Risk Communication, Risk Perception and Behavior as Foundations of Effective National Security Practices

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INTRODUCTION

Any event that impacts upon the ability of individuals, communities, organizations and nations to carry on as normal constitutes a threat to national security. As a result, the management of risk is a central role of governments around the world. The UK's Blackett Review of High Impact Low Probability Risks states, "One of the key drivers in a major crisis is to avoid collateral impacts and restore 'normality' as quickly as possible" (Government Office for Science, 2011, p. 24). Whether you believe in the possibility of returning to "normal" or embrace the concept of "the new normal" (McArdle et al., 2012, p. 754), the success of government interventions before, during, and after a crisis relies on the cooperation of the public. Risk communication is a primary tool for achieving understanding and cooperation from society. Therefore, risk communication is an essential part of risk management and forms an important cornerstone of the foundation of effective national security practices.

This chapter will argue that risk communication, risk perception, and behavior must be recognized as foundations of effective national security, and that policies and practices that do not incorporate the concepts underpinning effective risk communication are bound to fail. In doing so, this chapter will provide a detailed explanation of the primary drivers and, thus, the primary targets, of all risk communication: risk perception and behavior. It will explain how risk perceptions influence the psychological and behavioral responses that play a key role in determining health, social, and economic impacts of extreme events. It will then unpack the relationship between risk communication, risk perception, and behavior. This will entail an exploration of the underlying issues informing expert and public variations in perceived risk, the identification of likely behavioral reactions to extreme events, and an illustration of the ways in which effective risk communication can mitigate negative impacts by reducing unnecessary care-seeking and increasing compliance with official guidance. Finally, this chapter will suggest steps that can be taken to better enable practitioners and policy makers to develop risk communication messages and emergency response programs capable of informing public perceptions of risk and positive health behaviors.

RISK COMMUNICATION: A PILLAR OF NATIONAL SECURITY

Risk communication is increasingly recognized as a primary tool within an effective security arsenal. Depending on the nature and evolution of the risk being addressed, risk communication can be used to reduce anxiety during times of crisis, to manage awareness in order to maintain engagement, or to raise awareness of issues when engagement is low (Government Office for Science, 2009, p. 2). As a result, risk communication can play a variety of roles in preparing for, responding to, and recovering from a broad range of natural and technological, accidental, and malicious disasters. Overall, risk communication is believed to improve resilience across organizations and communities.

The increased focus on the use of communication to improve our ability to prepare, respond, and recover from extreme events can be seen in a variety of government documents (see Government Office for Science, 2009, 2011; Cabinet Office 2011a), national and international research programs (e.g., PIRATE, CIE Toolkit, PRACTICE, Resilient Futures), and independent government reviews. These reviews reflect upon the success or failure of governments to respond to crises ranging from infectious diseases such as pandemic flu (Hine, 2010), to extreme weather events such as flooding and hurricanes (U.S. House of Representatives, 2006; Cabinet Office 2008a), to social unrest (HMIC, 2011), and, finally, to terrorist attacks (The 9-11 Commission, 2004; Coroner's Office, 2011; Home Office, 2012). The independent findings and lessons learned repeatedly stress the need for improvements in the communication of risk. Why is the effective communication of risk important enough to lead governments from around the world to emphasize the need to communicate and engage with members of the public?

THE IMPORTANCE OF EFFECTIVE RISK COMMUNICATION

Evidence gathered from real-world emergencies and disasters, government training exercises, and academic studies prove repeatedly that getting the messages right can mean the difference between a successful response and a failed response. In short, the effective communication of risk can be a matter of life or death during a crisis situation. This is because risk communication messages inform the public psychological and behavioral responses to risks, and as a result, help determine the subsequent likelihood of disease or injury (morbidity) and survival (mortality) rates in response to a crisis (Rogers et al., 2007).

The relationship between risk communication, morbidity, and mortality rates was evident in the reported evacuation experiences of the World Trade Center (WTC) during the terrorist attacks in New York City on September 11, 2001. While the evacuation of the WTC is largely viewed as a success, resulting in a survival rate of 99% for those below the crash site, there were instances where communication had the potential to put lives at risk (Glass and Schoch-Spana, 2002; Proulx and Fahy, 2003; Sheppard et al., 2006). For example, survivors report that, shortly after the first airplane struck Tower 1, a message was issued over the public announcement system informing individuals that, "…Tower 2 was secure and that it was safe for occupants to return or stay in their offices" (Proulx and Fahy, 2003, p. 30). This information was correct at the time (approximately 9:00 A.M.), although Tower 2 was struck by an aircraft three minutes later. Behavioral responses to the message varied: some occupants in Tower 2 started their evacuation prior to the announcement and continued to evacuate after hearing the announcement, others disregarded the instruction to return or stay in their office and began to evacuate, and others turned back in order to return to their offices upon hearing the announcement (Proulx and Fahy, 2003). The behavioral response to the risk messaging resulted in different health outcomes for different individuals caught up in the same event.

Acknowledging Variations in Behavioral Responses to Risk Communication

The importance of understanding variations in behavioral response to risk communication cannot

be underestimated. Individuals can instigate a number of major and minor behavioral changes in order to avoid real or perceived risks. Some of these changes are "spontaneous precautionary behaviours" (Rubin et al., 2010), undertaken without (and sometimes in the absence of) official advice. Examples of spontaneous precautionary behaviors include the self-evacuation of approximately 40% of the population within 15 miles of the Three Mile Island nuclear plant during a partial meltdown in 1979 (Glass and Schoch-Spana, 2002); the widespread purchase of face masks during the 2005 avian flu and 2009 swine flu pandemics; and the avoidance of public transportation after the 9/11 attacks in the United States, the 2004 Madrid bombings, and the 2005 London bombings (Gigerenzer, 2004; López-Rousseau, 2005; Fasolo et al., 2008). Some behaviors, such as the adoption of hand and respiratory hygiene advice during an infectious disease outbreak (Hine, 2010) will only have a minor impact on day-to-day life, while others such as social distancing, unwarranted self-presentation at health facilities, the unnecessary uptake of antibiotics, and the avoidance of travel, have the potential to impact the economy, as well as the ability of health services and society to respond to current and future threats.

Implications for Physical Health

While a number of spontaneous precautionary behaviors enable members of the public to avoid or decrease the likelihood of exposure to risk, some behaviors lead to exposure to additional risks. As a result, the way in which individuals perceive risks and the way in which they behave as a result of those perceptions can have serious implications for physical health.

Consider the relationship between the perceived risk of travel on public transportation after terrorist attacks and the resultant public behavior. Evidence for this relationship began to accumulate in December 2001, when David G. Myers noted that cancellations had crippled the aviation and holiday industry. He assumed that Americans were driving instead of flying and based on a mile-for-mile comparison in the United States, which demonstrated that Americans are 37 times more likely to die in a car crash than on a commercial flight expressed concern that "…the terrorists may still be killing us, in ways unnoticed" (Myers, 2001). Gigerenzer (2004) confirmed that, when compared with the 2000 statistics, the 2001 national revenue passenger miles showed a significant decrease from October to December 2001. Additionally, road traffic data indicated that Americans were driving further, as the monthly miles driven were significantly higher than in previous years. Gigerenzer went on to note significantly higher levels of road traffic fatalities during the months of October, November, and December 2001, which he calculated as resulting in an additional 353 road traffic fatalities. When put in context, the number of additional road traffic fatalities that came about as a result of this spontaneous avoidance behavior exceeds the number of lives lost (266) on the hijacked airplanes.

A similar trend has been observed in Europe, where "…dying as a passenger on a train is 20 times less likely than dying as a passenger in a car" (López-Rousseau, 2005, p. 426). An analysis of the Madrid train bombings in 2004 and the London bombings in 2005, however, demonstrates that avoidance behaviors resulted in an entirely different set of physical health outcomes for the Madrid and London public. For example, in spite of a significant decrease in the number of train travelers after the Madrid bombing, Spaniards did not replace train travel with car journeys. As a result, members of the Spanish public were not exposed to the additional risk associated with car journeys (López-Rousseau, 2005). Londoners avoided the underground and buses after the London bombings in 2005 to a greater extent than the Spaniards, but to a lesser extent when compared to the Americans. Instead of increases in the use of cars, however, Londoners took to the roads on bicycles and two-wheeled vehicles. Fasolo et al. (2008) did not find evidence of an increase in fatalities as a result of the Londoners' substitutions.

López-Rousseau (2005) and Fasolo et al. (2008) suggest that the role of cultural factors must be taken into consideration when discussing variations in public behavioral responses to extreme events. For instance, variations in the extent of behavioral change between the three countries could have been influenced by the differences in scale and number of fatalities as a result of the attacks. Other issues, such as a desire to avoid London's congestion charge for all private vehicles entering London and the lack of a car culture in Spain could have influenced the level of travel substitutions. Finally, both the Spanish and UK publics have had previous experience with terrorist attacks, which also has the potential to mediate the public reaction (López-Rousseau 2005, Fasolo et al., 2008).

Implications for the Ability of Systems to Respond

It is evident that public perceptions of risk and their resulting behavioral responses can create additional risks for members of the public. The interactions between risk perceptions and behavior can also impact the ability of governments and government agencies to respond to disasters, thus creating additional risks for national security. While many emergency response plans focus on the potential of public behavior to overwhelm their resources and ability to respond, threats to emergency response systems can arise from over-response, under-response, and the more likely, unpredictable, mixed responses to official advice, or a lack, thereof.

The potential of members of the public to overwhelm a systems ability to respond through over-response was illustrated by the 1987 radioactive incident in Goiania, Brazil. In this case, government failure to communicate about an accidental release of radioactive material resulted in the healthcare system becoming overwhelmed when more than 112,000 individuals sought medical examination for an incident that resulted in 4 deaths and 260 contaminations (IAEA, 1998; Acton et al., 2007; Rogers et al., 2007). Similarly, the Sarin attacks in the Tokyo subway (1995)

tested the ability of systems to cope with unpredictable public behavior. In this, case, "5,510 of those who flooded hospital emergency departments were "psychological casualties"—that is, they experienced physical symptoms without direct exposure to nerve agent" (Lemyre et al., 2005 p. 2). More recently, the World Health Organization had to offer guidance on how to avoid radiation in response to the "panic" buying that took place during the Fukushima nuclear accident in Japan in March 2011. In this instance, members of the public were buying potassium iodide tablets, which prevent the absorption of radioactive iodide-131 into the thyroid gland (McCurry, 2011).

Conversely, in the case of the 2009 swine flu pandemic, in spite of the fact that the UK government's communication strategy successfully built up high levels of public awareness and understanding of pandemic flu (Hine, 2010), reported levels of engaging in protective behaviors and likely acceptance rates for vaccines were low (Rubin et al., 2010). These low levels were attributed to a number of factors (e.g., levels of worry about the possibility of one's child catching swine flu or personally catching swine flu, perceiving the government to be well-prepared for swine flu, etc.), including the perception that too much fuss was being made about the risk of swine flu (Rubin et al., 2010). The 2009 swine flu pandemic was not as severe as it could have been, but it issued a warning to governments that communication about future outbreaks of infectious disease must address the low uptake of recommended behaviors observed during this outbreak.

Finally, it is important to recognize that, when discussing the ability of systems to respond, we must not plan for a simple over-demand or under-demand for health or emergency services. This is because the public behavioral response to extreme events is often mixed, as demonstrated by the public response to the Anthrax attacks in the United States (2001). Public behavioral responses to the Anthrax attacks ranged from the "panic" purchasing of gas masks and ciprofloxacin, to multiple reports of calm and orderly

behavior as individuals waited in line for their turn to be tested or given prophylaxis, to reports of individuals in affected states reporting little or no concern about contracting anthrax (Glass and Schoch-Spana, 2002). These variations in public behavior in response to a shared event (anthrax) did not generate enough of an impact to cripple the system's ability to respond. However, they did provide evidence that it does not take a large percentage of the population to change their behavior(s) in order to increase the demands on the system in quite a large way. This highlights the need for the development of resilient, adaptable response plans and procedures built upon a strong understanding of the relationship between risk communication, risk perceptions, and behavior.

Inspiring Trust, Influencing Response

One constant trend in the midst of all of these complex behavioral reactions to extreme events is that the likelihood of the success or failure of risk communication is strongly and consistently mediated by the levels of public trust (Glass and Schoch-Spana, 2002; Earle, 2004; Kasperson and Palmlund, 2005; Rogers et al., 2007; Pearce et al., 2012a). This is due to the fact that the ability of governments and government agencies to respond to disasters is limited by the extent of public trust in the efficacy of the response and in those tasked with communicating the response. Building and maintaining trust is vital, as trust is considered the primary route to cooperation and once lost it is very hard to regain (Wynne, 1992; Rogers et al., 2007; Pearce et al., 2012a,b).

Fear that the public will panic has repeatedly led authorities to withhold information following extreme events. Rather than reassuring the public, this has resulted in an increase in unnecessary care seeking of the sort seen following the 1987 Goiania radiation accident. Trust was clearly an issue during the anthrax incident in the United States in which behavior ranged from over-reactions to under-reactions. The variation noted in public behavior during and after the anthrax attacks must be "…seen in the context of conflicting reports from experts about the nature of the threat, as well as vague and nonspecific government alerts about additional possible attacks, the level of public concern appears measured and reasonable" (Glass and Schoch-Spana, 2002, p. 222). Additionally, public confidence in the Japanese government rapidly declined in the wake of the 2011 Fukushima nuclear accident when the hydrogen explosion made the severity of the crisis clear despite government attempts to downplay the seriousness of the situation (Funabashi and Kitazawa, 2012). Organizations tasked with risk communication are also learning that the use of modern technologies and 24/7 news broadcasts to document and respond to crises are hindering attempts to downplay the seriousness of events in an information-rich media environment.

Lack of trust may not only lead to an increase in unnecessary care seeking, but may also lead to refusal to adopt recommended protective health behaviors. For example, following the 2011 anthrax attacks in the United States, failure to effectively communicate reasons for lack of consistency in testing and treatment regimes for groups exposed at different times, or to address ongoing concerns about history of racial discrimination in vaccination programs led to particularly low uptake of prophylactic vaccination among at-risk African American postal workers (Blanchard et al., 2005). While the consequences on that particular occasion were not fatal, failing to persuade the public to comply with targeted vaccination programs following a catastrophic outbreak of an infectious disease could determine the effectiveness of these interventions and subsequent mortality and morbidity rates.

RISK PERCEPTION: A FOUNDATION FOR UNDERSTANDING PUBLIC RESPONSES TO EXTREME EVENTS

In order to establish the likelihood that the public will adopt protective health behaviors, it is important not only to understand the extent of trust in those tasked with providing advice and

treatment, but also to understand public perceptions about the risks associated with compliance or noncompliance with recommended behaviors. For example, the sharp decrease in uptake of the measles, mumps, and rubella (MMR) vaccine after a 1998 *Lancet* report linking the MMR vaccine with autism suggests that the risks associated with the vaccine were perceived by the UK public to be higher than the risk of nonvaccination, despite the fact that increased incidence of measles and mumps could result in severe and permanent injuries, as well as deaths (Bellaby, 2003). Additionally, the muted public response to the 2006 radioactive poisoning of Alexander Litvenenko in London resulted in a low public level of uptake of testing for individual levels of contamination in spite of the fact that the incident involved radioactive contamination in public areas, an issue believed to have the potential to cause extreme changes in public behavior (Acton et al., 2007). In this instance, the perception that the attack was a targeted assassination led to low perceptions of risk (Rubin et al., 2007).

To truly understand the relationship between risk communication, risk perception, and behavior it is important to realize that risk means different things to different individuals. It is also imperative for organizations who hope to engage in effective risk communication to recognize that a gap exists between public and professional perceptions of risk (Rogers et al., 2007).

Expert Perceptions of Risk

When experts discuss risk, they are attempting to quantify the amount of harm or the number of deaths that can arise as a result of exposure to a risk. Experts often discuss risks in terms of cause and effect relationships, and they use complex statistical methods in order to analyze large amounts of data in an attempt to identify the risks that are the most likely to impact public health (Slovic et al., 1981, 1986; 1998; Beck, 1999; Weidemann et al., 2003; Rogers et al., 2007). They are then tasked with communicating these risks to members of the public.

Public Perceptions of Risk

The low uptake of suggested precautionary behaviors following the 1998 MMR controversy (Bellaby, 2003) and the 2009 swine flu pandemic (Rubin et al., 2010) demonstrate that public perceptions of risk do not necessarily reflect the level of risk that experts are trying to communicate. Members of the public are interested in the science driving expert perceptions of risk, but expert communication of risk to members of the public often fails to take the social context of risks into account (Beck, 1999; Rogers et al., 2007). Table 6.1 illustrates the different factors that experts and members of the public focus on when making decisions about risks. Risks qualify as "dread risks" if they are believed to have catastrophic potential, fatal consequences, seen as uncontrollable, seen as inequitable, and have a high risk to future generations (Slovic et al., 1981).

Risk perceptions are made in dynamic, ever-changing environments. Information that influences one factor will have knock-on effects across the other factors and, thus, have the

TABLE 6.1	Variations in Public and Expert Perceptions of Risk
Expert Risk Perception Factors	**Public Risk Perception Factors**
Can I identify a clear cause and effect relationship?	Is the risk voluntary or involuntary?
Can I quantify the amount of harm?	Is the risk familiar or unfamiliar?
Do I suspect a hazard based on past experience?	Do I have control over the risk or do I trust the organizations who are supposed to be responsible for the risk?
Is there a possibility of an accident?	Is the risk fair or unfair?
Is there a possibility of exposure to the risk?	Is the risk natural or technological?
Is there evidence of damage?	Does the risk cause dread?

potential to change the overall perception of the risk. Risk perceptions will, in turn, inform the behavioral response to the risk.

BEHAVIOR: UNDERSTANDING LIKELY PUBLIC RESPONSES TO EXTREME EVENTS

Professional Planning Assumptions and Public Behavior

Variations in the perception of risk and levels of trust are not the only stumbling blocks hindering the effective communication of risk between experts and members of the public. In spite of the growing recognition of the importance of communicating with members of the public, many emergency planning assumptions and risk communication campaigns are built upon an imperfect understanding of the relationship between risk communication, risk perception, and public behaviors. As a result, emergency planning assumptions often fail to incorporate human behavior and are based on contradictory expectations.

The contradictions that can exist within emergency planning assumptions can be seen in focus groups, which examined UK and Polish health care responders' views of the public response to a hypothetical chemical event (Pearce and Rogers, 2011). Responders in both countries assumed public panic. For example, one respondent said, "Camera crews, it wouldn't take them long to get there, so it'll be on television within minutes and people around them will be starting to panic." However, as the event progressed, the same respondent suggested that, upon hearing official advice to shelter, members of the public would comply. He stated, "I think quite generally in any incidents like that they see a uniform and they sort of feel a bit better, 'I feel safe,' and you've just got to say something to most of them and they'll just do as you tell them." Clearly, it would be difficult for individuals who were in the middle of a panic to calmly comply with official advice. Which view is accurate? Will the public panic or will the public comply with official advice during an emergency? It is important to answer this question in order to ensure that emergency planning assumptions incorporate accurate data about the ability of the public to respond to disasters in their own right.

Assumptions of public panic in light of an emergency event are the norm, rather than the exception. Discussions about the ways in which members of the public might respond to an extreme incident are based on "…the assumption that the general public tends to be irrational, uncoordinated, and uncooperative in emergencies— not to mention prone to panic" (Glass and Schoch-Spana, 2012, p. 217). Assumptions of panic lead emergency planning processes to exclude members of the public. As a result, emergency planning assumptions fail to understand and plan for the variety of behaviors that can take place during an extreme event.

Is the assumption of public panic valid? There is some evidence for panic, particularly in situations where there have been fires in enclosed spaces where there is no visible means of escape (Glass and Schoch-Spana, 2002). However, overwhelming evidence suggests that when faced with disasters and emergencies, people become cooperative and panic is rare. For example, there were multiple reports of helping behavior and an atmosphere of calm during the evacuation of the WTC during the 9/11 attacks (Proulx and Fahy, 2003; Sheppard et al., 2006); first-hand accounts of pro-social behavior and calm during the 7/7 transport bombings in London during 2005 (Sheppard et al., 2006; Drury et al., 2009); and resourcefulness, civility, and mutual aid were reported during the response to the 1918 Spanish influenza pandemic (Glass and Schoch-Spana, 2002). What appear to be panic behaviors are therefore more likely to reflect a lack of choice, rather than poor decision making or a rational choice under the circumstances and in light of the available information. The continued focus on panic has the potential to obscure the broad range of possible behaviors identified in previous examples.

Public Behavioral Response Assumptions during an Extreme Event

Members of the public have also been known to make inaccurate assumptions about their responses to extreme events. In spite of the fact that compliance with official guidance is often poor (Lemyre et al., 2010; Rubin et al., 2010; Pearce et al., 2012a), members of the public tend to overestimate their levels of compliance with official advice during an emergency event. For example, Pearce et al. (2012a) assessed public intention to comply with official advice to shelter in place following a hypothetical chemical spill in the UK and Poland. Their findings demonstrated that members of the public reported high levels of intended compliance with official advice to shelter in place when at home (95% UK, 93% Poland), although this figure dropped when members of the public were asked to shelter in a public place such as the post office (30% UK, 70% Poland). However, once intended behaviors that were incompatible with compliance (e.g., collecting children from school, evacuation, checking on friends and loved ones) were taken into account, intended compliance was significantly reduced. In fact, this more accurate measure of intended compliance suggests that only 43% of UK respondents and 7% of Polish respondents would comply with advice to shelter at home. In the post office, only 10% of UK respondents and 5% of Polish respondents intended to comply with the advice to shelter. The key factors that influenced the public intention to comply in this study included the perceived ease of compliance, the intention to collect children from school, the individual's perception of their ability to respond, the perceived ability of the professional organizations to respond, the perceived cost of responding, and the level of trust that they had in authorities (Pearce et al., 2012a).

Inaccurate and uninformed assumptions about public behavioral responses to extreme events must be addressed on the policy-making level, the professional emergency response level, and on the public level. Assumptions of panic can have far-reaching consequences as they can lead to a less effective emergency response by obscuring the ways in which public behaviors, concerns, and anxieties can be modified by effective risk and crisis communication. Overestimations of compliance suggest that members of the public do not truly understand the emergency response processes and procedures that will take place during an extreme event. Risk communication messages and programs must be designed in order to address these gaps. What steps can be taken to better enable practitioners and policy makers to develop risk communication messages and emergency response programs capable of informing public perceptions of risk and positive health behaviors?

RISK COMMUNICATION IN PRACTICE

This chapter has demonstrated the importance of recognizing risk perception, risk communication, and behavior as foundations of effective national security and recognizing that policies and practices that do not incorporate the concepts underpinning effective risk communication are bound to fail. In short, all approaches to public risk communication, irrespective of the reason for communication, must be built upon an understanding of risk perceptions and likely behaviors. This is especially important in light of the fact that, "For many high impact risks we do not understand what the public actually expects in a situation, or how tolerant they may be of 'abnormal' risks during a crisis" (Government Office for Science, 2011, p. 24).

First and foremost, it is important to recognize that getting messages right can mean the difference between a successful or failed response. Risk messages influence risk perceptions and behavior and, in turn, influence the likelihood of exposure to disease, injury, survival, and death. Acknowledging that public behavior in response to extreme events often reflects the quality and availability of information is a crucial step toward reworking one of the strongest tools available to governments: communication.

The interactions between risk perceptions and behavior can impact the ability of governments and government agencies to respond to disasters. Members of the public can over-react, under-react, or demonstrate a mixed response to government attempts to communicate about and respond to an extreme event. All forms of response can lead to a threat to national security. In order to address these issues, organizations must concentrate on building, improving, and maintaining levels of trust before, during, and after an incident occurs.

Additionally, in order to enhance the efficacy of risk communication, government organizations should "…work more closely with risk communication experts and behavioral scientists to develop both internal and external communication" (Government of Science, 2011, p. 26) to produce clear messages that are based on an understanding of the differences between expert and lay perceptions of risk. Trust can be built by the provision of factually correct, consistent, regularly updated information (Rogers et al., 2007). Unpalatable information should not be withheld due to fear of provoking panic. The resulting loss of credibility and absence of clear direction are both associated with spontaneous protective behaviors that are likely to lead to behaviors that may overburden medical services and hinder emergency responses (Glass and Schoch-Spana, 2002).

Overall, risk communicators should focus on improving knowledge and understanding as well as managing public expectations. Well-informed risk communication can help practitioners achieve these goals by enhancing the likelihood that at-risk populations will take appropriate protective actions and decrease the likelihood that low-risk populations will overburden emergency response systems. Effective risk communication can also reassure those who are not at risk by reducing rumors and fears and maintaining public trust and confidence in agencies responsible for ensuring public welfare (Becker, 2004; Rogers et al., 2007).