TALKING ABOUT PUBLIC HEALTH RISK: NEWS COVERAGE OF THE NDM-1 IN INDIA, UNITED KINGDOM, AND THE UNITED STATES

By

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A THESIS PRESENTED TO THE GRADUATE SCHOOL OF THE UNIVERSITY OF FLORIDA IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ADVERTISING

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This thesis examined how Indian, UK and U.S. newspapers conveyed health risk information in coverage of the NDM-1 superbug. A quantitative content analysis of 266 news articles was conducted. Using the psychometric paradigm as a theoretical framework, the following dimensions of risk characteristics were examined in this study: dread-evoking information, uncertainty, perceived controllability, and familiarity. Some clear differences emerged in the way NDM-1-related risks were covered and possible reasons are discussed. The results showed that social factors may affect the way media cover health-related issues. Moreover, the study indicated the complexity of global health communication. Based on the findings, the study suggested that decision-makers should consider as more social factors as possible to ensure the public receives the correct and transparent information.

CHAPTER 1
INTRODUCTION

The Goal of the Study

The objective of the current study is to evaluate NDM-1 superbug coverage in newspapers from India, the United Kingdom and the United States, from the perspective of public health and risk communication. These countries were chosen due to the different development stages of NDM-1 in each country. This superbug was initially discovered in India, and has received a lot of attention in India and the United Kingdom, and now it is emerging in the United States. The study builds upon existing research in health communication, risk communication, social and psychological studies, and the methods used in this study are based on an earlier study conducted by Fung, Namkoong, and Brossard (2011). The study takes into consideration the social context of these three countries, including the stage of development of NDM-1 in each country, as well as each country's health care system, and media system. An important model in the field of risk analysis, the psychometric paradigm, was used as a theoretical framework in the study.

Background information about NDM-1

Antimicrobial resistance has been defined as "resistance of a microorganism to an antimicrobial medicine to which it was previously sensitive" ("Combat Antimicrobial Resistance," n.d., para. 2). In other words, infections caused by resistant microorganisms can make standard treatments ineffective, so that individuals suffering from many forms of antimicrobial-resistant organizisms will experience "prolonged illness and greater risk of death" ("Combat Antimicrobial Resistance," n.d., para. 1).

Antimicrobial resistance is now perceived as a serious global threat, is "reaching unprecedented levels" (World Health Organization [WHO], 2011d, para. 2). It

threatens human's control over infectious diseases and is causing tremendous health and economic consequences. For example, in the European Union alone, more than 25,000 people die each year from antibiotic-resistant bacterial infections (WHO, 2011d), and the annual economic loss is estimated to reach at least 1.5 billion Euros (WHO, 2011d).

Antibiotic-resistant bacteria are commonly referred to as "superbugs." The past several decades have witnessed an increase in the number of cases of different drug-resistant superbugs: methicillin-resistant Staphylococcus aureus (MRSA), Enterococcus faecium, Klebsiella pneumoniae, Acinetobacter baumannii, Pseudomonas aeruginosa, and enterobacter species, and others (Moellering, 2010). The drug-resistant superbugs and the kinds of health problems they cause are shown in Table 1-1.

The NDM-1 superbug, an acronym for New Delhi metallo-ß-lactamase-1, is a pan-resistant enzyme that makes bacteria resistant to a broad range of antibiotics (Moellering, 2010). It was first identified in New Delhi, India, in 2008 (Moellering, 2010), and since early 2010, resistant bacteria containing the NDM-1 enzyme have begun to strike other areas of India, Pakistan and the United Kingdom (WHO, 2010a). In August 2010, the spread of the resistant bacteria in India, Pakistan and the United Kingdom was described in a report published in a British journal, *The Lancet Infectious Diseases* (WHO, 2011e). In that report, the new superbug was described as resistant to all currently available antibiotics (Golikeri, 2011). In other words, the NDM-1 is a "completely resistant bacteria" (WHO, 2011f, para. 15), and "there is no known antibiotic that can treat it" (WHO, 2010a, para. 3).

In 2010, the spread of bacteria carrying NDM-1 quickly became a global issue: a number of other countries, such as the United States, Canada, Australia, Belgium,

Japan, Sweden and Viet Nam, all reported cases in 2010. For example, by early September 2010, three NDM-1 cases had been identified in three U.S. states: California, Massachusetts and Illinois (WHO, 2010a).

Consequently, NDM-1 has become a potentially serious public health issue and has received “considerable press coverage” (WHO, 2010b, para. 57) and attracted global attention. In a 2010 report, Professor John Conly from the University of Calgary said he believed the spread of NDM1-containing resistant bacteria “constitute[s] a public health event of international concern” (WHO, 2010a, para. 8). For World Health Day 2011, the World Health Organization launched a worldwide campaign to call on governments to combat the global threat posed by antimicrobial resistance (WHO, 2011b).

Treatment of NDM-1

According to the World Health Organization (2010a), NDM-1 is extremely hard to treat for many reasons. First, NDM-1 exists in a number of different types of bacteria. Most of these NDM-1-containing strains are resistant to the most powerful antibiotics, and at least 10% of these strains are incurable so far. Second, very little progress has been made in the development of new drugs for antimicrobials. So when a person is infected with bacteria that harbor this new resistance mechanism, there are few antibiotics to treat them. Moreover, the infection mechanism of NDM-1 is controlled by a set of genes that are transmissible and can move easily among bacterium. Furthermore, E. coli NDM-1 has been found in E.coli bacteria, which is the most common cause of bladder and kidney infections. According to the Centers for Disease Control and Prevention (2012), some certain species of E. coli can cause diarrhea, while others can cause "urinary tract infections, respiratory illness and pneumonia, and other illnesses" (para. 1). The most recent outbreak of E. Coli was in

Europe, 2011 (WHO, n.d.). According to statistics available, there were 3,999 cases reported in Germany and 122 in 16 other countries during the 2011 European E. coli outbreak, and a total of 50 people died ("E.coli death toll increases to 50", 2011, July 1). Finally, although there are two antibiotics that may be effective against NDM-1, one of them, at the highest dosage, has the potential to cause kidney damage in one third of people taking the drug. To sum up, it is difficult to treat patients infected with bacteria with the NDM-1 enzyme. The current study is designed to investigate Indian, UK and US news coverage related to risks posed by the NDM-1 superbug to determine if there are significant differences in coverage in the three countries.

Significance of the Study

This study is significant for the following reasons. First, because NDM-1 is becoming a highly important topic across many areas of the world, this paper attempts to investigate what specific risk-related information is covered when journalists are reporting about NDM-1. To date, no empirical study has been done regarding coverage of the NDM-1.

Timely and continuously updated information is crucial for infection control, especially when people have only limited knowledge about a new risk (Ahmad, Krumkamp, & Reintjes, 2009). This study may provide some insight for future research on health and risk communication.

The theoretical framework of the study is the psychometric paradigm, an important and useful approach in research on public perceptions of risk (Bronfman, Cifuentes, & Willis, 2007; Renn & Rohrmann, 2000; Slovic, 1987). However, there is limited literature using the psychometric paradigm to examine health coverage in the news media (for recent exceptions, see Fung et al., 2011). Thus, more research is needed in this area, as it can add to existing knowledge of health communication and

risk communication by expanding the application of psychometric theory to the domain of global health communication, where a very limited number of studies have been conducted so far.

Table 1-1. Known superbugs and health problems.

Medical name of superbugs	Health problems
Methicillin-resistant Staphylococcus aureus (MRSA)	Can affect various body sites and staph infections can be found in "the bloodstream, heart, lungs, blood, bone, urine, or at the site of a recent surgery" (PubMed Health, 2011, para. 9)
Enterococcus species	Can cause infections "anywhere in the body" (WebMD, 2011, para. 2)
Klebsiella pneumoniae	Can cause "different types of healthcare-associated infections, including pneumonia, bloodstream infections, wound or surgical site infections, and meningitis" (Centers for Disease Control and Prevention [CDC], 2010, para. 1). Healthcare-associated infections refer to "infections that people acquire while they are receiving treatment for another condition in a healthcare setting" (Department of Health and Human Services, n.d., para. 1).
Acinetobacter baumannii	Can cause bloodstream infections (CDC, 2004) and "various types of human infections, including pneumonia, wound infections, urinary tract infections, bacteremia, and meningitis" (Choi, Lee, Lee, Park, & Lee, 2008, para. 1). Bacteremia is "the presence of viable bacteria in the circulating blood" (Bennett, 2012, para. 1).
Pseudomonas aeruginosa	Can cause pneumonia, extensive tissue damage or even septic shock (BBC News, 2012). Septic shock is “a serious condition that occurs when an overwhelming infection leads to life-threatening low blood pressure” (A.D.A.M. Medical Encyclopedia, 2010, para. 1).
Enterobacter species	Can cause many different types of infections, including "bacteremia, lower respiratory tract infections, skin and soft-tissue infections, urinary tract infections (UTIs), endocarditis [an infection of the inner layer of the heart], intra-abdominal infections [infections in the cavity of the abdomen], septic arthritis [also known as infectious arthritis], osteomyelitis [bone infection], and ophthalmic infections [eye infections]. " (Fraser, 2010, para. 1)

CHAPTER 2
LITERATURE REVIEW

Media Coverage of Health Risks

Mass media play a vital role in influencing public perception of reality (Scheufele 1999). In particular, the media serve as a major source of health information for the general public (Bomlitz & Brezis, 2008) and play a pivotal role in communicating health-related risk information to the public, especially to non-expert audiences (Courtney, 2004; Sjöberg, Kolarova, Rucai, & Bernström, 2000). Health-related media content has been discussed in past research in sociology (Courtney, 2004; Wenham, Harris, & Sebar, 2009), psychology (Lyons, 2000; Renn & Rohrmann, 2000), science communication (DeSilva, Muskavitch, & Roche, 2004), and health communication (Bomlitz & Brezis, 2008; Fung et al., 2011; Y. Liu, M. Liu, Xiao, Cai, & Xu, 2010; Stryker, 2003; Yanovitzky & Blitz, 2000). These scholarly studies have investigated how news media convey health information (Bomlitz & Brezis, 2008; DeSilva, et al., 2004; Fung et al., 2011; Y. Liu et al., 2010; Wenham et al., 2009), how media content can shape individuals' perceptions of health risks (Courtney, 2004; Lyons, 2000) and how the media influence individuals' behavior (Lyons, 2000; Stryker, 2003; Yanovitzky & Blitz, 2000).

Social Context in India, the United Kingdom and the United States

In the current study, news articles collected from three countries (India, the UK and the U.S.) will be analyzed for cross-national comparisons. The three countries not only represent vast differences in social proximity, health care systems, media systems, and people's health literacy, but also represent different development stages of NDM-1.

Society of India, the United Kingdom and the U.S.

Research has shown health communication is related to many social factors,

including economic factors (Bloom & Canning, 2008; Parker, Woelfel, Hart, & Brown, 2009), cultural factors (Kreuter & McClure, 2004) and religious factors (Ellison & Levin, 1998). Comparisons of above-mentioned factors in India, the United Kingdom and the United States are presented below.

Economy. The United States has the largest and most technologically powerful economy in the world (CIA, 2011c). The United Kingdom, another developed country, is the world's eighth-largest economy by purchasing power parity and the third-largest economy in Europe (CIA, 2011b). India is the only developing country among the three; however, as one of the major emerging economies in the world, it has become the world's fifth-largest economy by purchasing power parity (CIA, 2011a) with the world's fifth-fastest GDP real growth rate. In a word, each of these three countries plays an important and influential role in the international arena.

However, as a developing country, poverty remains a major challenge in India, which is located in South Asia. It is second only to China in terms of population. According to the Central Intelligence Agency, the poverty rate (percentage of population below the poverty line) is 14% in the United Kingdom, 15.1% in the United States, but as high as 25% in India (CIA, 2011a, b, c).

Culture. Previous research also linked cultural factors to the quality of health promotion and health communication (Kreuter & McClure, 2004). According to Hofstede's national culture index, the dimensions of power distance, individualism, and long-term orientation vary widely among India, the United Kingdom, and the United States (see Geert-Hofstede.com, n.d.); this is especially true for individualism and long-term orientation. Americans and British people score high (about 90) on the dimension of individualism, which means the American and British culture tend to put great emphasis on personal achievement, personal opinions, personal needs and

privacy; however, Indians only score 48, which means people in Indian society tend to develop close ties with other people and have strong loyalty towards the group and the relationship. India scores high (61) on the dimension of long-term orientation, while western societies, including the United Kingdom (scores 25) and the United States (scores 29), usually score low on this dimension. These scores reflect the fact that India has a more pragmatic future-oriented culture, "rather than a conventional historical short-term point of view" (Geert-Hofstede.com, India, n.d., para. 13).

Cultural factors have a great impact on population health and wellbeing. Researchers argued that individualism is disadvantageous to personal health care (Eckersley, 2006; Shiell & Hawe, 1996), because many diseases (including heart diseases) are associated with lack of control over one's life, and lack of social support, but individualism “not only reduces social connectedness and support, but also diminishes personal control” (Eckersley, 2006, p. 254).

Religion. Religious beliefs in these three countries also differ considerably. Religion in India has been dominated by Hinduism for centuries, while the dominant religion in the United Kingdom and the United States is Christianity. More than 80% of Indians identify themselves as Hindus, and only 2.3% of Indians were Christians in 2001 (Office of the Registrar General & Census Commissioner, 2001). In contrast, 71.6% of UK adults (*United Kingdom Census 2001 - Religion*, 2001) and 78.4% of U.S. adults (*U.S. Religious Landscape Survey*, 2008) were Christians.

Hofstede's research into national and organizational culture suggests that Hinduism has had considerable influence on the development of Indian culture. According to the Geert Hofstede's website, which uses copyrighted information from Professor Geert Hofstede’s work on national cultures:

> Countries like India have a great tolerance for religious views from all over the

> world – Hinduism is often considered a philosophy more than even a religion; an amalgamation of ideas, views, practices and esoteric beliefs. (Geert-Hofstede.com, India, n.d., para. 14).

In some sense, the differences between Eastern and Western thought are reflected in the divergence of Hinduism and Christianity. For example, Christians believe that the nature of man is sinful, while Hindus believe that man's problem is ignorance; Christian doctrine stresses "belief," while Hinduism stresses "duty"; Christians believe that Jesus Christ can save people from sin, while Hindus believe that nobody can have the assurance of salvation (*Comparison of Christian and Hindu Beliefs*, n.d.; Kreeft, 1987). Christianity believes that there is a strong link between suffering and evil, but that people's suffering can be transformed into something beneficial with the help of God; however, central beliefs of Hinduism include a belief in Karma, the law of cause and effect, which implies that any form of suffering is not a punishment but a consequence of negative behavior in past life (Whitman, 2007).

The religion-health connection is an emerging and fast growing research area (Cadge, Ecklund, & Short, 2009; Ellison & Levin, 1998; Miller & Thoresen, 2003). Although some researchers argued that the scientific evidence of the relationship between religion and medical views is "weak and inconsistent" (Sloan, Bagiella & Powell, 1999, p.667), recent research suggested that religious beliefs may have complex effects on health beliefs or health outcomes (Koenig, 2007). The *Health Care Providers' Handbook on Hindu Patients* (The Queensland Government, 2011) mentioned that Hindu beliefs might affect health care in many respects. For example, most Hindus don't eat beef and some Hindus are entirely vegetarian; therefore, medications made using animals are not suitable for vegetarian Hindus. Furthermore, as mentioned before, Karma implies that people's thoughts and deeds in past lives

will affect their current life, including their health, and the best way to cope with suffering is to accept it and understand that the suffering is natural; therefore, Hindu patients' decision-making regarding health care may be affected by the belief of Karma.

Health Care Systems in India, the United Kingdom and the United States

Based on reports from the World Health Organization and statistics from the Central Intelligence Agency (2011a, b & c), it is clear that the healthcare systems and government investment in healthcare in these three countries are quite different. As shown in Table 2-1, there are observable differences between India and the other two developed countries in terms of health expenditure and health outcomes. For instance, regarding government expenditure on health as a percentage of total government expenditure, India spends 4.4% of its government budget on health, while United Kingdom spends 15.1% and the United States spends 18.7% (*World Health Statistics 2011,* 2011, see Table 2-1).

United Kingdom. Health services in the United Kingdom are mainly financed by the government, although there is a growing private health care industry (Roe & Liberman, 2007). The National Health Service (NHS) provides preventive medicine, primary care and hospital services to all legal residents and citizens of the United Kingdom (Boyle, 2011, p.21). The NHS is "one system, one organization" that "guarantees the right to health care access to all citizens" (Roe & Liberman, 2007, p. 193). According to *World Health Statistics 2011*, 82.6% of the total expenditure on health in the United Kingdom was paid by the government, while the percentage was 47.8% for the United States and 32.4% for India. Apart from public coverage, about 13% of the British population is covered by voluntary private health insurance (Boyle, 2011).

United States. Cutler (2008) states that although the United States has "the most technologically advanced medical system in the world … citizens do not automatically have medical coverage" (para. 1). Private business plays a significant role in the American health insurance system, and a lot of people are uninsured across the nation. According to the Census Bureau, the number of uninsured persons in the United States was 49.9 million in 2010, constituting about 16.3% of the population (Christie, 2011). However, in 2010, The Health Care and Education Reconciliation Act of 2010 was signed into law. This act "maintains the private insurance system but makes it work for everybody" (Phillips, 2010, para. 2). New health insurance provisions in this act can possibly increase the availability of tax credits to help people cover the cost of insurance, and can possibly ensure that everyone has access to the health care when they need it (Phillips, 2010). Therefore, it is likely the condition of health insurance coverage in America will change for the foreseeable future.

India. The health care system in India is a "system of consumer-paid health care" (Mehr, 2008, p.8). Although India spent 4.6% of its GDP on health, their government share of that expenditure is quite low, accounting for only 0.9% of its GDP (WHO, 2006b); meanwhile, out- of- pocket expenditure is high, although India has a large impoverished population (WHO, 2006a). In terms of health insurance, according to estimates, "only 3% to 5% of Indians are covered under any form of health insurance" (Rao, 2005: p.5).

Quality control in public hospitals is almost absent in India; Mehr (2008) asserted that "medical care is largely unmeasured in public hospitals and physician offices" (p.6). Therefore, India's private hospital sector, which provides high-quality and high-standard medical services, has become the most promising for "improving the

healthcare access and quality of care in India" (Mehr, 2008, p.6). However, those private practitioners cost much more than government hospitals and can only serve particular groups of people, including international medical tourists. Most of the medical tourists are from Southeast Asia, North America and Europe (Mehr, 2008).

Health inequality between urban and rural areas is another big problem in India (Mehr, 2008). Health care in India's rural regions is poor. Many regions face a critical shortage of health care providers; many regions lack funds and access to primary care. Because of the poor sanitation and water supply difficulties in its rural area, India faces a great many of difficulties in dealing with diseases (Mehr, 2008).

Use of antibiotics in India, the United Kingdom and the United States

The rational use of antibiotics is key of infection prevention and control. As "infectious diseases remain a major cause of illness, disability, and death" (U.S. Department of Health and Human Services, n.d., para. 2), the control of infectious diseases relates closely to people's health status and is one of the major components of a country's health system (U.S. Department of Health and Human Services, n.d.).

However, inappropriate use of antibiotics can lead to severe consequences. According to the World Health Organization (2011f, para. 11), “[a]ntimicrobial resistance is the inevitable consequence of prescribing antibiotics.” Research has found that inappropriate use of antimicrobial medicines creates an ideal environment for “resistant microorganisms to emerge, spread and persist” (Sosa, 2005; WHO, 2011a). However, some developing countries such as India have limited regulation of the use of antibiotics in their healthcare system, inevitably leading to irrational use of antibiotics in hospitals (WHO, 2010c). Moreover, a 2011 WHO study revealed that 53% of Indians take antibiotics without a doctor's prescription (WHO Regional Office for South-East Asia, 2011). A standardized measure of antibiotic consumption is DDD

(defined daily doses), which is recommended by the WHO Collaborating Centre for Drug Statistics Methodology (2009). Basically, the DDD is defined as "the assumed average maintenance dose per day for a drug used for its main indication in adults" (WHO Collaborating Centre for Drug Statistics Methodology, 2009, para. 2). A popular DDD index is DDDs per 1000 inhabitants per day, which can "provide a rough estimate of the proportion of the study population treated daily with a particular drug or group of drugs" (*The concept of the defined daily dose,* para. 8). For example, when the antibiotic consumption in a certain population is 10 DDDs per 1000 inhabitants per day, this indicates that 1% of the population on average might receive antibiotics (*The concept of the defined daily dose*). In terms of DDDs/1000 inhabitants/day, the antibiotic receiving rate for India was 39% - 43% (Kotwani & Holloway, 2011), while the corresponding rate was 24% for the United States and 15% for the United Kingdom (The Center for Disease Dynamics, Economics & Policy, 2007: p.8). Moreover, it is reported that in India, the antibiotics sector constitutes the largest market segment of the pharmaceutical industry with a share of 15.7% (*MIHR report to CIPIH,* 2005). In summary, it can be seen that the use of antibiotics in India is heavy and unregulated compared with use in the United Kingdom and the United States.

Media systems in India, the United Kingdom and the United States

Historically, the Western media systems, including those in Western Europe and North America, have been based on market-oriented private ownership. In India, although there were some state-owned media agencies in the past, its private media sector has grown rapidly over the past decade (Business Knowledge Resource Online, 2012). In 2001, all of the top five daily newspapers and three of the top five television stations in India were private owned (Djankov, McLiesh, Nenova, & Shleifer, 2001). In 2010, all of the top five Indian English-language daily newspapers, including

The Times Of India, *Hindustan Times*, *The Hindu*, *The Telegraph* and *Deccan Chronicle* (Manocha, 2010), were owned or controlled by large private companies such as Bennett & Coleman & Co. Ltd. On the other hand, India still ranked poorly on press freedom. According to a press freedom rankings released by the organization Reporters Without Borders (2012), the United Kingdom was ranked 28th out of 179 countries, the United States was ranked 47th, while India was ranked 131st.

Prevalence of NDM-1 in India, the United Kingdom and the United States

The NDM-1 was initially identified in India. By September 2011, there were 143 NDM-1 cases in India, 88 cases in the United Kingdom (Health Protection Agency, 2011), and three cases in the United States. Moreover, a research paper published in *The Lancet Infectious Diseases* reported that bacterial strains with the NDM-1 were found in the public water supply in New Delhi, India (Walsh, Weeks, Livermore, & Toleman). The water sources that tested positive were used for drinking, food preparation, bathing and personal hygiene and laundry, indicating bacteria carrying the NDM-1 have been "widely disseminated in New Delhi" and that the enzyme "has spread into key enteric pathogens" (Walsh et al., p.360). Thus, the NDM-1 can be viewed as prevalent in India and the United Kingdom, and it is emerging in the United States.

Shih, Wijaya and Brossard (2008) investigated media coverage of three types of public health epidemics, including mad cow disease, West Nile virus, and avian flu, and found that different development stages of a specific risk influence media coverage of health-related risk issues. Thus, it seems reasonable to deduce that news reporting of NDM-1 in India, the United Kingdom, and the United States would be influenced by the prevalence of NDM-1 in each country.

Health Literacy

Definition of Literacy

Because general literacy is the necessary prerequisite to processing and understanding health information, it is necessary to understand what literacy constitutes and how it may vary from one country to the next. As the most comprehensive measure of adult literacy in the United States since 1992, the 2003 National Assessment of Adult Literacy (NAAL) assessed seven types of literacy skills: (1) basic skills of recognizing and understanding words; (2) basic skills of understanding sentences; (3) text search capability; (4) ability to identify necessary calculations in text; (5) ability to calculate mentally or with the help of calculators to solve quantitative problems; (6) ability to make reasonable inferences while reading; (7) capability to use information obtained in above processes for decision-making.

Previous research found that level of education is closely associated with the usage pattern of health information in newspapers (Hay, Coups, Ford, & DiBonaventura, 2009). Compared to people with lower education levels, those with higher education levels are more likely to be exposed to health information in newspapers (Hay, Coups, Ford, & DiBonaventura, 2009) and trust health information in newspapers (Hesse, et al., 2005).

Definition of Health Literacy

In the report *Healthy People 2010*, health literacy was defined by the U.S. Department of Health and Human Services as "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions" (2000, p. 11-20). In a broader definition of health literacy, the World Health Organization (1998) not only stressed citizens' personal ability to deal with health information, but also emphasized citizens' intrinsic

motivation for better health status: "Health literacy represents the cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand, and use information in ways that promote and maintain good health" (p. 10). Apart from that, the American Medical Association (1999) has defined health literacy in a more practical and functional way: "[Health literacy is] the ability to read and comprehend prescription bottles, appointment slips, and the other essential health-related materials required to successfully function as a patient" (p. 552).

Health Outcomes and Behaviors Associated with Health Literacy

Research in the past years has documented that health literacy not only affects people’s ability to seek, receive and use health information (Longo, et al., 2010), but also affects people's health outcomes and behaviors (Parker, Ratzan, & Lurie, 2003; Speros, 2005). It is a strong predictor of health status that "empowers people to act appropriately in new and changing health-related circumstances" (Speros, 2005, 33). The benefits of health literacy improvement include better health status, reduced health care costs, enhanced health knowledge and a more efficient health care system (Speros, 2005). Therefore, improving health literacy has become a national health goal in the United States (Department of Health and Human Services, 2000).

There are many negative consequences of inadequate health literacy. For instance, inadequate health literacy is associated with inappropriate treatments (Persell, Osborn, Richard, Skripkauskas &Wolf, 2007), relatively higher mortality (Sudore, Yaffe, Satterfield et al., 2006) and other undesirable health outcomes. At present, researchers believe inadequate health literacy is still common, affects people from all facets of life (Speros, 2005) and is a common challenge faced by health organizations all over the world (Stableford & Mettger, 2007).

Health Literacy and Media Literacy

Health news coverage in popular media has been increased during the past decades (Gilk, 2003). Interest in media literacy as a facet of health education has been growing because media literacy can have an impact on how people consume and utilize health content in the news media (Gilk, 2003). Also, based on a national telephone survey, a report ("The Social Life of Health Information, 2011") released recently by the Pew Research Center indicated that people's media literacy and health literacy are "inextricably linked" (Long, 2011, para. 4). Therefore, it is necessary to take media literacy into consideration when discussing health literacy.

Definition of Media Literacy

Media literacy has become increasingly important to society (Livingstone, 2004), and has become a fast growing research area during the past decades (Potter, 2010). To date, there is little consensus over the standard definition of media literacy; a number of scholars and organizations have made their own attempts and proposed various definitions (Brown, 1998; Potter, 2010).

Briefly, media literacy refers to the ability or skill to use media information. For example, according to the National Communication Association, "A media literate person understands how words, images, and sounds influence the way meanings are created and shared in contemporary society in ways that are both subtle and profound" (as cited in Potter, 2010, p.677). From a skills-based approach, the skills of access, analysis, evaluation and content creation are the most recognized components of media literacy (Livingstone, 2003). For example, Schwarz (2005) defined media literacy as "the ability to access, analyze, evaluate, and create media in a variety of forms" (p. 11). Many scholars also have stressed the ability to think critically when defining media literacy (Adams & Hamm, 2001; Brown, 1998;

Siverblatt & Eliceiri, 1997). For instance, to Siverblatt and Eliceiri (1997), media literacy is "a critical-thinking skill that enables audiences to decipher the information they receive through the channels of mass communications and empowers them to develop independent judgments about media content" (p. 48). In sum, although there are diverse definitions of media literacy, all definitions emphasize understanding "the selection, interpretation, and impact" of media messages (Rubin, 1998: p.3).

Health Literacy in India, the United Kingdom and the United States

There is widespread agreement, including by researchers and healthcare practitioners, that health literacy is an important factor influencing the prevention and control of emerging diseases (Gargano, Schreier, & Hughes, 2010; Pappas, et al., 2007). Therefore, it seems reasonable to deduce that health literacy would be an important factor that affects people's perception and behaviors towards NDM-1.

India. According to the most recent data from the 2011 census for India, the absolute literacy rate in India was only 74%, which means 26% of the Indian population was illiterate. Here, the criteria for "literate" is the ability to read and write with understanding (Park, 2009). No research has examined the health literacy status in India, but given that general literacy is a required precursor to using health information effectively, it is clear that at least 26% of the Indian population may lack health literacy skills.

The United States. According to the U.S. Department of Health and Human Service (2008), more than one-third of U.S. adults have difficulty with common health tasks, and only 12% of U.S. adults had proficient health literacy skills.

The United Kingdom. In comparison with India and the U.S., health literacy condition in the UK is relatively better. The 2011 Skills for Life Survey (SLS) showed that 14.9% of British adults were at or below the entry level for health literacy (UK

Department for Business, Innovation and Skills, 2011). According to the UK Department of Health (2009), the 2011 Skills for Life Survey (SLS) indicated that less than 60 % of British adults had the full potential to deal with health information and perform complex tasks.

Media literacy education in the United Kingdom, the United States and India

As noted by Livingstone and Thumim (2003), "there is little consensus over the appropriate means to measure media literacy" (p.1). Although scholars and educators have not yet agreed on how to measure media literacy, we can still draw useful lessons from the development of media literacy education in different countries. In the following paragraphs, the state of media literacy education in India, the United Kingdom and the United States will be reviewed and discussed. Generally speaking, media literacy education is developing rapidly in the United Kingdom and the United States, while it has only just begun to grow in India.

The United Kingdom. The United Kingdom has been widely acknowledged as a leader in media literacy education because media literacy education has long been established in the national school curriculum (Rubin, 1998). UK media education not only emphasizes understanding the content and social influence of media messages, but also pays attention to how to engage citizens in the creation and production of media content (Brown, 1998). In 2002, the British government proposed a communications bill (draft) to 'promote media literacy' among the UK population. This was the first time that the United Kingdom had addressed this issue at the policy level (Livingstone & Thumim, 2003). Later in 2003, for the first time in UK legal history, the Communication Act of 2003 gave the duty to promote media literacy to the Office of Communications (Ofcom). After that, media literacy levels in the United Kingdom generally have improved. For example, according to the recent *UK Adults's Media*

Literacy Report (Ofcom, 2011), compared to the past, UK adults are more likely to understand that media content is regulated across media platforms.

The United States. Media literacy is emerging in the United States (MacDonald, 2008). U.S. scholars and media literacy educators generally agree that citizens should be equipped with adequate skills to utilize and benefit from media. But unlike the media education in United Kingdom, media literacy projects in the United States tend to pay more attention to the negative nature of mass media (Brown, 1998). In this way, media audiences are trained to be aware of the negative influences of advertising and media entertainment.

India. While media literacy education is fast growing in developed countries such as the United Kingdom, the United States and Canada, it is just beginning to gain interest from educators and scholars in developing countries such as India (Arul & Suresh, 2009). Although the Indian media industry is rapidly developing, media literacy in India is making very slow progress (Arul & Suresh, 2009). On the one hand, Indian media education "enjoys a low priority in educational institutions and communication centers" (Arul & Suresh, 2009, p.121). For example, media literacy programs or media education programs are provided by a number of British universities (e.g., University of East Anglia, University of London) and U.S. universities (e.g., the University of Texas-Austin, Temple University); but in India, there are no similar college programs at all and research on media literacy education is very hard to find (Arul & Suresh, 2009). In addition, "insufficient training and lack of teaching materials available to media educators" (Arul & Suresh, 2009, p.127) make it very difficult for educators to keep up with the development of information and technology.

Media literacy and health literacy are important for health communication

research. Both media literacy and health literacy levels have an impact on people's attitudes toward health-related risk information and how the health-related risk information is delivered. Thus, in this study, media literacy and health literacy levels in India, United Kingdom and the United States are considered as important factors influencing the media messages about the NDM-1.

Training of Health Journalists in Three Countries

Today's health news industry environment is ever-changing and challenging; thus, vocational training is crucially important for health journalists (Schwitzer, 2009). The primary objective of training is to enhance journalists' knowledge and upgrade skills, to raise the quality of health journalism and to ensure that health messages are "delivered effectively by seasoned reporters who perform thoughtfully even in the face of breaking news and tight deadlines" (Dentzer, 2009, p. 1). Opportunities for training in health reporting and the extent of specialized training among health journalists varies significantly among the three countries in this study.

United Kingdom

Organizations. In the United Kingdom, there are some professional organizations for health reporters, such as the Medical Journalists' Association (London, UK) and the Guild of Health Writers (Hampton, UK). The Medical Journalists' Association (MJA) was founded in 1967 and has established itself to "support and encourage its members and enable them to work efficiently and at high levels of accuracy" ("Medical journalism at its best", n.d.). Its membership consists of "over 400 of the UK's leading medical and health journalists" ("Medical journalism at its best", n.d.), as well as "doctors, nurses, therapists and academics who contribute to national and provincial newspapers, professional journals, business and consumer magazines, radio, television and the web, and/or who write books" ("About Us", n.d.,

para. 2). The MJA organizes and manages various events for those who create health content in the media, such as the "Are you at sea with statistics?" (December, 2011), "Protecting patients, checking doctors: Have we got the balance right?" (October, 2011) and "Coventry health journalism" conference (June 2011).

Health journalists in the United Kingdom also have the opportunity to benefit from some other European organizations and projects, such as the Association of Health Care Journalists (AHCJ), an offshoot of the American AHCJ organization that was launched for all European health journalists and the HeaRT (Health Reporter Training) project. The HeaRT project, which was launched in November 2010, was designed to "develop vocational training on health reporting for journalists" ("Health Reporter Training Summer 2012", 2012, p. 2). The HeaRT 2012 program is designed for "health journalists, working journalists, journalism students, editors and publishers" ("Health Reporter Training Summer 2012", 2012, p. 1). This 2012 program has seven partner countries in Europe, including Estonia, Finland, Germany, Greece, Romania, Spain, and the United Kingdom. In the United Kingdom, training sessions are available at Coventry University. Seventy-seven seminars and courses were designed to provide participants with not only specialist knowledge, but also useful skills such as interpreting medical research reports and understanding statistics ("Health Reporter Training Summer 2012", March 11, 2012).

University Education. In the United Kingdom, several universities offer health journalism programs designed to provide appropriate and thorough training for future health reporters. For example, established in 2009, the master’s program in science journalism at City University London provides "a thorough grounding in the best practices in health, science and environmental journalism, whilst teaching you to be a critical consumer of scientific information" ("Science Journalism: Overview", n.d., para.

1). The program's graduates have been working for newspapers, magazines, broadcast media and the World Health Organization ("Science Journalism: Career Prospects", n.d.). In addition, Coventry University also offers a health journalism MA program.

United States

Organizations. In the United States, professional organizations also play a vital role in the training of health journalists. The most well-known organization is the Association of Health Care Journalists (AHJC). Founded in 1998 and now located at the University of Missouri-Columbia School of Journalism, the AHCJ has more than 1,000 members from 15 nations ("History of AHCJ", n.d.) and provides various types of training to its members, including conferences, workshops and seminars, as well as online interactive courses.

In his research report, *The State of Health Journalism in the U.S.*, Schwitzer (2009) described AHCJ as "one of the most positive forces in the [Health Journalism] industry" (p. 5):

> Its annual (and more recently introduced regional) conferences have become popular and successful training opportunities for hundreds of journalists. The group has also begun offering periodic workshops on urban and rural health topics. AHCJ has published comprehensive guides on covering the quality of health care, on covering hospitals, on multicultural health issues, and on covering obesity. Its online tip sheets address dozens of health care topics. (p. 5)

University Education. The first health journalism program in the United States was launched at the University of Minnesota in 2003 (Johnson, 2006). This masters of arts program in health journalism, which combines knowledge and training in journalism and public health, was designed to bring together students from two disciplines and teach them how to communicate public health issues accurately and effectively (Johnson, 2006). At present, this program has two different training directions: health journalism and health communication. According to the official

website of the University of Minnesota, the health journalism emphasis prepares students to "gain advanced knowledge about public health and the evaluation of claims from health, medical, and scientific sources, as well as advanced training on reporting health stories for different media" (Program curriculum section, n.d., para. 1). Also, the University of California-Berkeley launched a three-year M.P.H./M.J. (Master of Public Health and Master of Journalism) concurrent degree program, which "allows students to combine their interests in public health, journalism, communications and media" (University of California-Berkeley, n.d., para. 1). The program prepares students to be future public health professionals who are also successful media practitioners, communicators, and journalists.

But still there is much room for improvement. Schwitzer (2009) analyzed the data from a 2008 survey of members of the AHCJ, which was conducted jointly by AHCJ and the Kaiser Family Foundation (KFF). The survey showed that although 20% of respondents (staff journalists) said their training opportunities had increased in recent years, 43% of respondents reported a reduction of training opportunities (Schwitzer, 2009). This point is consistent with Dentzer's (2009) argument that many health journalists thought they didn't receive enough training in medical knowledge. Schwitzer's (2009) research suggested that more training opportunities should be created for young health journalists and editors.

India

Training provided by NGOs. People have long failed to pay proper attention to the significance of medical journalism, especially in developing countries like India (“Medical Journalism”, 2011). Compare with the United States and United Kingdom, there seem to be very few training programs for health journalists in India. However, in summer 2006, an India-based non-profit organization, Communication for

Development and Learning, organized a training course for experienced Indian health journalists (International Journalists' network, 2006).

Educational institutions. Several educational institutions in India offer medical journalism education to students. For example, the James Lind Institute offers two types of medical journalism programs: a Professional Diploma in Medical Journalism and an Advanced Postgraduate Diploma in Scientific Writing and Medical Journalism, both of which are short-term programs. The Professional Diploma in Medical Journalism program, which takes only 4 - 6 months, prepares students with a "strong foundation in medical journalism and narrative techniques" (Professional Diploma in Medical Journalism, n.d., para. 4). Another advanced postgraduate diploma program, which takes 6 -8 months, aims to "provide high level of understanding of core writing and analytical skills" (*Advanced Post-Graduate Diploma in Scientific Writing and Medical Journalism*, n.d., para. 3).

In the Indian definition of medical journalism, medical news "helps inform readers about how to live longer and healthier lives, how to avoid unnecessary suffering and how to use resources as wisely as possible" (“Medical Journalism”, 2011, para. 5). Differing from health journalism education in the United Kingdom and United States, medical journalism education in India attaches great importance to audience interest and narrative skills. For instance, the James Lind Institute elaborated this point as follows: "A journalist should always keep in mind that he/she is narrating a story and not merely setting down facts" (“Medical Journalism”, 2011, para. 7).

Differences of health journalists training among three countries

To sum up, the current status of health journalism training in India is worse than that in the United Kingdom and the United States. In the United Kingdom, the development of health journalists training depends not only on formal college

education and domestic organizations, but also on other European organizations. In the United States, health journalists not only have the opportunity to receive training from international organizations like AHCJ (Association of Health Care Journalists), but also have the opportunity to use resources from world-class communication schools like the University of Missouri School of Journalism. In comparison, it seems that health journalists in the India do have fewer resources and opportunities. Given the discussions above, it is reasonable to expect that there would be some different patterns of reporting among newspaper coverage of NDM-1 among these three countries. The research question is presented as follows.

RQ: Will the presentation of risk-related information differ in Indian, UK and U.S. newspaper coverage of NDM-1?

Theoretical Framework

Psychometric paradigm

People's perception of risk has an enormous impact on their decision-making process and hazard management (Slovic, 2000). The psychometric paradigm, which was proposed by Slovic and his colleagues, is the predominant and most widely used approach in research about public attitudes toward risks (Bronfman, Cifuentes, & Willis, 2007; Renn & Rohrmann, 2000; Slovic, 1987).

According to Slovic et al. (1982), the basic idea of the psychometric paradigm is that “perceived risk is quantifiable and predictable” (p.85). By utilizing psychological scaling methods and multivariate analysis techniques, researchers have developed "quantitative measures of perceived risk, perceived benefit, and other aspects of perceptions" (Slovic, 2000: p.xxii-xxiii); hypothesized a set of risk characteristics; and tested how these risk characteristics can influence people's risk perception and acceptance (Slovic et al., 1982; Slovic, 2000).

Typically, within the psychometric paradigm, researchers have used questionnaires to measure people's risk attitudes and perceptions about various hazards, including technological risks and natural hazards, such as nuclear power, mad cow disease, avian flu, and so on (Slovic et al., 1982). Fischhoff et al. (1978) used the psychometric paradigm to study perceived risk for 30 activities and technologies, including alcohol, fire fighting, handguns, and so forth. A total of 76 individuals completed anonymous questionnaires. Four measures of risk and benefit were examined: the perceived benefit of each activity, the perceived risk of each activity, acceptability of the current risk level, and characterization of risk based on risk dimensions such as dread, knowledge and controllability. The questionnaire data suggested that these risk dimensions might be "effective predictors of the tradeoff between acceptable risk and perceived benefit" (Fischhoff et al., 1978, p.127).

As the study by Fischhoff et al. (1978) demonstrated, perceived risk is quantifiable and predictable (Slovic et al., 1982; Slovic, 1987). The psychometric techniques utilized by Fischhoff et al. (1978) were also found to be effective in risk perception research, numerous similar studies were carried out the following years (Slovic, 1987). Slovic, Fischhoff, and Lichtenstein (1980) conducted a study to investigate how experts and the public perceive risk. Four different groups of people were involved in the study: college students, members of the League of Women Voters, members from the Active Club, and experts. Participants were asked to rate 30 activities with regard to the fatality and the relationship between perceived risk and annual fatalities, along with nine risk characteristics: voluntariness, immediacy of the effect, knowledge about risk to people, knowledge about risk to science, controllability, newness, potential threat to future generations, dread, and severity of consequences. The researchers found that public perception of risk is a multidimensional task and a

wide range of characteristics drive public perception of risk, including dread, severity, newness, potential threat to future generations, and others; in contrast, the number of expected fatalities inform experts' perception of risk.

Thus, researchers within the psychometric paradigm were able to produce “quantitative representations of risk attitudes and perceptions” (Slovic, Fischhoff, & Lichtenstein, 1982: p.84), use psychometric techniques such as psychophysical scaling and multivariate analysis techniques to explore the structure of people’s risk perception (Renn & Rohrmann, 2000), construct cognitive maps (Slovic, 1987), and investigate the roles of those psychometric variables in influencing people's risk perception and decision-making.

The utilization of psychometric techniques involves understanding people's behavior, predicting the potential social impact of an event and protecting potential victims from diverse hazards (Slovic, 1987). Although the definition of “risk” is not the same for everyone (Slovic et al., 1982; Slovic, 1987), research on people's risk perceptions shows that remarkable similarities can be identified among diverse public groups (Slovic, 2000). In short, the psychometric paradigm has some implications for risk communication and risk management (Slovic, 1987).

Risk characteristics

Psychometric research suggests that there is a broad domain of risk characteristics that determine the acceptance of risk for the general public. However, there are several different versions of these "general concepts." Slovic, Fischhoff, and Lichetenstein (1995) proposed that risk perception is most strongly determined by the following five risk characteristics:

(1) Knowledge about risk: the degree to which a risk is understood;

(2) Severity of consequences: the likelihood of the risk causing death;

(3) Dread: the degree to which the event evokes a feeling of dread;

(4) Global catastrophic potential: the degree to which a risk may cause catastrophic consequences such as death across the world;

(5) Controllability of the risk: the degree to which a risk can be prevented or controlled (such as a decrease in mortality).

Some other studies have extended early research and investigated 18 risk characteristics (Slovic et al, 1980; Slovic, Fischhoff, and Lichetenstein, 2000). Using a factor analysis, Slovic et al. (1980) proposed three dimensions of perceived risk (see Table 2-2), labeled “dread” (number 1-12), “familiarity” (number 13-17), and "population" (number 18). The "dread" dimension means that risks are regarded as hard to control, hard to prevent, potentially fatal, having an inequitable distribution of risks and benefits, catastrophic, globally catastrophic, threatening to future generations, irreducible, increasing in impact, involuntary, and affecting everyone. The "familiarity" dimension refers to difficulty in observing the risk, the immediacy of consequences, newness, the lack of understanding among those exposed, and outcomes unknown by science. The "population" dimension means the number of people exposed to the risk.

Using the above-mentioned risk characteristics, Slovic, Fischhoff, and Lichetenstein (2000) asked people to rate 90 different types of hazards, such as nuclear power, terrorism, DDT, antibiotics, and so on. According to the factor analysis, three "underlying dimensions of factors" were confirmed (see Table 2-2) (Slovic, Fischhoff, & Lichtenstein, 2000: p.141). These finding were also consistent with the research of Slovic, Fischhoff, and Lichtenstein (1982).

To summarize, prior literature about psychometric paradigm research holds that there are three main risk characteristics in general: (1) the degree to which a risk is

known precisely; (2) the degree to which it evokes feelings of dread; and (3) the population involved in the risk (Slovic, Fischhoff, & Lichtenstein, 1982; Rohrmann & Renn, 2000; Slovic, Fischhoff, & Lichtenstein, 2000).

Risk perception and media coverage

Risk perception studies also have pointed out that the media coverage of some unfortunate events (e.g., accidents, environmental pollution) may greatly influence risk perceptions. Early work with the psychometric paradigm emphasized one question: What role do risk perceptions play in influencing the impact of unfortunate events? As a result, risk perceptions studies have shown that in addition to the nature of the particular event (e.g., how many people died in an accident), people's risk perceptions also can be influenced by how the event is described in the media, especially when the coverage is biased. In this case, the influence of media can be significant (Slovic, 2000).

Thus, in this particular study, the psychometric paradigm is used as a theoretical framework to investigate how newspapers construct and convey health-related risk information. When the psychometric paradigm was introduced to communication research for the first time, Fung et al. (2011) studied news coverage of avian flu, using five dimensions of risk characteristics: (1) catastrophic potential information; (2) dread-evoking information; (3) uncertainty; (4) perceived controllability; and (5) familiarity. This study used the coding instruments created by Fung et al. (2011) to see how risk characteristics are presented in coverage regarding NDM-1 in three different countries: India, the United Kingdom, and the United States.

Hypotheses

This study investigated news reporting about the NDM-1 superbug in different countries by examining how journalists describe NDM-1 in terms of risk dimensions.

Based on the risk perception research literature and research goals, the author has proposed a set of hypotheses.

A content analysis conducted by Fung et al. (2011) indicated that news coverage of avian flu in different countries varied significantly in the inclusion of dread-evoking information, presentation of catastrophic potential, uncertainty-related information and familiarity-related information. As the NDM-1 was initially isolated in India and has already spread in India and the United Kingdom, the researcher expects that more uncertainty, less dread and less familiarity will be observed in U.S. news coverage regarding the NDM-1. Hence, the following hypotheses have been proposed:

Hypothesis 1a: News coverage of the NDM-1 superbug in Indian and UK newspapers will include more worst case scenario information about NDM-1 risk than coverage in U.S. newspapers.

Hypothesis 1b: The placement of this worst case scenario information will be more prominent in Indian and UK coverage than in U.S. coverage.

Hypothesis 2a: News coverage of the NDM-1 superbug in Indian and UK newspapers will use more loaded words than coverage in U.S. newspapers.

Hypothesis 2b: The placement of loaded words will be more prominent in Indian and UK coverage than in U.S. coverage.

Hypothesis 3a: News coverage of the NDM-1 superbug in U.S. newspapers will contain a greater proportion of uncertainty-related information than coverage in Indian and UK newspapers.

Hypothesis 3b: The placement of this uncertainty-related information will be more prominent in U.S. coverage than in Indian and UK coverage.

Hypothesis 4a: In comparison to news coverage in U.S. newspapers, news

coverage of the NDM-1 superbug in Indian and UK newspapers will provide more risk magnitude information about human infection/ death.

Hypothesis 4b: In comparison to news coverage in U.S. newspapers, news coverage of the NDM-1 superbug in India and UK newspapers will provide more information about the magnitude of risks for financial loss to society.

As the World Health Organization (2010a) reported, although antimicrobial resistance has been an important issue confronting countries worldwide, it is "particularly a concern in countries where prescription of antimicrobials is unregulated and where you can buy antibiotics over the counter," such as India. Further, it seems unlikely that the situation of of antibiotic misuse in India will have any observable change in the short term (WHO, 2011e). Thus, the researcher infers that the Indian press will consider this issue less controllable. Moreover, based on the health literacy situation in these three countries, the researcher also expects that UK news coverage will contain more information about the prevention of NDM-1. Further hypotheses are formulated as follows:

Hypothesis 5a: In news coverage of the NDM-1 superbug, UK newspapers will be most likely and Indian newspapers will be least likely to include personal protection information.

Hypothesis 5b: In news coverage of the NDM-1 superbug, UK newspapers will be most likely and Indian newspapers will be least likely to include societal protection information.

Another hypothesis is formulated based on Fung et al.'s (2011) study. They suggested that news reports can characterize a risk by referring to similar issues in the past, which constitutes a key indicator of familiarity-related information. For example, in the NDM-1 case, news coverage might refer to the MRSA superbug

(Methicillin-resistant Staphylococcus aureus), which was identified in 1961 and has spread throughout the world. Fung et al. (2011) also found that U.S. news coverage tends to contain more statements regarding the potential of local risks to become global risks. Hence, Hypothesis 6a, Hypothesis 6b and Hypothesis 7 are formulated as follows,

Hypothesis 6: In news coverage of the NDM-1 superbug, U.S. newspapers will contain a greater proportion of information regarding comparisons to known risks than Indian and UK newspapers.

Hypothesis 6b: The placement of information regarding comparisons to known risks will be more prominent in U.S. newspapers than in Indian or UK newspapers.

Hypothesis 7: In news coverage of the NDM-1 superbug, U.S. newspapers will contain a greater proportion of information regarding comparisons to known risk-related information in other countries than Indian and UK newspapers.

Here, information about risk comparison to other countries refers to "all regions or countries that appeared in each article for comparison" (Fung et al., 2011, p.898).

Table 2-1. Health-related data in India, United Kingdom, and the United States.

	India	United Kingdom	The United States
Total expenditure on health as % of GDP*	4.2	8.7	15.2
Government expenditure on health as % of total expenditure on health*	32.4	82.6	47.8
Private expenditure on health as % of total expenditure on health*	67.6	17.4	52.2
General government expenditure on health as % of total government expenditure	4.4	15.1	18.7
Infant mortality rate (probability of dying by age 1 per 1000 live births)**	50	5	7
Children under the age of 5 underweight (%)*	43.5	N/A	1.3
Life expectancy at birth (years)**	66.8	80.05	78.37
Life expectancy at birth (country comparison to the world)**	161	28	50
Physicians (per 10,000 population) *	6	27.4	26.7
Hospital beds (per 10,000 population)*	9	34	31

Note: * *World health statistics 2011*, 2011; ** The Central Intelligence Agency (CIA), 2011a, b, c.

Table 2-2. Eighteen risk characteristics.

Risk characteristics	Explanations
1) Controllability	Control over the damage of certain unfortunate events
2) Preventability	Control over "the occurrence of a mishap" (Slovic, Fischhoff, & Lichtenstein, 2000: p.139)
3) Dread	The extent that a risk can make people feel dread
4) Fatality	Whether this risk causes any fatal harm; certainty of fatality
5) Equitable distribution of risks and benefits	Whether the benefits can be equitably distributed among those at risk (especially for technology-related issues, e.g., nuclear power)
6) Catastrophic potential	The degree to which a risk may cause "catastrophic loss of life" (Slovic, Fischhoff, & Lichtenstein, 2000: p.152)
7) Global catastrophic potential	The degree to which a risk may cause catastrophic consequences across the whole world
8) Future impact	Whether a risk threatens future generations
9) Reducibility	Whether the risk is easily reducible
10) Risk growth	Whether the risk is increasing or decreasing
11) Voluntariness	Whether people face the risk voluntarily
12) Personal effects	Whether the risk affects everyone personally
13) Observability	"Are the damage-producing processes observable as they occur?" (Slovic, Fischhoff, & Lichtenstein, 2000: p.138)
14) Immediacy of effect	Immediacy of consequences of certain unfortunate events
15) Newness	Whether the risk is new/novel or old/familiar
16) Unknown to those exposed	The degree to which a risk is understood by those exposed
17) Unknown to science	The degree to which a risk is unknown to science
18) The population involved	The number of people exposed to the risk

Note: summarized from Slovic, Fischhoff, & Lichetenstein (2000).

CHAPTER 3
METHOD

Design

This study was designed to investigate the differences in media coverage of the risks posed by the NDM-1 superbug in newspapers from India, the United Kingdom and the United States. These countries were chosen in this study due to the different development stages of NDM-1 in each country. It was initially discovered in India, then become prevalent in India and the United Kingdom, and now is emerging in the United States. The method used for this study is a comparative quantitative content analysis.

Sample

Newspapers were the chosen medium for analysis because they have several advantages. The first advantage is the accessibility of newspaper articles. Further, newspapers have the ability to communicate lengthy, complex and detailed information. More importantly, "issues and events are perceived differently across town, around the country and throughout the world" (The Newsbank, n.d., para. 4); and among all local news sources, "newspapers offer the most extensive, up-to-date record of emerging and ongoing local issues, personalities and stories of interest" (The Newsbank, n.d., para. 3).

Newspaper articles were retrieved from the LexisNexis Academic database using the key terms “NDM-1” and “NDM1.” The sample came from English-language newspaper articles discussing the NDM-1 and published in India, the United Kingdom, and the United States between August 2009 and December 2011. The data range was chosen because the first newspaper article covering the issue appeared in *The Guardian* (London), August 13, 2009. Duplicated and unrelated articles were excluded. For example, in some UK articles, the term “NDM” was an acronym for

“National Defence Medal” or the “North Down Museum”, so those articles were considered as irrelevant and were excluded.

Procedure

After articles were collected and screened for use in the study, the coding of all newspaper articles was completed by the researcher and another graduate student who is a native speaker of English. Both of the coders had been trained in quantitative content analysis.

First, both of the coders independently coded 20 articles and calculated the intercoder reliability. The percentage agreement was good for most questions, except for Q1 (worst case scenarios) and Q10 (societal protection information). After discussion, the coders independently coded another 20 articles and achieved substantial levels of agreement for all questions. Next, one coder coded about one third of the remaining 226 articles (70 articles) and the other coder coded two thirds (156 articles). Data from each article were entered into the spreadsheet.

Measures

This study uses a quantitative coding sheet (see Appendix A). Each news article we coded based on coding items adopted from previous research (Fung et al., 2011; Slovic et al., 1982). Based on the established research instruments developed by Fung et al. (2011), eight major risk dimensions of risk information were coded for each article, including:

1. Worst case scenarios: this term indicates whether the news article provides worst case scenario information of NDM-1. For example, a statement such as the following would be coded as worst case scenario information: "We are essentially back to an era with no antibiotics" (WHO, 2010a, para. 2). First, this variable will be coded as present or absent. Second, if it was present, the placement of this variable

was coded in terms of whether or not the information appeared in the headline, in the lead paragraphs, or in the body of the story.

2. Loaded words: this term indicates whether the news article uses any "emotionally charged language" (Dudo, Dahlstrom, & Brossard, 2007, p.438), such as life-threatening, fatal, deadly, kill, alarming, untreatable, etc. First, this variable will be coded as present or absent. Second, if it was present, the placement of this variable was coded in terms of whether or not the information appeared in the headline, in the lead paragraphs, or in the body of the story. Finally, the exact word or phrase which appears in this article will be recorded.

3. Uncertain words: this term indicates whether the news article uses any words to describe NDM-1 related issues as uncertain or unknown, such as not sure, unsure, unknown, questionable. undetermined, remains to be determined, remains to be seen. First, this variable will be coded as present or absent. Second, if it was present, the placement of this variable was coded in terms of whether or not the information appeared in the headline, in the lead paragraphs, or in the body of the story. Finally, the exact word or phrase which appears in this article will be recorded.

4. Risk magnitude information about human infection/death: this variable will be coded yes or no for each of the following choices: 0) information about human infection/death is absent; 1) the article provides qualitative/non-numerical information about human infection/death; 2) the news article provides quantitative information (chances of infection, number of infected persons) about human infection/death at numerator level (e.g., "there have been 50 cases identified in the UK"); 3) the news article provides quantitative information about human infection/death at numerator/population level (e.g., "at least 3% of people infected").

5. Risk magnitude information about financial loss to society: this variable will be

coded yes or no for each of the following choices: 0) information about financial loss to society is absent; 1) the news article provides qualitative information about financial loss to society caused by NDM-1 (e.g., "suffered a deadly blow"); 2) the news article provides quantitative information about financial loss (e.g., "dropped by 30%").

6. Personal protection information: this term refers to personal protection information to decrease personal risk of NDM-1 (e.g., wash hands, use antibacterial surface wipes, etc.). First, this variable will be coded as present or absent. If present, the statement about personal protection was recorded.

7. Societal protection information: This term refers to any actions taken by domestic and/or foreign governments or international organizations to prevent NDM-1. This variable will be coded as present or absent.

8. Information comparing NDM-1 to known risks:

(1) Risk comparison: This term indicates whether the news story mentions about any other superbugs which are known (e.g., MRSA, MSSA, C-Difficile, etc.). This variable will be coded into three categories: 1) one type of other superbugs mentioned; 2) two or more types of other superbugs mentioned; 3) The news story doesn't mention any other superbugs.

(2) Information about known risks: This variable will be coded into four categories (multiple choices: the coder can choose one or more answers): 1) the article provides qualitative/non-numerical information about any other superbugs which are known (e.g., MRSA, MSSA, C-Difficile, etc.); 2) the news article provides quantitative information (chances of infection, number of infected persons) about other superbugs at the numerator level (e.g., "there have been 50 cases identified in the UK"); 3)the news article provides quantitative information about other superbugs at

numerator/population level (e.g., "at least 3% of people infected"); 0) information about other superbugs is absent.

(3) Risk comparison to other countries: Here, “other countries” means any country other than the country where the newspaper was published. For example, for an article in the United Kingdom, “other countries” may include India, Pakistan, Italy, and so on. First, this variable was coded as present or absent. If present, the country name was recorded.

As has been noted previously that, Fung et al. (2011) investigated five dimensions of risk characteristics in their study of Hong Kong and U.S. coverage of avian flu. However, their coding instrument for the risk dimension of catastrophic potential information does not apply in the case of NDM-1. In order to examine catastrophic potential information, Fung et al. (2011) examined the presence of historical flu outbreaks, including the 1918 Spanish Influenza, the 1957 Asian flu, and the 1968 Hong Kong flu. These historical flu outbreaks had one point in common: all of them killed millions of people within a short time. But in the case of NDM-1, there is no record of major superbug outbreaks which were as disastrous as those historical flu outbreaks. Thus, the risk dimension of catastrophic potential information could not be examined in this study.

CHAPTER 4
RESULTS

Review of Method

Descriptions of the Sample

The total sample included 266 news articles, of which 148 were from newspapers in India, 97 were from the United Kingdom, and 21 were from the United States. Articles from India accounted for 55.6% of the total sample, while articles from the United Kingdom and the United States accounted for 36.5% and 7.9%, respectively. This distribution is consistent with the different development stages of the NDM-1 in each country. The unit of the analysis was each individual article.

The average length of newspaper articles in India, the United Kingdom and the United States were 512 words (range = 127 to 1795 words), 417 words (range = 64 to 1572 words), and 573 words (range = 133 to 1393 words) respectively. Not surprisingly, the appearance of Indian and UK news articles dealing with the NDM-1 tended to increase after 2009 (see Table 4-1). For example, in the United Kingdom, there were four articles concerning NDM-1 in 2009, 23 articles in 2010, and 70 articles in 2011. However, in the United States, the number of articles on the NDM-1 issue tended to decrease from 2010 (18 articles) to 2011 (three articles). The U.S. news media's lack of interest is possibly the main reason for this phenomenon.

Intercoder Reliability

Using Scott’s Pi formula for calculating intercoder reliability, the overall percentage of the intercoder agreement was .90. With some variables, such as personal protection information, risk magnitude information about human infection, and information about risk comparison to other countries, the intercoder agreement achieved .95. The lowest percentage of agreement was for the worst-case scenarios,

which achieved .81 (See Appendix C).

Statistical analysis

The researcher conducted chi-square tests to investigate potential differences among newspaper articles from the various countries in their use of risk information, as mentioned in the chapter of methodology.

Review of Findings

The coding process uncovered an interesting phenomenon well worth further investigation. Apart from "pure" health news, this study identified a number of articles from India that focused on why the deadly gene was named after the Indian capital of New Delhi or how the medical tourism business in India would be affected by the NDM-1 crisis. Some articles denied the NDM-1 problem by stating that the issue was international slander. They claimed that Western countries had ulterior motives and were trying to discredit the medical tourism industry in India.

Mostly published in 2010 (the early stage of the NDM-1 problem), those articles avoided describing the NDM-1 issue as a public health risk. Instead, they tended to express the following opinions: (1) The *Lancet* study, which was conducted by British scholars and raised public awareness of NDM-1 for the first time, was unscientific; (2) The *Lancet* study was supported by some pharmaceutical companies that make antibiotics; (3) The likelihood is great that the problem is not as serious as feared; and (4) Western countries want to suppress the booming medical tourism industry in India, as "150,000 Americans travelled overseas last year for medical care to save on costs"; thus the NDM-1 crisis had became "a PR nightmare for India's expanding health tourism industry" (Choudhury, 2010).

Although a number of news articles in India portrayed the NDM-1 superbug issue as a huge controversy, an unscientific conclusion, or a slander effort with ulterior

motives and unworthy of attention, many Indian news articles also warned of the potential dangers of NDM-1, noting that it is untreatable or unmanageable. Some articles in India also covered the severe situation of antibiotic overuse and resistance in India, as well as necessary measures that should be taken. Moreover, since September 2010, Indian newspapers began to request ask the public to wash their hands frequently or boil water before drinking. In April 2011, Indian newspapers announced that the government had began to finalize new guidelines to prevent misuse of strong antibiotics, indicating that the Indian government had realized the problem of irrational use of antibiotics and started to take corresponding measures to solve the problem.

Major findings from this study are presented in detail below.

H1a: Presence of Worst Case Scenarios

H1a posited that the coverage of the NDM-1 in India and the United Kingdom would include more worst-case scenarios about the risk of NDM-1 than coverage in the United States. Table 4-2 shows the presence of worst-case scenarios in the news coverage of NDM-1 in each country. Coverage in the United Kingdom and the United States was more likely to cover worst-case scenarios than those in India (India & UK: χ^2 (1, N = 245) = 3.94, $p < .05$; India & the U.S.: χ^2 (1, N = 169) = 4.06, $p < .05$[1]). Also, as 28.5% of U.S. articles and 21.6% of UK articles mentioned worst-case scenarios, there was no significant difference between them (χ^2 (1, N = 118) = .47, $p > .05$). Therefore, H1a was not supported.

H1b: Placement of Worst Case Scenarios

H1b posited that the placement of worst-case scenarios would be more

[1] P value is the significance level. For example, a p value of 0.10 means that there is a 10% chance that this deviation is due to chance alone. Based on standard $p < 0.05$, this is not within the range of acceptable deviation and the difference is statistically significant.

prominent in Indian and UK coverage than in U.S. coverage. The placement of worst-case scenario statements was coded into three categories: headlines, lead paragraphs, and story bodies. As shown in Table 4-3, four of 148 (2.7%) of Indian news articles and two of 21 (9.5%) U.S. news articles mentioned worst-case scenarios in the headlines or lead paragraphs. Thus the placement of worst-case scenarios was not more prominent in Indian coverage than in U.S. coverage (χ^2 (1, N = 169) = .90, p >0.05). Moreover, as six of 97 (6.2%) UK news articles presented worst-case scenarios in the headline or lead paragraph, there was no significant difference between the presence of worst-case scenarios in UK and U.S. coverage (χ^2 (1, N = 118) = .01, p > .05). Therefore, H2b was also not supported.

H2a: The Presence of Loaded Words

H2a posited that India and UK coverage of NDM-1 would use more loaded words to describe NDM-1 risk than U.S. coverage, because there have been more contracted cases in India and the United Kingdom. But as Table 4-4 shows, a significantly larger number of loaded words was presented in articles from the United Kingdom and the United States than in those from India (India & UK: χ^2 (1, N = 245) =31.06, p < .05; India & U.S.: χ^2 (1, N = 169) =5.70, p < .05), and there was no significant difference between the United Kingdom and the United States concerning the use of loaded words (χ^2 (1, N = 118) = .66, p > .05). Therefore, H2a was not supported.

Table 4-6 shows the most frequently used loaded words in each country. It is interesting to note that “warn/warning” were the most frequently used loaded word in all three countries. Other frequently used words included “threat,” “fear,” “worry/worrying/worryingly,” as so on.

H2b: Placement of Loaded Words

H2b posited that the placement of loaded words would be more prominent in news coverage of NDM-1 from India and the United Kingdom. Compared with U.S. coverage, a much smaller proportion of loaded words was presented in lead paragraphs in Indian newspapers (χ^2 (1, N = 169) = 28.85, $p < .01$, see Table 4-5), while there was no significant difference between UK and the U.S. coverage (headline: χ^2 (1, N = 118) = 3.61, $p > .05$; lead paragraph: χ^2 (1, N = 118) = 2.20, $p > .05$). Therefore, H2b was not supported.

H3a: Use of Words Reflecting Uncertainty

H3a proposed that a greater proportion of U.S. news coverage than Indian and UK news coverage would contain statements reflecting uncertainty. As Table 4-7 shows, the U.S. newspapers were most likely to use words suggesting uncertainty. About 38.1% of articles from the United States included uncertainty-related information regarding the NDM-1, while the percentage for articles in India was only 11.5%. Thus, the use of words suggesting uncertainty was significantly different between Indian and U.S. coverage (χ^2 (1, N = 169) = 8.33, $p < .01$). This difference was also observed between the United Kingdom and the United States (χ^2 (1, N = 118) = 21.05, $p < .01$), as only 3.1% of UK articles presented uncertainty-related information. This hypothesis was supported.

Table 4-9 shows the most frequently used uncertainty-reflecting words in news coverage for each country. For example, Indian and UK newspapers were more likely to use “don’t know”, while U.S. newspapers were more likely to use “unknown” and “no consensus on.”

H3b: Placement of Uncertain Words

H3b posited that the placement of uncertainty-related information would be more

prominent in U.S. coverage than in India and UK coverage. But the study found that all words reflecting uncertainty were placed in the body of the story, regardless of country. No uncertainty-connoting words were found in headlines or lead paragraphs. Therefore, H3b was not supported (see Table 4-8).

H4a: Information of Risks of Human Infection/Death

H4a proposed that news coverage of the NDM-1 superbug in India and the United Kingdom would provide more information about the magnitude of risks for human infection or death. As Table 4-10 exhibits, articles in the U.S. presented more qualitative level of information on human infection than those in India (χ^2 (1, N = 169) = 44.35, $p < .01$) and UK (χ^2 (1, N = 245)= 42.28, $p < .01$). At the numerator level, articles in UK provided more numeric information on human infection than those in India (χ^2 (1, N = 245) = 61.91, $p < .01$) and the U.S. (χ^2 (1, N = 118)= 10.80, $p < .01$), and there were no significant difference between India and the U.S. (χ^2 (1, N = 169)= 2.24, $p > .05$). But at the numerator and population level, India was the only country that offered information on human infection. Therefore, H4a was partly supported.

H4b: Risk Information About Financial Loss

H4b predicted that news coverage in India and the United Kingdom would contain more information about the magnitude of risk for economic losses caused by the NDM-1 superbug. As Table 4-11 shows, very few articles in the three countries mentioned economic losses caused by the NDM-1 superbug. At the qualitative level, the data did not show significant difference among these countries (e.g., between the United Kingdom and the United States, χ^2 (1, N = 118) = .07, $p > .05$). At the quantitative level, none of these three countries presented information about the risk of financial loss. Therefore, H4b was not supported.

H5a: Personal Protection Information

H5a posited that UK newspapers would be most likely to present personal protection information and Indian newspapers would be least likely to teach people how to protect themselves against superbugs. In comparison with news articles in India, a larger proportion of news articles in the United Kingdom (χ^2 (1, N = 245) = 6.99, $p < .01$) and the United States (χ^2 (1, N = 169) = 8.09, $p < .01$) presented personal protection information (see Table 4-12). News articles from the United Kingdom and the United States did not significantly differ in presenting personal protection information (χ^2 (1, N = 118) = .64, $p > .05$). Therefore, H5a was partially supported.

Personal protection information in this study included instructions for decreasing one's personal risk of NDM-1 through good hygiene, appropriate antibiotic use and safe drinking water. As is shown in Table 4-13, coverage in the United Kingdom and the United States was more likely to mention good hygiene (e.g., wash hands frequently and properly, use hand gels and antibacterial surface wipes) than those in India (India & UK: χ^2 (1, N = 245) = 10.85, $p < .05$; India & the U.S.: χ^2 (1, N = 169) = 7.24, $p < .05$). Also, as 23.8% of U.S. articles and 17.5% of UK articles mentioned measures to maintain personal and environmental hygiene, there was no significant difference between them (χ^2 (1, N = 118) = 2.46, $p > .05$). In addition, coverage in the United States was more likely to promote appropriate antibiotic use than those in India (χ^2 (1, N = 169) = 6.68, $p < .05$). On the other hand, India was the only country that offered information on drinking water safety (e.g., keep the water pipeline clean, drink purified water or drink boiled water).

H5b: Societal Protection Information

Societal protection information referred to any actions taken by domestic and/or

foreign governments or international organizations to prevent NDM-1 or reduce its impact. For example, these organizations included the World Health Organization (WHO), the Atlanta-based Center for Disease Control and Prevention (CDC), the National Health Service (NHS) in the United Kingdom, the India-based National Centre for Disease Control (NCDC), and other research centers.

H5b posited that articles in the United Kingdom would be most likely and articles in India would be least likely to present such information. As Table 4-14 exhibits, 66% of UK news articles, 38.1% of U.S. news articles and 29.1% of Indian news articles provided societal protection information when covering NDM-1. Significant differences were shown between the United Kingdom and the United States (χ^2 (1, N = 118) = 5.64, $p < .05$) and between the United Kingdom and India (χ^2 (1, N = 245) = 32.48, $p < .01$). There was no difference between India and the United States (χ^2 (1, N = 169) = .71, $p > .05$). Therefore, H5b was partially supported.

H6a: Information Comparing NDM-1 Risk to Known Risks — Presence of Other Superbugs and Information Type

H6a posited that U.S. newspapers would be most likely to contain comparisons to known risk-related information. As shown in Table 4-15, no significant difference was found between the United States and India (χ^2 (1, N = 169) = 1.45, $p > .05$) and between the United States and the United Kingdom (χ^2 (1, N = 118) = 1.99, $p > .05$). Moreover, a larger proportion of news articles from the United Kingdom mentioned two or more types of other superbugs in comparison to articles from India (χ^2 (1, N = 245) = 29.58, $p < .05$) and the United States (χ^2 (1, N = 118) = 5.65, $p < .05$); thus, U.S. newspapers did not contain a greater proportion of comparisons to other superbugs than UK newspapers. Further, as Table 4-16 shows, India was the least likely to provide qualitative and numeric information regarding comparisons to other

superbugs, but the U.S. and UK coverage was not significantly different, either on the qualitative level (χ^2 (1, N = 118) = .85, $p > .05$) or the numerator level (χ^2 (1, N = 118) = 1.20, $p > .05$). Therefore, H6a was not supported.

H6b: Placement of Information Comparing NDM-1 to Known Risks

H6b posited that the placement of risk information related to other superbugs would be more prominent in U.S. coverage than in Indian and UK coverage. But, as Table 4-17 shows, news articles from the United Kingdom and the United States did not mention other superbugs in the headlines or in lead paragraphs, while a few Indian articles did (1.4%). Therefore, H6b was not supported.

H7: Information Comparing Risks in Other Countries

H7 posited that news coverage of the NDM-1 superbug in U.S. newspapers would present more comparisons about risks related to NDM-1 in other countries. In general, news stories in the United Kingdom and the United States were more likely to contain information about risk comparison related to other countries than those in India (see Table 4-18), but there was no significant difference between UK and U.S. coverage (χ^2 (1, N = 118) = .73, $p > .05$). U.S. news articles were more likely to mention Canada and Australia as countries affected by NDM-1. As mentioned previously, the NDM-1 superbug was initially discovered in India; there was no significant difference between UK and U.S. coverage regarding comparisons to risks related to NDM-1 in India, but UK news articles were more likely to mention India's neighboring countries, such as Pakistan and Bangladesh. Therefore, H7 was partly supported.

Table 4-1. Numbers of newspaper articles on NDM-1 in each country.

	India	United Kingdom	The United States	Total
2009	0	4	0	4
2010	62	23	18	103
2011	86	70	3	159
Total	148	97	21	266

Table 4-2. Frequencies of worst case scenarios in news coverage.

	Frequency of worst case scenarios (Presence)	Percentage (Presence)
India	18 (Total = 148)	12.2%
United Kingdom	21 (Total = 97)	21.6%
The United States	6 (Total = 21)	28.5%
χ^2	India & United Kingdom: 3.94 (p= .047< .05) India & The United States: 4.06 (p= .04) United Kingdom & The United States: .47 (p= .49)	

Table 4-3. Placement of worst case scenarios in news coverage.

	India N = 148 (%)	United Kingdom N = 97 (%)	The United States N = 21 (%)
In the headlines	3 (2.0%)	2 (2.1%)	0 (0%)
In the lead paragraphs	1 (0.7%)	4 (4.1%)	2 (9.5%)
In the headlines or lead paragraphs (not replicated)	4 (2.7%)	6 (6.2%)	2 (9.5%)
In story body	14 (9.5%)	16 (16.5%)	4 (19%)
χ^2 (In the headlines or lead paragraphs)	India & United Kingdom: 1.03 (p=.31) India & The United States: .90 (p=.34) United Kingdom & The United States: .01 (p=.94)		

Table 4-4. Frequencies of loaded words in news coverage.

	Frequency of loaded words (presence)	Percentage (presence)
India	79 (Total = 148)	53.4%
United Kingdom	85 (Total = 97)	87.6%
The United States	17 (Total = 21)	81.0%
χ^2	India & United Kingdom: 31.06 (p= .00)	
	India & The United States: 5.70 (p= .02)	
	United Kingdom & The United States: .66 (p=.42)	

Table 4-5. Placement of loaded words in news coverage.

	India N = 148 (%)	United Kingdom N = 97 (%)	The United States N = 21 (%)
In the headlines [a]	11 (7.4%)	43 (44.3%)	4 (19.0%)
In the lead paragraphs [b]	19 (12.8%)	40 (41.2%)	13 (61.9%)
In story body	61 (41.2%)	71 (73.1%)	12 (57.1%)
χ^2 [a]	India & United Kingdom: 46.43 (p= .00)		
	India & The United States: 3.07 (p= .08)		
	United Kingdom & The United States: 4.6 (p= .03)		
χ^2 [b]	India & United Kingdom: 25.85 (p= .00)		
	India & The United States: 28.85 (p= .00)		
	United Kingdom & The United States: 2.98 (p= .08)		

Table 4-6. Most frequently used loaded words in news coverage.

	India N = 148 (%)	United Kingdom N = 97 (%)	The United States N = 21 (%)
1	Warn / Warning 26 (17.6%)	Warn / Warning 54 (55.7%)	Warn / Warning 9 (42.9%)
2	Deadly 15 (10.1%)	Threat / Threatening 42 (43.3%)	Dangerous 9 (42.9)
3	Threat 15 (10.1%)	Fear 39 (40.2%)	Fear 8 (38.1%)
4	Worrying / Worryingly / Worrisome 15 (10.1%)	Alarm /Alarming 22 (22.7%)	Worry / Worrying(ly) / Worrisome 7 (33.3%)
5	Serious 12 (8.1%)	Alert 20 (20.6%)	Alarm 4 (19.0%)
6	Dangerous / Danger 10 (6.8%)	Deadly / Deadliest 17 (17.5%)	Serious 3 (14.3%)
7	Alarm 6 (4.1%)	Danger /Dangerous 13 (13.4%)	Alert 3 (14.3%)
8	Alert 4 (2.7%)	Worry / Worrying / Worryingly 11 (11.3%)	Threat / Threatening 3 (14.3%)
9	Untreatable 4 (2.7%)	Serious 10 (10.3%)	Scary 2 (9.5%)
10	Fear 4 (2.7%)	Life-threatening 5 (5.2%)	Kill / Killer 2 (9.5%)
Continue		Severe 5 (5.2%)	
Continue		Untreatable 5 (5.2%)	

Note: All the data refers to the number of articles used a particular word, not the frequency of occurrence of a word)

Table 4-7. Frequencies of uncertain words in news coverage.

Country name	Frequency of uncertain words	Percentage
India	17 (Total = 148)	11.5%
United Kingdom	3 (Total = 97)	3.1%
The United States	8 (Total = 21)	38.1%
χ^2	India & United Kingdom: 4.44 (p=.04)	
	India & The United States: 8.33 (p=.00)	
	United Kingdom & The United States: 21.05 (p=.00)	

Table 4-8. Placement of uncertain words in news coverage.

	India N = 148 (%)	United Kingdom N = 97 (%)	The United States N = 21 (%)
In the headlines	0 (0%)	0 (0%)	0 (0%)
In the lead paragraphs	0 (0.6%)	0 (0%)	0 (0%)
In story body	17 (11.5%)	3 (3.1%)	8 (38.1%)

Table 4-9. Most frequently used uncertain words in news coverage.

Country name	Uncertain words
India	Don't know, no evidence, unknown, unpredictable
United Kingdom	Don't know, unclear, uncertain
The United States	Unknown, no consensus on, not sure, too early to judge

Table 4-10. Risk magnitude of human infection/death.

Types of risk information about human infection/death	India N = 148 (%)	United Kingdom N = 97 (%)	The United States N = 21 (%)
Qualitative level [a]	26 (17.6%)	15 (15.5%)	18 (85.7%)
Numerator level [b] (Numeric information)	40 (27.0%)	76 (78.4%)	9 (42.9%)
Numerator / population level	3 (2.0%)	0 (0%)	0 (0%)
χ^2 [a]	India & United Kingdom: .19 (p= .67) India & The United States: 44.35 (p=.00) United Kingdom & The United States: 42.28 (p=.00)		
χ^2 [b]	India & United Kingdom: 61.91 (p=.00) India & The United States: 2.24 (p= .13) United Kingdom & The United States: 10.80 (p= 00)		

Table 4-11. Risk magnitude of financial loss.

Types of risk information about financial loss	India N = 148 (%)	United Kingdom N = 97 (%)	The United States N = 21 (%)
Qualitative level [a]	3 (2.0%)	1 (1.0%)	1 (4.8%)
Quantitative level	0 (0%)	0 (0%)	0 (0%)
χ^2 [a]	India & United Kingdom: .01 (p=.93) India & The United States: .00 (p=1.00) United Kingdom & The United States: .07 (p=.79)		

Table 4-12. Frequencies of personal protection information in news coverage.

	Frequency of personal protection information	Percentage
India	12 (Total = 148)	8.1 %
United Kingdom	19 (Total = 97)	19.6%
The United States	6 (Total = 21)	28.6%
χ^2	India & United Kingdom: 6.99 (p= .008) India & The United States: 8.09 (p= .00) United Kingdom & The United States: .64 (p= .46)	

Table 4-13. Personal protection information in news coverage.

Personal protection information	India N = 148 (%)	United Kingdom N = 97 (%)	The United States N = 21 (%)
Maintain good hygiene (personal hygiene, environmental cleaning) [a]	7 (4.5%)	17 (17.5%)	5 (23.8%)
Drink boiled water or purified water / keep the water pipeline clean	8 (5.4%)	0 (0%)	0 (0%)
Take antibiotics appropriately, don't overuse [b]	2 (1.4%)	3 (3.1%)	3 (14.3%)
χ^2 [a]	India & United Kingdom: 10.85 (p=.00) India & The United States: 7.24 (p=.01) United Kingdom & The United States: .04 (p=.84)		
χ^2 [b]	India & United Kingdom: 0.23 (p=.63) India & The United States: 6.68 (p=.01) United Kingdom & The United States: 2.46 (p=.12)		

Table 4-14. Frequencies of societal protection information in news coverage.

Country name	Frequency of societal protection information (Presence)	Percentage (Presence)
India	43 (Total = 148)	29.1%
United Kingdom	64 (Total = 97)	66.0%
The United States	8 (Total = 21)	38.1%
χ^2	India & United Kingdom: 32.48 (p= .00) India & The United States: .71 (p= .40) United Kingdom & The United States: 5.64 (p= .02)	

Table 4-15. Comparison to other superbugs — presence.

	India N = 148 (%)	United Kingdom N = 97 (%)	The United States N = 21 (%)
One type of other superbugs	14 (9.5%)	9 (9.3%)	4 (19.0%)
Two or more types of other superbugs [a]	12 (8.1%)	35 (36.1%)	2 (9.5%)
Total [b]	26 (17.6%)	44 (45.4%)	6 (28.6%)
χ^2 [a]	India & United Kingdom: 29.58 (p= .00) India & The United States: .05 (p= .83) United Kingdom & The United States: 5.65 (p= .02)		
χ^2 [b]	India & United Kingdom: 22.18 (p= .00) India & The United States: 1.45 (p= .23) United Kingdom & The United States: 1.99 (p= .16)		

Table 4-16. Comparison to other superbugs — information type.

Types of risk information about risk comparison to other superbugs	India N = 148 (%)	United Kingdom N = 97 (%)	The United States N = 21 (%)
Qualitative level [a]	7 (4.7%)	15 (15.5%)	5 (23.8%)
Numerator level [b] (Numeric information)	6 (4.1%)	19 (19.6%)	2 (9.5%)
Numerator / population level	2 (1.4%)	0 (0%)	0 (0%)
χ^2 [a]	India & United Kingdom: 8.26 (p= .00)		
	India & The United States: 10.15 (p= .00)		
	United Kingdom & The United States: .85 (p= .36)		
χ^2 [b]	India & United Kingdom: 15.43 (p= .00)		
	India & The United States: 1.22 (p= .27)		
	United Kingdom & The United States: 1.20 (p= .27)		

Table 4-17. Placement of risk comparison to other superbugs in news coverage.

Placement of risk comparison to other superbugs	India N = 148 (%)	United Kingdom N = 97 (%)	The United States N = 21 (%)
In the headlines	1 (0.7%)	0 (0%)	0 (%)
In the lead paragraphs	1 (0.7%)	0 (0%)	0 (%)
In story body	27 (18.2%)	44 (45.4%)	7 (33.3%)

Table 4-18. Risk comparison to other Countries.

	India N = 148 (%)	United Kingdom N = 97 (%)	The United States N = 21 (%)
Comparison to other countries (overall) [a]	66 (44.6%)	75 (77.3%)	18 (85.7%)
Comparison to India	/	66 (68.0%)	16 (76.2%)
Comparison to Pakistan, Bangladesh or Indian sub-continent	25 (16.9%)	56 (57.7%)	5 (23.8%)
Comparison to other Asian countries (Israel, Turkey, China, Hong Kong, Taiwan, South Korea, Japan or Singapore)	16 (10.8%)	9 (9.3%)	3 (14.3%)
Comparison to UK	41 (27.7%)	/	13 (61.9%)
Comparison to other European countries (Sweden, Germany, Italy, Greece, France, the Netherlands, Belgium, France, Israel, Turkey, Portugal and Spain)	21 (14.2%)	18 (18.6%)	8 (38.1%)
Comparison to the U.S.	17 (11.5%)	12 (12.4%)	/
Comparison to Canada	9 (6.1%)	9 (9.3%)	13 (61.9%)
Comparison to Australia	10 (6.8%)	9 (9.3%)	13 (61.9%)
χ^2 [a]	India & United Kingdom: 25.68 (p= .00) India & The United States: 12.43 (p= .00) United Kingdom & The United States: .73 (p= .39)		

CHAPTER 5
DISCUSSION

This study was designed to assess how newspapers in three countries are covering the NDM-1 superbug and how the coverage varies in three countries. Using the psychometric paradigm as a theoretical framework, the study provides quantitative analysis of NDM-1 superbug-related coverage in newspaper articles in three different countries: India, the United Kingdom and the United States.

The following dimensions of risk characteristics were examined in this study: (1) dread-evoking information, (2) uncertainty, (3) controllability, and (4) familiarity. While the previous chapter described how newspapers in India, the United States, and the United Kingdom covered the NDM-1 issue, this chapter presents major implications from this study, limitations, and recommendations for future research.

Major Findings and Implications

Dread-evoking Information

Worst-case scenarios, loaded words, and information about the magnitude of risks for human infection or death or for financial losses related to NDM-1 are all types of dread-evoking information. First, this study showed that UK and U.S. newspapers were more likely to include worst-case scenarios and loaded words than were Indian newspapers, and the placement of loaded words was more prominent in the UK and the U.S. coverage. This phenomenon may be the result of India's resistance to the public attention to NDM-1, especially with the consideration of India's booming medical tourism industry.

Second, UK newspapers were most likely to include quantitative information about the risks of human infection or death, while U.S. newspapers were most likely to provide qualitative information about the magnitude of the risk of human infection or death, such as “[The NDM-1] is apparently widespread in parts of India” and “the

number of NDM-1 related infections rise rapidly”. Although some scientists believed that the NDM-1 superbug is an "Indian superbug," the media message in India was not scarier than that in the United States, where far fewer cases have been found than in India. This phenomenon shows the emphasis on health-related issues in the British and American societies.

Perhaps the most noticeable difference between this study and previous research (e.g., Fung et al., 2011) is that, in this study, not all countries involved consistently treated the NDM-1 as a public health problem. In other words, the problem may lie in the objectivity of India’s newspapers. India was the exception. In 2011, some articles were published with titles such as "Delhi Superbug Is New Global Health Threat" or "Wake Up! The 'Superbug' Threat Is Real," but this was not the case in 2010. During the first few months following the *Lancet* paper that identified the NDM-1 enzyme (August 2010), many Indian news articles took a denial or debate stance, rather than encouraging awareness or action. Therefore, it was not surprising that coverage of NDM-1 in India did not present as much dread-evoking information as was expected.

Uncertainty

This study also examined the presence and placement of information suggesting uncertainty about the NDM-1 superbug in the news coverage. In general, only a few news articles included uncertainty-related information regarding NDM-1. As Table 4-7 shows, of the 266 articles examined in the current study, only 28 used uncertainty-connoting words such as "unknown" or "unclear." However, a greater proportion of U.S. articles (38.1%) presented uncertain-reflecting statements than did articles in India and the UK. This finding is consistent with the previous research that remoteness can affect the presence of uncertain words in news coverage of public

health risks (Fung et al., 2011). The high proportion of articles in the U.S. may be the result of geographical remoteness; stories of NDM-1 in India might seem geographically remote to most U.S. citizens not traveling to South Asia.

People can easily recognize uncertain-reflecting words in news stories (Johnson and Slovic, 1995), and such uncertainty-related information influences how a risk is understood by people/science (Slovic et al., 1980; Slovic, Fischhoff, and Lichetenstein, 2000). Therefore, the investigation into uncertainty-related information has important implications for risk communication research; when the uncertainty of a risk is stressed in the press, people's perceptions of risk will possibly be affected.

Controllability

Significant differences were shown in the dimension of controllability among newspaper coverage in three countries. This dimension of controllability was measured by the presence of personal protection information and societal protection information. Fung et al. (2011) found that information about personal protection was seldom mentioned, and there were no significant differences in personal protection information between the Hong Kong and U.S. coverage of avian flu. However, the current study found that although personal protection information such as hand hygiene was also infrequently mentioned in all three countries, Indian newspapers were least likely to present personal protection information such as advice on good hand hygiene. One possible reason is that many Indian articles were still debating the seriousness of NDM-1. As a result, health educator and communication practitioners may be reluctant to provide personal protection information. Another possible reason is that the state of both health literacy and media literacy in the United Kingdom and the United States is relatively better than that in developing countries.

The finding suggested some practical implication for health reporters and health educators. News articles in all three countries mentioned that basic sanitation practices are the most important personal protection measures, suggesting that health reporters and health educators should be encouraged to promote hygiene practices like hand washing in coverage of NDM-1 and other easily transmissible risks. However, very few newspaper articles in the three countries told their readers to prevent overuse or inappropriate use of antibiotics, suggesting that more measures should be taken to promote appropriate antibiotic use. Also worth noting is the fact that only Indian newspapers presented advice on drinking water, as British scientists stated that the NDM-1 gene had been found in community waste seepage (water pools in streets or rivulets) and tap water in New Delhi, India (Walsh, Weeks, Livermore, & Toleman).

Second, UK news articles were most likely to mention societal protection information such as actions taken by governments and organizations to prevent NDM-1; a significantly smaller proportion of coverage in India and the U.S. mentioned such information. One explanation is that the United Kingdom has a national health service that guarantees all citizens have access to health care service. As mentioned in the section discussing health care systems in the literature review, government spending on and government control of health care differs greatly between the United Kingdom and India and between the United Kingdom and the United States, as health services in the United Kingdom are primarily financed by the government. Therefore, the NHS has been frequently mentioned in domestic health reporting. A large proportion of articles in the United Kingdom mentioned NHS hospitals, NHS patients, and the researchers, scientists and clinicians working in the NHS. Another explanation might be that the UK treated this issue as a serious threat, while India did

not consider it a pressing problem during the first few months and only a few cases were identified in the United States.

Familiarity

The dimension of familiarity was measured by analyzing the inclusion of information comparing NDM-1 risk to known risks and information comparing the NDM-1 risk in the host country versus other countries. In terms of the presence of risk comparisons to other known risks (other superbugs), news coverage of NDM-1 in the United Kingdom and the United States included more comparisons than stories in India. Although the researcher expected that the United States would include more information about other superbugs, there was no significant difference between UK and U.S. coverage. Additionally, UK newspapers were most likely to mention two or more types of other superbugs. One possible explanation is that a number of cases of NDM-1 had been identified in the United Kingdom and UK reporters consistently regarded it as a serious and urgent problem.

With regard to information comparing NDM-1 risks in the host country versus in other countries, the data showed that news articles in India presented the least amount of information about risk comparison related to other countries. One possible reason is that the NDM-1 was initially identified in India, but Indian newspapers did not want to admit that India is the “epicenter” for this problem.

It is not surprising that the U.S. news articles were more likely to mention Canada because of the countries' proximity. Interestingly, U.S. news articles were more likely to mention Australia, while UK news articles were more likely to mention India's neighboring countries such as Pakistan and Bangladesh. One possible explanation for this phenomenon is that health writers often rely on announcements from domestic public health departments to get information on a public health issue in

other countries, so articles from the same country may repeat the same country names as those included in public health department documents.

Summary

In sum, the current study expanded the application of the psychometric framework of risk perception to examine news coverage of global health risks. The current study supports previous research showing that social factors, such as geographical factors and social/cultural context of the involved country, may "influence the way newspapers report on a distant risk" (Fung et al., 2011, p.902).

The study indicated the complexity of global health communication considering the features of the NDM-1 itself and complicated contextual variances across different regions. For example, Indian newspapers denied the existence of the NDM-1 problem for a long time allegedly to protect the reputation of India's medical tourism business. On the other hand, the media messages may influence the way audiences think about the risk (Slovic, 2000); if people in different regions perceive health threats very differently, it may become harder for countries to gain international support to reduce the risk (Fung et al., 2011).

The findings suggested that the psychometric framework of risk perception may be useful in understanding and predicting people's risk perceptions and psychological acceptance of other health risks. Meanwhile, it is advisable that decision-makers take more social factors into consideration to ensure the public receives correct and transparent health information.

Limitations

Several limitations of this study should be noted. As described in the methods section, this study drew articles from newspapers in only three countries from an online database, so the results may not be generalizable to other media platforms,

such as magazines, television, and network media. Also, the sampling process from an electronic news database made it impossible to take other factors into consideration, such as headline font (including font size and color), use of images, and so on.

A further limitation of this study is the lack of information about material types. For many articles examined in the study, the LexisNexis database does not specify if the article is an editorial, an informative article, a column, or anything else. Thus there is no ability to do further analysis.

Furthermore, the cultural differences among these three countries may pose another limitation for this study, although it is very difficult to avoid in comparative research.

Future Research Recommendations

First, only the newspaper coverage of health risks was examined in this study. If this study were to be replicated, it may be useful to include reports from other types of media platforms, such as magazines, health websites, health blogs, and so on.

This study is also limited by the period of the evaluation. The researcher believes that new studies could also examine similar risk scenarios longitudinally and measure changes over a longer period. This could be particularly helpful for future research to reveal the changes of coverage in different developmental stages of public health issues.

Further, this study did not examine the actual impact of health risk information on society across countries. Lab experiments can be designed to assess the relationship between risk perception and behavioral outcomes.

APPENDIX A
CODING SHEET

Item ID # _____ Coder name: DF / BB Code date: ____/____/2012

Basic information

Newspaper Date: _____ /_____ /20___

Worst case scenarios

1. Does the news article provide worst case scenario information of NDM-1? (H1a)

   1) Yes → Go to Q2

   2) No → Go to Q3

2. Where is the worst case scenario information placed in the article? (H1b)

   1) In the headline

   2) In the lead paragraph

   3) In story body

Loaded words

3. Does the news article use any loaded words? (H2a)

   1) Yes → Go to Q4

   2) No → Go to Q5

4. Where are the loaded words placed in the article? (H2b)

   1) In the headline

   2) In the lead paragraph

   3) In story body

● Specify the "loaded words": _____

Uncertain words

5. Does the news article use any uncertain words? (H3a)

1) Yes → Go to Q6

2) No → Go to Q7

6. Where are the uncertain words placed in the article? (H3b)

1) In the headline

2) In the lead paragraph

3) In story body

● Specify the "uncertain words": _____

Risk magnitude information about human infection/death

7. What types of information does the news article provide regarding the human infection/death caused by NDM-1? (H4a)

1) Qualitative risk information (non-numerical NDM-1-related risk statements)

2) Quantitative risk information — numerator level

3) Quantitative risk information — numerator/population level

0) None

Risk magnitude information about financial loss to society

8. What types of information does the news article provide regarding the financial loss to society caused by NDM-1? (H4b)

1) Qualitative risk information (non-numerical NDM-1-related risk statements)

2) Quantitative risk information (numerically based NDM-1-related risk statements)

0) None

Personal protection information

9. Regarding the NDM-1 risk, does the news article provide any personal protection information to decrease personal risk of NDM-1? (H5a)

1) Yes

2) No

● Specify the “personal protection information”: _____

Societal protection information

10.Regarding the NDM-1 risk, does the news article provide any societal protection information to prevent people from NDM-1? (H5b)

1) Yes

2) No

Information about risk comparison to known risks

11. Does the news article compare the risks of NDM-1 to other similar risk scenarios? (H6a)

1) Yes, one → Go to Q12

2) Yes, more than one → Go to Q12

3) No → Go to Q14

12. What types of information does the news article provide regarding other similar risk scenarios? (H6a)

1) Qualitative risk information (non-numerical NDM-1-related risk statements)

2) Quantitative risk information (numerator level)

3) Quantitative risk information (numerator/population level)

0) None

13. Where are the similar risk scenarios placed in the article? (H6b)

1) In the headline
2) In the lead paragraph
3) In story body

14. Does the news article provide information about risk comparison to other countries? (H7)

1) Yes, specify the country name_____
2) No

APPENDIX B
CODING GUIDELINES

Basic information

Date – MM/DD/20_ _

Worst case scenarios

1. Worst case scenarios – indicate whether the news article provides worst case scenario information of NDM-1 by circling yes or no. Examples of the worst case scenarios are: "We are essentially back to an era with no antibiotics." (WHO, 2010a, para. 2) "Less than a handful of antibiotics are currently in the pipeline to combat antibiotic-resistant bacteria, and the worldwide spread of severe resistance genes is considered a nightmare scenario." (WHO, 2011 c, para. 9).
2. Placement of worst case scenario information – if the news article provides any information about worst case scenario, indicate where the information is placed: 1) headline; 2) lead paragraph; 3) story body.

Loaded words

3. Loaded words – indicate whether the news article uses any "emotionally-charged language" (Dudo, Dahlstrom, & Brossard, 2007, p.438), such as life-threatening, fatal, deadly, kill, alarming, untreatable, etc.
4. Placement of loaded words – if the news article uses loaded words, indicate where the word(s) is placed: 1) headline; 2) lead paragraph; 3) story body. Also, write down the word(s).

Uncertain words

5. Uncertain words – indicate whether the news article uses any words to describe NDM-1 related issues as uncertain or unknown, such as not sure,

unsure, unknown, questionable. undetermined, remains to be determined, remains to be seen.

6. Placement of Uncertain words – if the news article uses uncertain words, indicate where the word(s) is placed: 1) headline; 2) lead paragraph; 3) story body. Also, write down the word(s).

Risk magnitude information about human infection/death

7. Information of the human infection/death – If the news article does not provide any information about human infection/death (e.g., chances of infection, number of infected persons), circle 0). If the news article provides qualitative/non-numerical information about human infection/death, circle 1). If the news article provides quantitative information about human infection/death at numerator level (e.g., "there have been 50 cases identified in the UK"), circle 2). If the news article provides quantitative information about human infection/death at numerator/population level (e.g., "at least 3% of people infected"), circle 3).

Risk magnitude information about financial loss to society

8. Information about financial loss to society – If the news article provides qualitative information about financial loss to society caused by NDM-1 (e.g., "suffered a deadly blow"), circle 1). If the news article provides quantitative information about financial loss (e.g., "dropped by 30%"), circle 2). If the news article does not provide any information about financial loss to society, circle 0).

Personal protection information

9. Personal protection information – indicate whether the news article include any personal protection information to decrease personal risk of NDM-1 (e.g.,

wash hands, use antibacterial surface wipes, etc.)

Societal protection information

10. Societal protection information – indicate whether the news article include any actions taken by domestic and/or foreign governments or international organizations to prevent NDM-1.

Information about risk comparison to known risks

11. Risk comparison – indicate whether the news story mention about any other superbugs which are known (e.g., MRSA, MSSA, C-Difficile, etc.). If the news article mentions one type of other superbugs, circle 1). If the news article mentions two or more types of other superbugs, circle 2). If none, circle 3).
12. Information of known risks – If the news article does not provide any information about other similar risks (e.g., chances of infection, number of infected persons), circle 0). If the news article provides qualitative/non-numerical information about other similar risks, circle 1). If the news article provides quantitative information about human infection/death at numerator level (e.g., "there have been 50 cases identified in the UK"), circle 2). If the news article provides quantitative information about human infection/death at numerator/population level (e.g., "at least 3% of people infected"), circle 3).
13. Placement of similar risk scenarios– if the news article mentions similar risk scenarios, , indicate where the information is placed: 1) headline; 2) lead paragraph; 3) story body.
14. Risk comparison to other countries – If the news article provides similar risk scenarios in other regions and/or country(countries), circle 1) and record the name of other regions and/or country(countries) appear in the article. If not,

circle 2).

APPENDIX C

SCOTT'S PI COEFFICIENTS

Item	Scott's pi
Q1. Presence of worst case scenarios	0.85
Q2. Placement of worst case scenarios	0.81
Q3. Presence of loaded words	0.93
Q4. Placement of loaded words	0.95
Q5. Use of words reflecting uncertainty	0.9
Q6. Placement of uncertain words	0.98
Q7. Information of risks of human infection/death	0.95
Q8. Risk information of financial loss	0.85
Q9. Personal protection information	0.95
Q10. Societal protection information	0.85
Q11. Information comparison NDM-1 to known risks information	0.83
Q12. Information comparison NDM-1 to known risks information --- information type	0.93
Q13. Placement of information comparing NDM-1 to known risks	0.81
Q14. Information comparing risks in other countries	0.95
Overall	0.9

APPENDIX D
LOADED WORDS

Alarm, alarming, alert, danger, dangerous, deadly, deadliest, fatal, fear, frightening, horror, impossible to treat, kill, killer, lethal, life-threatening (life threatening), panic, scare, scary, serious, severe, threat, threatening, trouble, troublesome, unmanageable, unprecedented, unstoppable, untreatable, warn, warning, worry, worrying(ly), worrisome, worst

APPENDIX E
UNCERTAIN WORDS

Do not know, further studies seem necessary, impossible to say, "It has to be seen ...", little data, need to be confirmed, no consensus on, no conclusions, no evidence, no records, not sure, there can't be any assumptions made, too early to judge, uncertain, uncertainty, unclear, unknown, unpredictable

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BIOGRAPHICAL SKETCH

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