon shared cultural values or ideologies which already exist as tacit mental categories ready to be drawn upon for the purpose of sorting experience (Fowler, 1991). During the early test runs, numbers of cluster levels ranging from 2 to 10 were examined to determine what cut-off point yielded a clear overall pattern that neither over-simplified nor fragmented emergent frames. For the current study, a two-cluster-level analysis provided the strongest balance between such clarity and detail. In order to name the frames, it was important to closely scrutinize words that had clustered together. Frame names reflected themes arising from the key concepts, or frequently used words, in each cluster. Finally, the frames were closely examined against original texts in order to discern the context from which each frame emerged. News stories in the sample were read many times by the principal researcher in order to illuminate word clusters, or frames, identified as a result of CATPAC analyses. Such qualitative interpretation complemented and strengthened the quantitative computer outputs.

## Results

Cluster analysis was performed to find news frames in the three major newspapers in New York City area about West Nile Virus. The result of cluster analysis shows two distinct word clusters. In the test runs of cluster analysis, only two cluster clearly contained sufficient number of words which would yield a reasonable interpretation (See Tables 1, 2, 3, 4, 5, and 6). In the two cluster analysis, 83 words were included in the first cluster (See Table 1) with 67 words in the other cluster. Hence, these two clusters could be regarded as frames in the new coverage of West Nile Virus.

To interpret the content of each cluster, the words were ordered according to their case frequencies. Based on the assumption that frequency of words represents the importance of those words in the cluster, the researcher scrutinized the words in each cluster according to their frequencies to figure out the major aspect described in each cluster (See Table 7).

The first cluster contains many words related to the prevention policy and guide for protective behaviors against West Nile Virus. Particularly, among the 20 most frequently used words in the first cluster, many words were related to the prevention efforts of state organizations (i.e., Spray, Virus, City, State, Health, Department, County, Control and etc.). On the other hand, the second cluster contains many words related to the cause and negative impact of certain risk issues. The pattern is clear when the most 20 frequently used words in the second cluster generally depict how the negative impacts and hazards were caused by West Nile Virus (i.e., Mosquito, Bird, People, Infection, WNV, Disease, Human, Encephalitis, and etc.). (See Table 7)

**Table 1 Frames of West Nile Virus (Two Clusters)**

Cluster 1	Spray, Virus, City, Year, State, Health, Death, Nile, Will, found, County, Yesterday, Area, Case, Queens, Dr., Department, Park, Control, Kill, Outbreak, Federal, First, Giuliani, Summer, Center, Time, NYC, Water, Mayor, Malathion, Residents, Positive, Ill, Long, Over, Environmental, Man, Commissioner, Manhattan, Brooklyn, Around, Westchester, Chicken, Tomorrow, Reported, Jersey, Spread, Scientists, Bronx, Know, Going, Suffolk, Against, Sickened, Million, Samples, Central, Early, Experts, Prevention, Information, Woman, Carrying, National, Results, Evidence, Might, Chemical, Neal, Others, Whether, Point, Never, Region, Agency, Announced, Cause, Tonight, Become, Director, Local, Think
Cluster 2	Mosquito, Bird, Last, Officials, People, Infection, WNV, West, Pesticide, Test, Disease, Island, I, Human, Two, Public, Day, Encephalitis, Old, Cohen, Seven, Mr., Three, Week, Plan, Night, Part Confirmed, York, Anvil, Including, Crows, Used, Don't, Blood, Borne, Far, News, Symptoms, Nassau, Four, Hospital, Ground, Connecticut, Five, Month, Risk, Program, Breeding, Number, Several, Aerial, Home, Spokeswoman, Pools, Children, July, Today, Yorkers, Borough, Called, Down, Next, Medical, Help, Go, Potentially

**Table 2 Frames of West Nile Virus (Three Clusters)**

Cluster 1	Spray, Virus, City, Year, State, Health, Death, Nile, Will, found, County, Yesterday, Area, Case, Queens, Dr., Department, Park, Control, Kill, Outbreak, Federal, First, Giuliani, Summer, Center, Time, NYC, Water, Mayor, Malathion, Residents, Positive, Ill, Long, Over, Environmental, Man, Commissioner, Manhattan, Brooklyn, Around, Westchester, Chicken, Tomorrow, Reported, Jersey, Spread, Scientists, Bronx,
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	Know, Going, Suffolk, Against, Sickened, Million, Samples, Central, Early, Experts, Prevention, Information, Woman, Carrying, National, Results, Evidence, Might, Chemical, Neal, Others, Whether, Point, Never, Region, Agency, Announced, Cause, Tonight, Become, Director, Local, Think
Cluster 2	Mosquito, Bird, Last, Officials, People, Infection, WNV, West, Pesticide, Test, Disease, Island, I, Two, Public, Day, Encephalitis, Old, Cohen, Seven, Mr., Three, Week, Plan, Night, Confirmed, York, Anvil, Including, Crows, Used, Don't, Blood, Borne, Far, News, Symptoms, Nassau, Four, Hospital, Ground, Connecticut, Five, Month, Risk, Program, Breeding, Number, Several, Aerial, Home, Spokeswoman, Pools, Children, July, Today, Yorkers, Borough, Called, Down, Next, Medical, Help, Go, Potentially
Cluster 3	Human

**Table 3 Frames of West Nile Virus (Four Clusters)**

Cluster 1	Spray, Virus, City, Year, State, Health, Death, Nile, Will, found, County, Yesterday, Area, Case, Queens, Dr., Department, Park, Control, Kill, Outbreak, Federal, First, Giuliani, Summer, Center, Time, NYC, Water, Mayor, Malathion, Residents, Positive, Ill, Long, Over, Environmental, Man, Commissioner, Manhattan, Brooklyn, Around, Westchester, Chicken, Tomorrow, Reported, Jersey, Spread, Scientists, Bronx, Know, Going, Suffolk, Against, Sickened, Million, Samples, Central, Early, Experts, Prevention, Information, Woman, Carrying, National, Results, Evidence, Might, Chemical, Neal, Others, Whether, Point, Never, Region, Agency, Announced, Cause, Tonight, Become, Director, Local, Think
Cluster 2	Mosquito, Bird, Last, Officials, People, Infection, WNV, West, Pesticide, Test, Disease, Island, I, Two, Public, Day, Encephalitis, Old, Cohen, Seven, Mr., Three, Week, Plan, Night, Confirmed, York, Anvil, Including, Crows, Used, Don't, Blood, Borne, Far, News, Symptoms, Nassau, Four, Hospital, Ground, Connecticut, Five, Month, Risk, Program, Breeding, Number, Several, Aerial, Home, Spokeswoman, Pools, Children, July, Today, Yorkers, Borough, Called, Down, Next, Help, Go, Potentially
Cluster 3	Human
Cluster 4	Medical

**Table 4 Frames of West Nile Virus (Five Clusters)**

Cluster 1	Spray, Virus, City, Year, State, Health, Death, Nile, Will, found, County, Yesterday, Area, Case, Queens, Dr., Department, Park, Control, Kill, Outbreak, Federal, First, Giuliani, Summer, Center, Time, NYC, Water, Mayor, Malathion, Residents, Positive, Ill, Long, Over, Environmental, Man, Commissioner, Manhattan, Brooklyn, Around, Westchester, Chicken, Tomorrow, Reported, Jersey, Spread, Scientists, Bronx, Know, Going, Suffolk, Against, Sickened, Million, Samples, Central, Early, Experts, Prevention, Information, Woman, Carrying, National, Results, Evidence, Might, Chemical, Neal, Others, Whether, Point, Never, Region, Agency, Announced, Cause, Tonight, Become, Director, Local, Think
Cluster 2	Mosquito, Bird, Last, Officials, People, Infection, WNV, West, Pesticide,

	Test, Disease, Island, I, Two, Public, Day, Encephalitis, Old, Cohen, Seven, Mr., Three, Week, Plan, Night, Confirmed, York, Anvil, Including, Crows, Used, Don't, Blood, Borne, Far, News, Symptoms, Nassau, Four, Hospital, Connecticut, Five, Month, Risk, Program, Breeding, Number, Several, Aerial, Home, Spokeswoman, Pools, Children, July, Today, Yorkers, Borough, Called, Down, Next, Help, Go, Potentially
Cluster 3	Human
Cluster 4	Medical
Cluster 5	Ground

**Table 5 Frames of West Nile Virus (Six Clusters)**

Cluster 1	Spray, Virus, City, Year, State, Health, Death, Nile, Will, found, County, Yesterday, Area, Case, Queens, Dr., Department, Park, Control, Kill, Outbreak, Federal, First, Giuliani, Summer, Center, Time, NYC, Water, Mayor, Malathion, Residents, Positive, Ill, Long, Over, Environmental, Man, Commissioner, Manhattan, Brooklyn, Around, Westchester, Chicken, Tomorrow, Reported, Jersey, Spread, Scientists, Bronx, Know, Going, Suffolk, Against, Sickened, Million, Samples, Central, Early, Experts, Prevention, Information, Woman, Carrying, National, Results, Evidence, Might, Chemical, Neal, Others, Whether, Point, Never, Region, Agency, Announced, Cause, Tonight, Become, Director, Local, Think
Cluster 2	Mosquito, Bird, Last, Officials, People, Infection, WNV, West, Pesticide, Test, Disease, Island, I, Two, Public, Day, Encephalitis, Old, Cohen, Seven, Mr., Three, Week, Plan, Night, Confirmed, York, Anvil, Including, Crows, Used, Don't, Blood, Borne, Far, News, Symptoms, Nassau, Four, Hospital, Connecticut, Five, Month, Risk, Program, Breeding, Number, Several, Aerial, Home, Spokeswoman, Pools, Children, July, Today, Yorkers, Borough, Called, Down, Next, Help, Go, Potentially
Cluster 3	Human
Cluster 4	Medical
Cluster 5	Ground
Cluster 6	Month

**Table 6 Frames of West Nile Virus (Seven Clusters)**

Cluster 1	Spray, Virus, City, Year, State, Health, Death, Nile, Will, found, County, Yesterday, Area, Case, Queens, Dr., Department, Park, Control, Kill, Outbreak, Federal, First, Giuliani, Summer, Center, Time, NYC, Water, Mayor, Malathion, Residents, Positive, Ill, Long, Over, Environmental, Man, Commissioner, Manhattan, Brooklyn, Around, Westchester, Chicken, Tomorrow, Reported, Jersey, Spread, Scientists, Bronx, Know, Going, Suffolk, Against, Sickened, Million, Samples, Central, Early, Experts, Prevention, Information, Woman, Carrying, National, Results, Evidence, Might, Chemical, Neal, Others, Whether, Point, Never, Region, Agency, Announced, Cause, Tonight, Become, Director, Local, Think
Cluster 2	Mosquito, Bird, Last, Officials, People, Infection, WNV, West, Pesticide, Test, Disease, Island, I, Two, Public, Day, Encephalitis, Old, Cohen, Seven, Mr., Three, Week, Plan, Night, Confirmed, York, Anvil, Including, Crows, Used, Don't, Blood, Borne, Far, News, Symptoms, Nassau, Four, Hospital, Connecticut, Five, Month, Risk, Program, Breeding, Number, Several, Aerial, Home, Spokeswoman, Pools, Children, July,

	Today, Yorkers, Borough, Called, Down, Next, Help, Go, Potentially
Cluster 3	Human
Cluster 4	Medical
Cluster 5	Ground
Cluster 6	Month
Cluster 7	Four

**Table 7 Diagnostic and Prognostic Frames of West Nile Virus**

Prognostic			Diagnostic		
Words	N of news articles containing the words	Case %	Words	N of news articles containing the words	Case %
SPRAY	324	69.5	MOSQUITO	408	87.6
VIRUS	365	78.3	BIRD	261	56
CITY	349	74.9	LAST	349	74.9
YEAR	354	76	OFFICIALS	311	66.7
STATE	308	66.1	PEOPLE	329	70.6
HEALTH	352	75.5	INFECTION	275	59
DEATH	340	73	WNV	417	89.5
NILE	310	66.5	WEST	312	67
WILL	281	60.3	PESTICIDE	249	53.4
FOUND	242	51.9	TEST	255	54.7
COUNTY	195	41.8	DISEASE	244	52.4
YESTERDAY	281	60.3	ISLAND	219	47
AREA	247	53	I	171	36.7
CASE	205	44	HUMAN	209	44.8
QUEENS	210	45.1	TWO	210	45.1
DR	149	32	PUBLIC	152	32.6
DEPARTMENT	212	45.5	DAY	166	35.6
PARK	154	33	ENCEPHALITIS	147	31.5
CONTROL	205	44	OLD	159	34.1
KILL	226	48.5	COHEN	119	25.5
OUTBREAK	188	40.3	SEVEN	212	45.5
FEDERAL	171	36.7	MR	60	12.9
FIRST	190	40.8	THREE	161	34.5
GIULIANI	153	32.8	WEEK	141	30.3
SUMMER	160	34.3	PLAN	138	29.6
CENTER	179	38.4	NIGHT	136	29.2
TIME	166	35.6	PART	140	30
NYC	165	35.4	CONFIRMED	111	23.8
WATER	130	27.9	YORK	135	29
MAYOR	155	33.3	ANVIL	100	21.5
MALATHION	69	14.8	INCLUDING	131	28.1
RESIDENTS	135	29	CROWS	98	21
POSITIVE	141	30.3	USED	116	24.9
ILL	131	28.1	DON'T	121	26
LONG	129	27.7	BLOOD	86	18.5
OVER	140	30	BORNE	139	29.8

ENVIRONMENTAL	117	25.1	FAR	101	21.7
MAN	96	20.6	NEWS	96	20.6
COMMISSIONER	157	33.7	SYMPTOMS	98	21
MANHATTAN	121	26	NASSAU	51	10.9
BROOKLYN	103	22.1	FOUR	111	23.8
AROUND	131	28.1	HOSPITAL	74	15.9
WESTCHESTER	107	23	GROUND	98	21
CHICKEN	55	11.8	CONNECTICUT	68	14.6
TOMORROW	95	20.4	FIVE	106	22.7
REPORTED	103	22.1	MONTH	107	23
JERSEY	102	21.9	RISK	82	17.6
SPREAD	110	23.6	PROGRAM	86	18.5
SCIENTISTS	86	18.5	BREEDING	82	17.6
BRONX	93	20	NUMBER	95	20.4
KNOW	107	23	SEVERAL	92	19.7
GOING	101	21.7	AERIAL	75	16.1
SUFFOLK	70	15	HOME	90	19.3
AGAINST	109	23.4	SPOKESWOMAN	103	22.1
SICKENED	128	27.5	POOLS	80	17.2
MILLION	69	14.8	CHILDREN	68	14.6
SAMPLES	79	17	JULY	66	14.2
CENTRAL	81	17.4	TODAY	78	16.7
EARLY	94	20.2	YORKERS	91	19.5
EXPERTS	80	17.2	BOROUGH	72	15.5
PREVENTION	113	24.2	CALLED	93	20
INFORMATION	77	16.5	DOWN	76	16.3
WOMAN	62	13.3	NEXT	84	18
CARRYING	104	22.3	MEDICAL	82	17.6
NATIONAL	80	17.2	HELP	81	17.4
RESULTS	80	17.2	GO	75	16.1
EVIDENCE	81	17.4	POTENTIALLY	89	19.1
MIGHT	84	18			
CHEMICAL	62	13.3			
NEAL	113	24.2			
OTHERS	101	21.7			
WHETHER	83	17.8			
POINT	77	16.5			
NEVER	78	16.7			
REGION	77	16.5			
AGENCY	74	15.9			
ANNOUNCED	82	17.6			
CAUSE	82	17.6			
TONIGHT	79	17			
BECOME	75	16.1			
DIRECTOR	81	17.4			
LOCAL	74	15.9			
THINK	69	14.8			

The two clusters found in the current study correspond with the results of the past framing studies. Snow and Benford (1988), in their study of discourse about social movement, suggested two distinct frames, "Diagnostic," and "Prognostic". Diagnostic framing involves "identification of a problem and the attribution of blame and causality" (Snow & Benford, 1988, 200). Based on Snow and Benford's suggestion, one of the two clusters found in this study can be interpreted as "Diagnostic framing". Entman (1993, 52) noted that "To frame is to select some aspects of a perceived reality and make them more salient in a communication context." Entman (1991) also noted that functions of frames include defining problems and diagnosing causes. First, diagnostic framing includes "Problem identification" that defines the "range and diversity of the problems" (Gerhards & Rucht 1992, 580) and describes the important elements of the issue and potential sources of the problem. The diagnostic frame identifies what were at risk and how they were unsecured. Defining problems can be achieved in the form of providing stories concerning what a causal agent is doing with what costs and benefits. Diagnosing causes is identifying the forces creating problems. In this regard, the diagnosis frames of identify problems of West Nile Virus (e.g., Infection, Disease, Encephalitis), describe the important elements and potential sources of the issue (e.g., Mosquito, bird, Crows) and classify forces dealing with such problems (e.g., Officials, Spokeswoman, Hospital).

The other cluster represents "Prognostic framing." Prognostic framing implies "a proposed solution to the diagnosed problem that specifies what needs to be done" (Snow and Benford 1988, p199). According to Entman (1993), frames suggest remedies by offering and justifying treatments for the problems and predicting their likely effects. In principle, the solutions for the problems are the reversal of the defined problems and causes found in diagnostic frames (Gerhards and Rucht, 1992).

The cluster analysis of news articles regarding the West Nile Virus issue implies two things in general. First, two distinctive frames were used in media for reporting the West Nile Virus issue – diagnostic and prognostic. Second, West Nile Virus was reported more with respect to diagnostic frame than prognostic, since the word "West Nile Virus" has been found to be included in the diagnostic frame.

## **Discussion**

The current study scrutinized complete stories in order to analyze news frames. Earlier quantitative studies of risk reporting counted key terms, tallied issues listed in tables while others examined only story headlines, leads, or the first few paragraphs of a news story (Bowman & Fuchs, 1981; Bowman & Hanaford, 1977; Wilkins & Patterson, 1991). Moreover, this study represents the exploratory case in which semantic network analysis has been applied to news texts.

Although media frame studies are well-developed in the field of political communication regarding voting issues, political candidates, and so on, very few risk communication studies have adopted the concepts of frames. Furthermore, risk communication studies seldom incorporate news media frames in the context of risk issue reporting. Past studies investigating how mass media report risk issues reveal that the media are reactive, ordinarily reporting on hazards that have already occurred instead of prognostic viewpoint. As a result, news stories are known to report hazards and do not provide much about the information to permit rational decisions to avoid the health hazards. Although news media tend to perform their surveillance function in society, for the most part they do not accurately inform about either the dimensions of the danger or the risks of alternatives because it is not their intent.

Media reports of the West Nile Virus issue, however, seem to provide two main frames in its content: diagnostic and prognostic. The cluster analysis based on the semantic network structure of the news text confirmed these two distinct frames. It is particularly interesting that

the actual wording, "West Nile Virus," is more associated with words contained in prognostic frame, which focuses the remedy and prevention of the health risk, than with those in a diagnostic frame. The result of this study in terms of media frames of West Nile Virus implies that not all the news coverage of health risk issues emphasizes the hazardous aspect of the issue. The scope of the current study does not provide sufficient information to answer the question of why such frames are dominant in reporting the West Nile Virus issue. To achieve better insight into what kind of factors, if any, would influence the frame organization in news stories should be studied further. Along with the investigation of detailed process in which news media organizations and journalists deal with scientific issues, news frame studies upon various health risk issues need to be conducted to reveal general patterns of news frames in reporting health risk.

In many cases the concept of attribute salience is viewed interchangeably with frames in that attribute salience, like frames, is defined as "the selection of a restricted number of thematically related attributes for inclusion on the media agenda when a particular object is discussed"(McCombs, 1997, 6). The typical study of frames is based on the concept of attribute salience, thus, focused on the clearly evaluative or judgmental concepts such as "corrupted" regarding the ethical aspect of a political candidate (McCombs et al., 2000). The appearance of the word, "corrupted," was identified as an indicator of the description of ethically negative aspects of a certain political candidate. The current study took an additional step by including a set of concepts that are not necessary evaluative or judgmental in the analysis. For example, the word "mosquito" by itself gives no indication of what kind of interpretation is being rendered. However, measuring word-to-word association reveals the cluster structure of the text. In this way the analysis reveals the attributes related to "mosquito." Consequently, the cluster structure provides insight into the use of "mosquito" in the text.

Being exploratory, the current study postulated many issues which warrant future study. First, the general structure of frames in health risk reporting is still to be revealed. Unlike past studies, the current study reveals reporting WNV focuses more on remedy and prevention than on hazardous aspect of the issue. Reporting other health risk issue might have different pattern.

Another aspect that the current study proposes for future research is the dynamics among different concepts in the relationship between media frame and audience knowledge structure. A frame is composed of the patterning of different words. The relational structure of these concepts defines how the frame involves the interpretation of the issue. How to measure the complicated relational structure of concepts and how to interpret the structure is still to be explored.

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