1-1-2011

Assessing City Preparedness for a Biological Attack

Joseph T. Moore
Walden University

Walden University

COLLEGE OF SOCIAL AND BEHAVIORAL SCIENCES

This is to certify that the doctoral dissertation by

Joseph Moore

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Ross Alexander, Committee Chairperson,
Public Policy and Administrations Faculty

Dr. David Powell, Committee Member,
Public Policy and Administrations Faculty

Dr. Mark Stallo, University Reviewer,
Public Policy and Administrations Faculty

Chief Academic Officer

David Clinefelter, Ph.D.

Walden University
2011

Abstract

Assessing City Preparedness for a Biological Attack

by

Joseph T. Moore

M.P.A., Rutgers University, 2007

B.A., Seton Hall University, 1999

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Public Policy and Administration

Walden University

May 2011

Abstract

The lack of preparedness by local communities in the event of a biological attack is a predicament that will result in chaos and an increase in casualties. Assessing city preparedness is essential in the event of a biological attack. The potential for an enormous number of casualties is real; it is imperative, therefore, for local communities to be prepared in the event of a biological attack. This descriptive single case study investigated whether one city in the southeastern United States is prepared for a biological attack. System theory provided the theoretical framework for this research, with the unit of analysis being the local Emergency Operations Center, which is responsible for coordination, preparation, and oversight in the event of such a disaster. Data were collected from interviews, documents, public records, and participant observation. Pattern matching and comparative analysis were utilized to analyze data that was collected in this research. This examination of the preparedness of the city for a biological attack is critical because any lack of preparedness would be devastating to the community. The findings of this study revealed that the city is prepared for a biological attack and that the recommendations and best practices identified in this study such as the utilization of virtual technology during a biological attack, the ability to perform random biological exercises, investments in laboratories, bioterrorism training for citizens, and establishing global partnerships in combating bioterrorism, promote social change, and will result in saving lives in the event of a biological attack. This research contributes to social change by promoting security improvements and identifying a model of preparedness for other cities in their own preparation for a biological attack.

Assessing City Preparedness for a Biological Attack

by

Joseph T. Moore

M.P.A., Rutgers University, 2007

B.A., Seton Hall University, 1999

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Public Policy and Administration

Walden University

May 2011

ProQuest LLC.
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 - 1346

Acknowledgements

This educational journey has been an exceptional and worthwhile experience. Throughout this journey, I would like to thank my chair, Dr. Ross Alexander who has been supportive in more ways than words can describe. Dr. Alexander's leadership and confidence that he exhibited was invaluable. I would also like to thank my committee members, Dr. David Powell and Dr. Mark Stallo, who have provided support, assistance, and encouragement throughout the dissertation process. Additionally, I would like to thank Dr. Price for showing that an aspect of happiness is to want the best for others. I would also like to thank my family, my friend and colleague David, and Ms. Kathleen Franklin. Last but not least, I would like to thank my wife Nancy for her patience, support, and dedication.

Table of Contents

Chapter 1: Introduction to Study

There have been limited studies examining local government preparedness for a terrorist attack (Giblin, Schafer, & Burruss, 2009). If cities in the United States are not prepared for a biological attack, it could result in devastation (Tucker, 2008). This is the social concern that this research addressed: the level of city preparedness specifically related to a biological attack. Five employees of the Emergency Operations Center in Alexandria, Virginia participated in this case study.

Over the years there have been several notable biological attacks in the United States. In 1984, a group of terrorists intentionally contaminated salad bars in restaurants in Oregon (U.S. General Accounting Office, 2005). This incident sickened 751 people (U.S. General Accounting Office, 2005). October 4, 2001, biological attacks resulted in 22 cases of anthrax, resulting in five deaths (Bossi et al., 2006; Urbano, 2006). Local governments must understand the ongoing threat of bioterrorism and utilize a proactive approach in defeating this threat.

Alexandria, Virginia, located approximately 6 miles from Washington, D.C (City of Alexandria, 2010), is particularly susceptible to the possibility of such bioterrorist attacks. The population of Alexandria is approximately 150,000 people and the Metropolitan Statistical Areas is 5,476,241 (U.S. Census Bureau, 2010). Additionally, a multitude of tourists visit Alexandria throughout the year (City of Alexandria, 2010). Cities like Alexandria, Virginia are greater targets because it is reasonable to assume that terrorists are more likely to attack larger cities (Kean & Hamilton, 2004). Population

density, proximity to the Nation's capital, and steady tourism make Alexandria a notable city to examine in terms of preparedness for a biological attack.

Bioterrorism is the deliberate use of a bacteria, fungi, virus, or toxin that derives from a living organism to cause death or disease in humans, animals, or plants (Ryan & Glarum, 2008). Urbano (2005) ascertained that a terrorist incorporates a biological organism into a weapon so that the weapon may then be more dangerous. The result is known as a bioweapon (Urbano, 2005). A bioweapon has the ability to sicken or kill hundreds or even thousands of people (Urbano, 2005); this is a serious concern for local governments due to the potential devastation that may result (Ryan & Glarum, 2008).

As with conventional methods of terrorism, an objective of bioterrorism is to create fear in much of the population as possible (Ahmad, 2009). It is essential for local officials to inform the public clearly and continuously (Wray et al., 2008) and to maintain calm. If the public panics, this may result in an increased number of injuries or deaths. Contingency planning, protection, and resilience are an important aspect of preparedness to help prevent this panic (Lentzos & Rose, 2009).

Teamwork, collaboration, and cooperation are critical to a successful response by local officials in the event of an attack (Kean & Hamilton, 2004). Routine training with various agencies is important in ensuring the necessary coordination in the event of a terrorist attack (Kean & Hamilton, 2004). Caruson and MacManus (2008) reiterated that intergovernmental cooperation is imperative in the event of a disaster situation. This cooperation is only possible with clear, practiced preparation.

A method for determining the preparedness of an agency is by examining the department needs and limitations (Giblin et al., 2009). This study examined Alexandria, Virginia's Emergency Operation Center's needs and limitations to subsequently assist in measuring the preparedness level for a biological attack.

Problem Statement

The problem this study addresses is that without proper preparation for biological attacks, it could result in devastation for local communities. A lack of preparedness will cause devastation and potentially impact surrounding communities (Cole, 2009). Giblin et al. (2009) indicated that there have been limited studies examining local governments' preparedness in the case of a terrorist attack after September 11th. The majority of research relating to preparedness for a terrorist attack tends to have focused at the federal and state level (Giblin et al., 2009). Additionally, Hamilton and Thomas (2004) examined the federal government's preparedness after September 11th attacks. The level of preparedness by city governments is a social issue that this research addressed.

Officials from the Federal, state, and local government are tasked with properly preparing their communities for disaster (Ryan & Glarum, 2008). However, local communities often do not have the required resources and have limited ability to respond to a terrorist attack (Ryan & Glarum, 2008). In order for local communities to properly be able to manage a biological attack, they must rely on the federal government (Ryan & Glarum, 2008).

Nature of the Study

The research utilized a descriptive single case study methodology focusing on qualitative data. Yin (2009) stated that a case study derives from the desire to understand a social phenomenon. The ability to examine the city of Alexandria provided insight and understanding of the city's preparedness for a biological attack. Consequently, the research focal point was the Emergency Operations Center. Furthermore, Yin (2009) indicated that the purpose of a case study is to learn about an entity in depth; therefore, the unit of analysis may be a single individual, a program, an organization, or a decision.

A case study can represent a significant contribution to knowledge and theory building (Yin, 2009). This research consisted of interviewing local city officials about the preparedness level in the event of a biological attack. The interviews addressed emergency plans, current programs, collaboration efforts with stakeholders, and the allocation of resources. This research was performed in order to obtain an understanding of the city of Alexandria's preparedness level for the event of a biological attack. Additionally, an examination of documentation was reviewed to assist in this research.

The Emergency Operation Center is a vital entity in the city if a biological attack occurs. The interviews were conducted with local officials within the Emergency Operations Center. In addition, the research design was framed to examine the function of the Emergency Operations Center.

Giblin et al. (2009) discussed how preparedness for a biological attack can be measured by studying the department's needs and limitation. Examining the department's needs and limitations was utilized in measuring the preparedness level for local officials

in responding to a potential biological attack. The case study methodology is discussed further in chapter 3.

Research Question

Research Question: Is the city of Alexandria, Virginia prepared for a biological attack?

Purpose of the Study

The first step in developing a contingency plan is to examine the local communities' methods in analyzing and assessing terrorist threats (Ryan & Glarum, 2008). The purpose of this study was to examine whether the city of Alexandria is prepared for a bioterrorist attack. In order to defeat the threat of a biological attack, local officials must constantly prepare and coordinate with all appropriate stakeholders at the federal, state, and local levels.

Emergency responses to a terrorist incident must be efficient (Broga et al., 2009). This research examined whether the response of Alexandria's local government to a biological attack is in a condition of preparedness. Preparation and practice will ensure local emergency facilitation. Additionally, Broga et al. (2009) indicated that an emergency plan must be clear and concise. In a chaotic situation such as a biological attack, it is imperative that all necessary plans are clearly executed and articulated. Adequate preparation in the case of a biological attack is necessary to effect positive social change.

Moreover, local government workers who are tasked with responding to terrorist attacks risk exposure to hazardous material (Ryan & Glarum, 2008). Silenas, Akins,

Parrish, and Edwards (2008) indicated that emergency preparedness is essential when responding to a disaster incident. Additionally, this research examined if proper coordination, table-top exercises, sharing of information and resources are being performed in the preparedness stages of a biological attack. The research subsequently identified best practices in the preparedness efforts by local officials in the event of a biological attack.

Furthermore, local officials can utilize the findings of the research in the preparedness efforts for a biological attack. If cities are not prepared for a biological attack, the resulting increase in disease and death would be catastrophic. This research addressed this social concern and subsequently exhibited best practices and how cities should prepare for biological attack.

Conceptual Framework

System theory states that an event happening today affects previous and future events (Gunbeyi & Gundogdu, 2009). Additionally, system theory states that if events today are a result of past events, then the connection between these past and present events warrants examination. Furthermore Gunbeyi and Gundogdu (2009) indicated that system theory treats terrorism as a social problem.

System theory indicates that if there is a social concern pertaining to biological preparedness, the issue begins with the process and not the terrorists (Gunbeyi & Gundogdu, 2009). The benefit of system theory is that it allows local government officials to concentrate on the system and not necessarily the perpetrator. If terrorists were to initiate biological attacks in a city's subway, system theory will focus on

enhancing security measures instead of focusing on the actions of the terrorists. System theory is a proactive approach that concentrates on improving the system and process.

Definition of Terms

Anthrax: a serious zoonotic disease caused by *Bacillus anthracis,* a bacterium that forms spores (Ryan & Glarum, 2008).

Biodefense: The collective efforts of a nation aimed at improving defenses against biological attacks (Ryan & Glarum, 2008).

Biological toxin: A toxic substance originating from a living organism (Ryan & Glarum, 2008).

Bioterrorism: The intentional use of microorganisms or toxins derived from living organisms to cause death or disease in humans or the animals and plants on which we depend (Ryan & Glarum, 2008)

Botulism: The result of poisoning from ingestion with botulinum toxin, which is produced by the bacterium *Clostridium botulinum* (Ryan & Glarum, 2008).

Emerging disease: Any disease, of a various cause, that has newly appeared or is rapidly expanding its range in the human species (Ryan & Glarum, 2008).

Pathogen: A specific causative agent of disease (Ryan & Glarum, 2008).

Plague: A serious, but eradicated, disease caused by smallpox virus (Ryan & Glarum, 2008).

Ricin: A biological toxin derived from the castor bean plant (Ryan & Glarum, 2008).

Zoonotic disease: An animal disease that may be transmitted to humans (Ryan & Glarum, 2008)

Assumptions

I assumed that the participants in this study were open and honest in the responses that were provided. The participants in this study are city government officials who have the public trust of the citizens in the community. Additionally, I assume that the participants at the Emergency Operations Center were extremely transparent throughout the research.

Limitations

A limitation of this study is that it only uses one unit of analysis, the Emergency Operations Center to discuss the city of Alexandria's preparedness for a biological attack. However, as indicated by Yin (2009), a case study may be performed to examine an organization, an individual, or even a decision. Finally, there are restricting conditions that were unknown and beyond the researcher's ability to control. An example would be the manner that the participants answered the questions. This unknown variable could have affected the collection of data.

Scope and Delimitations

The research focused on the Emergency Operations Center, not all the departments within the local, state, and Federal government that are tasked with preparedness for a biological attack. Focusing on one unit of analysis for the purpose of this research may be questioned; however, as Yin (2009) stated, a case study may be performed to examine an individual, organization, or solely a decision.

Additionally, this study examined previous biological attacks and cities where preparedness efforts have occurred by reviewing case studies, interviewing government officials, and reading scholarly literature. The city of Alexandria is unique and different compared to other cities, however, both large and small cities were discussed, compared, and analyzed. Having the ability to identify and examine different types of cities identified best practices and the ability to initiate and further social change.

The Emergency Operations Center has an essential role in coordinating and preparing for disaster situations such as a biological attack. However, the research discussed other agencies as they relate to and interact with the Emergency Operation Center. The ability to examine the Emergency Operations in-depth subsequently assisted in providing additional knowledge and best practices in preparing for and responding to a biological attack.

Significance of Study

Bossi et al. (2006) suggested that the anthrax attacks in October 2001 demonstrated that the United States was not prepared for a biological attack. This research evaluated if the city of Alexandria is prepared for a biological attack. Tucker (2008) indicated that a biological attack could result in a tremendous number of casualties. The possibility of a biological attack occurring and subsequently causing significant casualties is a significant social issue that this research addressed.

As indicated by the Dark Winter study, a small outbreak of a biological agent may possibly spread and cause an enormous amount of casualties (Tucker, 2008). This research addressed the preparation aspect and investigated whether local officials would

be prepared should a biological attack occur. The ability for local officials to constantly prepare for a biological attack is indispensable in the case of a biological incident. In addition, Holly et al. (2008) stated that the public should be treated as stakeholders in the preparedness aspect of a terrorist attack.

This research examined past and potential future threats pertaining to biological attacks. Additionally, this study is significant because it identifies best practices and provides recommendations on how cities should prepare for a biological attack, therefore saving lives. This research effects social change by examining the preparedness of the city of Alexandria in the case of a biological attack and subsequently using the city as a model on how to prepare for a biological attack. The city of Alexandria will receive these findings and best practices in preparation for a biological attack. Effecting positive social change is an imperative component that this research addressed.

Summary and Transition

This qualitative research study endeavored to determine the preparedness level of Alexandria, Virginia, for a biological attack. Determining the city's preparedness level will provide either a model of preparedness for other cities to follow or will reveal areas for improvement and an opportunity to develop resources so the city of Alexandria is better prepared.

Chapter 2 will examine existing literature pertaining to biological preparedness. Chapter 3 discusses the methodology that was utilized and a systematic approach to this research. Chapter 4 focuses on the analysis of interviews that were conducted and a

review of documents relating to the preparedness efforts for a biological attack. The last chapter, chapter 5, includes the summary, findings, conclusion, and recommendations.

Chapter 2: Literature Review

Search Strategy

The proceeding literature was obtained through a systematic review of various databases: Proquest, SAGE, Academic Search Complete, International Security & Counter Terrorism Reference Center, Military and Government Collection, SocINDEX with Full Text, and PolicyFile. Keywords used in this search process included: *biological, bioterrorism, disaster management, preparedness, local government,* and *government*. The search terms were used in various combinations resulting in utilizing 76 articles in the literature review. The articles that were not utilized from the search focused solely on the public health aspect of bioterrorism and not local government's preparedness aspect as a whole. Additionally, articles that duplicated similar information that was previously noted in this research were not utilized.

Books and documents pertaining to biological terrorism were used to provide additional insight and information. A search of the databases also revealed that following the terrorist attacks of September 11th there was literature relating to terrorism; however, biological terrorism was not explored to the degree of other forms of terrorism. The completed literature review consisted of 81 articles and a combination of books and government websites for a total of 87 sources.

Bioterrorism

Bioterrorism is the intentional use of microorganisms or toxins that derives from living organisms to cause death or diseases (Ryan & Glarum, 2008). Sprinkle (2008) indicated that many years ago, the possibility of a biological attack in the United States

was a distant thought (Sprinkle, 2008). In addition, Biosecurity is an important aspect for a myriad of countries (Sprinkle 2008). Without the necessary preparedness by federal, state, and local government officials, a biological attack would be devastating. Foxell and McCreight (2002) discussed the importance of preparedness for a biological attack.

Furthermore, biological weapons have been utilized throughout history (Ryan & Glarum). The following incidents in history have utilized biological weapons(Ryan & Glarum, 2008):

- In the sixth century BC, Assyrians poisoned enemy wells with rye, ergot, and fungus.
- In the fourth century BC, Scythian archers tipped their arrows with blood and tissues from decomposing corpses.
- In 1340 AD, attackers utilized dead animals in northern France, resulting in the opposition surrendering due to the horrendous smell.
- In 1495 AD, the Spanish contaminated French wine with the blood of lepers.
- In the mid 1600s, a general from the Polish military reportedly injected saliva from rabid dogs into spheres for use against his enemies.
- During the Civil War, Dr. Luke Blackburn, who became governor of Kentucky, infected clothing with smallpox and yellow fever, which he then sold to Union troops.

Additionally, during the siege of Kaffa, in the 14th century, the attacking Tatar force threw the bodies of their plague-infected soldiers over the city walls; this attack initiated a major outbreak of the plague, also called the “Black Death” (Bossi et al.,

2006). Bossi et al. (2006) indicated that this biological attack eventually demolished one-third of individuals residing in Europe. Thus, the ability to launch successful biological attacks has a history of causing major devastation. Therefore, local government officials should be able to understand the impact that this may have on a city in America.

Biological Weapons Program

Consequently, President Roosevelt approved the launch of America's biological warfare program; this was the first time that United States researchers attempted to produce the deadliest weapons by utilizing germs (Ryan & Glarum, 2008). In the spring of 1943, the United States began it bioweapons program at Camp Detrick, Maryland (Ryan & Glurum, 2008). The United States program focused mainly on the use of the agents that cause anthrax, botulism, plague, tularemia, Q fever, Venezuelan equine encephalitis, and brucellosis (Ryan & Glarum 2008). Ryan and Glarum (2008) stated that production of these agents occurred at Camp Detrick Maryland and other sites in Arkansas, Colorado, and Indiana.

During the 1940s, the U. S. bioweapons program continued to grow (Ryan & Glarum, 2008). This growth might have been contributed to communism and the threat of Russia (Ryan & Glarum, 2008). Bioweapons research was performed on animals; however, humans were also utilized on occasion (Ryan & Glarum, 2008). Additionally, Ryan and Glarum (2008) discussed that in 1949, researchers from Detrick, Maryland visited the Pentagon to initiate a secret mission utilizing non-infectious bacteria to assess the vulnerability of people inside large buildings.

The group of researchers released noninfectious bacteria into the duct work area of the building (Ryan & Glarum, 2008). The Pentagon trial was deemed to be successful because it revealed that germs could be formulated and released in this manner, casing devastation (Ryan & Glarum, 2008). An attack of this nature may be extremely difficult because it would require coordination from within, therefore allowing the potential terrorist access into the building without detection.

In addition, according to Colette, Stacey, and Jeanne (2007), during the 1960s, people were extremely concerned about the danger of poisonous substances in the food and water supply. Consequently, U.S. citizens called upon their government to protect them from the possibility of such harm (Colette et al., 2007). In order to defeat this threat of a biological attack, it is essential that all stakeholders are involved, including the public. Moreover, it is important for city officials to routinely prepare for terrorist attacks that may involve Agro terrorism and the food supply (Johnson et al., 2009)

Ryan and Glarum (2008) stated that additional testing was conducted in 1966, utilizing the New York subway system and a broken light bulb to show the ability for a biological agent to originate and facilitate from a central point to both ends of the system in less than an hour. It could be argued that the spread of a biological agent in such a manner could result in an enormous amount of casualties.

After nearly 3 decades of secret research and the production and stockpiling of biological weapons, President Richard Nixon signed an Executive Order that stopped the production and research of all offensive biological agents and toxin weapons (Ryan & Glarum, 2008). On November 25, 1969, President Nixon stated the following

> Biological warfare-which is commonly called "germ warefare." This has massive unpredicatable and potentially uncontrollable consequences. It may produce global epidemic and profoundly affect the health of future generations. Therefore, I have decided that the United States of America will renounce the use of any form of deadly biological weapons that either kill or incapacitate. Mankind already carries in its own hands too many of the seeds of its own destruction. (Ryan & Glarum, 2008, p.13)

In 1972, the United States and other countries signed the Convention on the Prohibition of the Development, Production, and Stockpiling of Bacteriological and Toxin Weapons and on Their Destruction, commonly called the Biological Weapons Convention. This treaty prohibits the stockpiling of biological agents for offensive use and forbids research into the further offensive use of biological agents (Ryan & Glarum, 2008).

Howitt and Pangi (2003) ascertained that after the Cold War, the United States was not focused on new forms of security threats. Instead, the United States was concerned about other internal conflicts in other countries (Howitt & Pangi, 2003). It could be argued that the attacks of September 11th are attributable, in part, to this lack or preparedness and an approach that was more reactive than proactive throughout the 1990s.

Impact of a Biological Attack

Greater awareness by the United States after 9/11 will not in itself solve the threat of terrorism (Howitt & Pangi, 2003). Hoffman (2009) indicated that officials tasked with

preparedness for a potential attack must concentrate on variety forms of terrorism. Additionally, Howitt and Pangi (2003) stated that the United States is ill prepared to handle security issues, and inadequate oversight is the reason for the United States deficiencies in combating terrorism (Howitt & Pangi, 2003). Therefore, coordination and oversight are vital in the event of a biological attack.

A biological attack requires an enormous amount of planning and resources (Sprinkle, 2008). Sprinkle (2008) ascertained that if a biological attack were to occur by an amateur, the possibility of a successful attack would be drastically decreased. Clearly, the United Sates government should be prepared for all potential types of terrorist attacks (Sprinkle, 2008).

After the attacks of September 11th, 2001, it was obvious that the state and local responses to domestic preparedness was inadequate (Kayyem & Pangi, 2003). The state and local government's preparedness is detrimental in the event of a biological attack (Kayyem & Pangi, 2003). Besides, it is important for local responders to be properly trained and prepared in the case of a biological attack, and to work with its counterparts. Consequently, the Department of Homeland Security is the agency whose objective is to make the nation less vulnerable to terrorism, prevent attacks, and assist if an attack were to occur (Ryan & Glarum, 2008).

Bossi et al. (2006) discussed the deliberate release of anthrax in the United States after the attacks of September 11th. These biological attacks resulted in 22 cases of anthrax, including five deaths (Bossi et al., 2006). Additionally, this deliberate release of anthrax changed the manner in which people contemplate about of terrorism (Bossi et al.,

2006). Furthermore Bossi et al. (2006) indicated that the impact of the anthrax attack was not solely limited to the United States, but throughout the world. Therefore although unfortunate, the anthrax attacks may have brought attention to biological terrorisms, thereby actually decreasing the possibility of a biological attack.

One major goal of bioterrorism is to generate fear in the population (Bossi et al., 2006). As local officials prepare for a biological attack, these preparations will assist in educating the public about biological terrorism (Bossi et al., 200). The ability for local officials to assess vulnerabilities in the water supply is imperative. Thus, preparedness is essential in combating bioterrorism. This research utilizes a qualitative approach to examine whether the city of Alexandria is prepared for a biological attack. The perception is that cities are not adequately prepared for a biological attack.

Biological agents are zoonotic and may originate from animals and be transmitted to humans (Bossi et al., 2006). Additionally, the convention, known as the Biological and Toxin Weapons Convention of 1973 prohibited the development and production of biological and toxin weapons (Bossi et al., 2006). Consequently, despite this convention, there is no reliable method to determine if international countries are in compliance with this agreement (Bossi et al., 2006). The number of countries known or suspected of having biological weapons has reportedly doubled since the start of the convention in 1975 (Bossi et al., 2006).

The social problem that this research addressed is whether a city is properly prepared for a biological attack. It is imperative to understand that if this social problem-preparedness for a biological attack is not adequately addressed, there will be tremendous

fatalities in the event of an attack. This is an important social issue that must be examined. Local governments must be adequately prepared if they are to ensure the security of their citizens.

From 1980 to 2000, estimates indicate that there were 40 deliberate uses of microorganisms as weapons throughout the world (Bossi et al., 2006). During 1988-1999, intentional use of infectious agents was considered in six cases in the United States (Bossi et al., 2006). Furthermore, more than 180 pathogens have been reported to be potential agents for bioterrorism (Bossi et al., 2006). It is imperative for a quick and accurate diagnosis of the biological agent that is used in a biological attack to further prevent the lost of life (Kalvatchev, 2010).

Biological agents are divided into three categories based on the level of public health importance: Categories A, B, and C (Ryan & Glarum, 2008). High priority agents include organisms that pose a risk to national security because of the following reasons (Ryan & Glarum, 2008):

- Easily transmitted from one person to another
- High mortality rate
- Possibility of creating social pandemonium
- An increased need for Public Health providers

The Centers for Disease Control and Prevention provided a listing of what are considered to be some of the most serious biological agents that may be encountered (Ryan & Glarum, 2008). The most serious threats of these biological agents belong to Category A, which can cause increase devastation to its citizens (Ryan & Glarum, 2008).

These agents are tremendously devastating because of the high likelihood of these agents being transmitted to many people in an area, overwhelming health care providers (Ryan & Glarum, 2008).

Category B consists of agents that are moderately easy to circulate, causing low mortality (Bossi et al., 2006). Category C consists of infectious agents that could be used for mass dissemination in the future because of their availability (Bossi et al., 2006). The ability to classify the threat level of a biological agent into specific categories will subsequently assist the local community in understanding the level of action that is needed.

Bossi et al. (2006) stated that in the event of biological warfare, these agents would most likely be disseminated by aerosols. Aerosols are invisible, silent, odorless, tasteless, and easily dispersed without detection (Bossi et al., 2006). Aerosols may be beneficial to terrorists because it can be easily concealed. Consequently, local governments must be proactive in detecting these biological agents and providing health care providers with the ability and resources to treat patients expeditiously.

Sufficient preparedness for bioterrorism includes an established list of possible agents that may be utilized in an attack (Tegnell et al., 2006). As indicated by Tegnell et al. (2006), this list could then be utilized by emergency officials to evaluate the type and amount of resources that are needed based on the biological agent that the terrorist utilized in the attack.

Alexandria Virginia Preparedness Level

Gerber, Cohen, Cannon, Patterson, and Stewart (2005) indicated that due to cities having different incentives, complexity, resources, and training, it is unlikely that the preparedness level will be similar. The city that I will examine for this case study is Alexandria, Virginia, which is located on the west bank of the Potomac River and approximately 6 miles from Washington, D.C (Alexandria.gov, 2008). The city of Alexandria is approximately 50 years older than Washington D.C., and is known as being one of America's historic communities (Alexandria.gov, 2008). In addition, Alexandria's Old Town historic district is known for its array of museums, architecture, special events, fine restaurants, and other attractions that 1.5 million international and domestic visitors come to visit each year (Alexandria.gov, 2008).

The population of Alexandria, Virginia is approximately 150,000 (U.S. Census Bureau, 2010). Due to the city's location and proximity to D.C., the size of its population, its historical aspect, its status as a magnet for tourism makes Alexandria a reasonable city to perform a case study. .

Examining the city of Alexandria's preparedness for a biological attack will subsequently assist in facilitating social change. Examining and preparing research pertaining to this important issue may ultimately be used and shared with other stakeholders to obtain best-practices in relation to maintaining the safety of citizens in the occurrence of a terrorist attack. In addition citizens are essential in the preparedness efforts in the case of a biological attack (Nicogossian, Metscher, Zimmerman, Hanfling, & Wise, 2007).

Biological Studies

In 1970, the World Health Organization predicted that a large city would exhibit grave devastation if subjected to a terrorist attack (Bossi et al, 2006). Moreover, the study that was performed indicated that a city consisting of 500,000 people would be in a difficult predicament faced with an aerosol release of 50 kilograms of a biological agent (Bossi et al., 2006). In such an example, if an aerosol of anthrax spores were used, it would incapacitate 125,000 people including 95,000 deaths (Bossi et al., 2006).

Moreover, if an aerosol of plague was used in a terrorist attack, it would incapacitate 85,000 individuals, resulting in 19,000 deaths (Bossi et al., 2006). Therefore, it should be argued that a city such as Alexandria, that is in close proximity to Washington, D.C., should be adequately prepared for a terrorist attack. These previous studies and research approaches that were utilized are important in understanding the impact of a biological attack. Consequently, Yin (2009) indicated that an advantage of utilizing a case study approach compared to other research approaches is that it allows the researcher to examine a variety of evidence such as documents, interviews, and observation.

Hall (2005) stated that the nation is unprepared to respond to a bioterrorism attack even though the United States has earmarked abundant funding for this issue. The question is whether funding is being utilized efficiently in ensuring maximum preparedness for a biological attack. Although Hall found the nation to be unprepared, Shea (2003) stated that the local response to terrorism has improved due to federal

support and programs. Having adequate resources in the event of a biological attack is essential in local governments' preparedness efforts.

In 1984, salad bars in restaurants in Oregon were contaminated with salmonella bacteria to thwart individuals from voting (U.S. General Accounting Office, 2005). Although no one died in this incident, 751 people were diagnosed with food borne sickness (U.S. General Accounting Office, 2005). An examination of this incident suggested that the local government was not prepared for an attack that had utilized biological agents.

In addition, Health and Human Services is the primary agency for coordinating federal assistance for state and local resources that may result in emergency incidents to include a biological attack (U.S. General Accounting Office, 2005). It is important for all agencies tasked with preparedness to understand the importance of coordination in the event of a biological attack. Additionally Chalk (2004) discussed the importance of the United States protecting the food industry against a biological attack.

Concern about the potential for a biological attack increased in the 1990s, marked by suspicions that Iraq still maintained a biological warfare programs despite its agreement after the Persian Gulf War. Additionally, the release of sarin in the Tokyo subway in 1995 heightened these concerns (Cole, 2009). That release of sarin, a chemical nerve agent, resulted in the death of 12 people and injured more than a thousand people (Cole, 2009). This chemical attack allowed individuals to understand that a biological attack, if initiated, would have a significant impact on citizens within the community (Cole, 2009).

By the beginning of the 21st century, bioweapons are clearly understood to be a emergent threat (Cole, 2009). Cole (2009) indicated that the focus on biological weapons stopped on September 11th in the wake of the terrorist attacks, which used airplanes on significance targets in the United States.

The U.S. General Accounting Office (2005) stated that the deliberate use of biological agents may not be recognized for numerous days. During this period of unawareness, the biological agent may spread rapidly throughout the community (U.S. General Accounting Office, 2005). Additionally, many physicians are not familiar with the germs likely to be utilized in biological weapons (Cole, 2009).

In the case of a biological attack using smallpox or plague, there is a wealth of knowledge; however, that is not the case with anthrax. In the United States, only 18 cases of anthrax from inhaled spores were recorded in the 20th century (Cole, 2009). Furthermore, the use of biological weapons for terrorism purposes has been infrequent (Cole, 2009).

Anthrax spores normally lie beneath the surface of the soil and animals such as sheep, goats, or cattles may become infected by ingesting or breathing in the bacteria (Cole, 2009). Human anthrax infections normally are initiated with contact with infected animals; however, cutaneous anthrax infections can occur if spores enter through cuts (Cole, 2009). Infections resulting from inhalation are almost always fatal; 90% of untreated victims of inhalation anthrax tend to die (Cole, 2009). Anthrax is not multiplied from person to person, except through contact with infected sores (Urbano, 2006).

Planning for a Biological Attack

Silenas, Akins, Parrish, and Edwards (2008) discussed the importance of interactive exercises in emergency preparedness, incident command, public health, surveillance, terrorism threats, and risk communication. The Homeland Security Advanced Research Agency focuses on technology that will scan for biological agents that will pose a danger to consumers (Pappalardo, 2005). The ability for local officials to be prepared in the case of a biological attack would be extremely beneficial to all parties involved. Learning the concepts and organization structure in emergency management is vital in confronting threats that may be of faced by the community (Silenas et al., 2008).

Moreover, Giblin, Schafer, and Burruss (2009) stated that after the attacks of September 11th, local, state, and federal agencies began to focus on improving preparedness in the case of a terrorist attack. Consequently, proper preparation should have occurred prior to the events of 9/11 (Kean & Hamilton, 2004). There were various signs that an attack was being planned by Al Qaeda (Kean & Hamilton, 2004). It is essential for the local government to constantly follow all intelligence leads in reference to a possible biological attack.

Giblin et al. (2009) discussed how there have been few studies examining local government's preparedness in the case of a terrorist attack after September 11th. Additionally, Giblin et al. attempted to examine the level and perception of local government's readiness if a terrorist attack were to occur. The perception and risk of a terrorist attack occurring appears to be low; however, law enforcement agencies have taken preemptive measures to prepare for this threat (Giblin et al., 2009).

Prior to September 11th few local law enforcement agencies had a written plan in place to address the possibility of a biological attack. This may be due to the idea that a biological attack is not seen as a preferred terrorist method against the United States. Attempts for a terrorist organization to initiate a successful biological attack may be viewed as difficult (Ryan & Glarum, 2008).

Preparedness for a biological attack can be measured by studying the department's needs and limitations (Giblin, Schafer, & Burruss, 2009). By examining what the local government lacks offers a reasonable measure of preparedness (Giblin et al., 2009). It should further be stated that preparedness is essential for providing safety and security for the local citizens (Ritchie et al., 2004).

In addition, Giblin et al. (2009) indicated that local government officials tend to affirm that that the risk of a terrorist attack in their jurisdiction is extremely insignificant. A survey of local government officials indicated that they believe that the threat of a biological attack was one of the least concerns compared to other methods or forms of terrorism (Giblin et al., 2009). Even so, Ryan and Glarum (2008) indicated a biological attack is a reasonable option for terrorists, who look for such vulnerabilities.

In reference to biological attacks, the possibility of terrorists utilizing a biological weapon is more likely than not due to the lack of monitoring, transparency, and oversight. In 1969, President Nixon signed an executive order that ceased the production of biological weapons (Ryan & Glarum, 2008). It has since been revealed, that the Russian government had still been producing biological weapons, even after the Executive Order ending all production of biological weapons (Ryan & Glarum, 2008).

Furthermore, the literature does not adequately discuss the advancements that were made in biological weapons after the signing of the Executive Order. Consequently, the literature does not provide city officials adequate or useful information on how to prepare for an unknown biological agent that may have been produced after the signing of the Convention on the Prohibition of the Development, Production, and Stockpiling of Bacteriological and Toxin Weapons and on Their Destruction in 1972.

A biological attack may cause enormous casualties, which will make an impact on the health care system (Kollek, Welsford, & Wanger 2009). It is important and vital for emergency officials in the local community to coordinate with other stakeholders to include the health care system. In order to save lives in the case of a terrorist attack, it is important for medical responders to arrive on the scene in an efficient manner (Kollek et al., 2009). Additionally, local governments should coordinate with medical personnel if a biological attack were to occur (Kanev, 2010). Protection is important for medical personnel when responding to a potential biological attack (Kollek et al., 2009).

Kollek et al. (2009) indicated that results of a survey showed that first responders and health officials exhibited a lack of preparation in the case of a biological attack. Additionally, Kollek et al. (2009) discussed the vital importance of first responders being able to utilize personal protective equipment in an effective manner therefore causing the necessary protections for individuals that are tasked with protecting the public and victims on the scene. Public health has an essential role in biological terrorist event planning (Hendrickson, 2005).

A study performed showed risk-assesment in relation to food safety and biological threat preparedness (Ranta et al., 2010). Ranta et al. (2010) stated that a purpose of the study was to show public health officials the danger of food-borne infection in humans. It should be said that for terrorists to contaminat food or water supplies would create a tremendous predicment for public health officials.

Considine and Mitchell (2009) stated that emergency nurses have little experience in dealing with terrorist incidents. It is important for the local community to understand the importances of informing the health care community of potential advances in biological weapons. Recently, terrorism and epidemics have changed the focus of disaster management (Considine & Mitchell, 2009). Terrorism planning has become more prevalent since the Tokyo subway sarin gas attack in 1995, the September 11th attacks, and various other bombings attacks throughout the world (Considine & Mitchell, 2009).

Considine and Mitchell (2009) discussed that during the Tokyo and World Trade Center attacks, numerous emergency preparedness personnel were not properly prepared and that this lack of preparation subsequently resulted in injuries and casaulaties to the emergency personnel and first responders. Organizations need to maximize training opportunites and effectively communicate with different agencies that are tasked with prepardeness efforts (Considine & Mitchell, 2009).

Terrorist incidents have rarely utilized chemical or biological agents; however, it is important to constantly prepare for these types of threats (Broga, Vetter, & Orton, 2009). Broga et al. (2009) stated how emergency responses to a terrorist incident must be efficient and the local emergency plan must be clear and concise. In addition, Broga et al.

(2009) discussed that in the case of a biological attack, an emergency plan must be practiced due to the probability of first responders having limited experience with a biological attack. Furthermore, Broga et al. (2009) indicated that utilizing personal protective equipment is vital for first responders prior to responding, or initiating treatment to patients.

In addition, Broga et al. (2009) addressed the issue of how preparing for a biological attack different from other forms of terrorist attacks. A biological attack is different from other forms of terrorism because emergency officials will treat an individual based on the type of biological agent that was utilized. Therefore, it is extremely important for first responders to remain vigilant in the event of a biological attack.

Ahmad (2009) indicated that the lack of concern for the possibility of another terrorist attack is unfortunate and that a major biological attack is possible. More than 180 pathogens have been reported to be potential agents for bioterorism, consisting of the West Nile Virus, Antharax, Botulism, and Ricin (Ahmad, 2009). Moreover, outbreaks of such biological agents would be a serious threat to the population and will also serious economic repercussions.

Biological agents could be concealed in a variety of manners (Ahmad, 2009). Several methods that may be utilized to conceal biological weapons prior to dispersement: in food, water, heating systems, ventillation or air-conditioning systems. One way to be proactive in preventing a biological attack is for all mechanisims such as a building's heating and ventillation systems to be properly secured and monitored on a

daily basis. Properly securing and frequently inspecting these mechanisms would subsequently make it difficult for terrorists to conceal biological agents.

Ahmad (2009) stated that there has been training performed around the world to prepare for the possibility of a terrorist attack however, a decrease in funding has drastically decreased the amount of training that is being conducted to prepare for the possibility of a biological attack.

Wray et al. (2008) indicated how the lack of communication may be a concern in the event of a biological attack. Wray et al. stated that between 2002 and 2006, a study, the Pre-Event Message Development Project (PEMDP), was performed that assessed public communication needs in the event of an emerging threat. Wray et al. discussed that the findings of this research revealed that the public has limited knowledge about terrorist attacks. The study revealed that rural groups tended to be less concerned about a terrorist attack and that rural residents believe that urban areas were more prone to an attack (Wray et al., 2008).

The PEMDP study revealed that the public does not have confidence in the preparedness readiness of local, state, or Federal agencies in handling an emergency situation (Wray et al., 2008). It is imperative for agencies to obtain the public's trust in the event of a terrorist attack and especially focus on expeditiously providing the public with information on what to do in the event of a terrorist attack (Wray et. al, 2008).

In addition, Lakoff (2008) discussed the necessity of being prepared for an epidemic. The 1918 Spanish flu, which killed an estimated 50 million people worldwide, showed the lack of preparedness for a catastrophic event (Lakoff, 2008). Certainly, one

should question whether local governments are prepared for a biological attack of a magnitude that parallels' the 1918 Spanish flu.

The period from 2001 to 2005 witnessed a massive increase in U.S. civilian bio-defense budgets due to the September 11th and the anthrax attacks that occurred in 2001 (Lakoff, 2008). Vogel (2006) indicated that after 9/11 greater public oversight was initiated, to include work with dangerous pathogens. Additionally, in references to preparedness for a biological attack, the primary agents that were examined have been smallpox and anthrax (Lakoff, 2008). Hurricane Katrina showed predicaments in the governments' and local authorities' response to a disaster situation (Lakoff, 2008).

In the wake of such devastating disasters, whether or not cities in the United States are prepared for a biological attack is a relevant question. Tucker (2008) stated that in 2001, the Center for Strategic and International Studies, and the John Hopkins Center for Civilian Biodefense Strategies, sponsored a simulation called "Dark Winter" to provide insight of the potential impact of biological attack in the United States. The exercise began December 9, 2002 at Andrews Air Force Base, and the model outbreak was caused by a small intentional release of smallpox in Oklahoma City, infecting approximately 24 individuals and subsequently resulting in two other outbreaks in Pennsylvania and Georgia (Tucker, 2008). The goal of this Dark Winter simulation was to determine whether cities are prepared for a biological attack.

Consequently, the results of this study showed that the number of possible cases from this outbreak within a 2 month period would be 3 million people, with a third of

those cases ending in death (Tucker, 2008). Tucker (2008) indicated that the lessons learned from this exercise were:

- A biological weapons attack with a contagious pathogen could cripple the United States.
- The less prepared that the government is the more civil liberties is threatened.
- Resources would be greatly strained.
- Necessary investments are needed to ensure rapid disease control.

Hoffman et al. (2007) stated that on March 20, 1995, the nerve gas sarin was used in a subway attack in Tokyo, resulting in more than 5,500 injuries, including injuries to members of the emergency officials that responded. A study was performed that showed the importance of following-up with individuals that have been exposed to a chemical or biological attack (Hoffman et al., 2007). This allows health care providers to monitor individuals who may exhibit long-term health risks due to the attack (Hoffman et al., 2007).

Healy, Weston, Romilly, and Arbuthnot (2009) stated that an aspect of being successful in planning for a terrorist attack is for stakeholders to know which agency is in charge before such a crisis an attack occurs. It could be argued that without having an agency identified as the lead in such a crisis would result in pandemonium. In addition, Healy et al. (2009) argued that because biological and terrorists attacks focus on the public, it is essential that the public understand what is needed in the event of a biological

attack. Healy et al. (2009) discussed that the public should understand and locate the most efficient means for respiratory protection, isolation, and decontamination.

Additionally, Holly, Lee, Lemyre, and Krewski (2008) stated that is essential for the public to be provided with accurate and clear information in the event of a biological attack. Holly et al. (2008) stated that the public should be treated as stakeholders in the preparedness aspect of a terrorist attack. Furthermore, Holly et al. (2008) indicated that in the preparedness stages of a biological attack, planning risk communication should be identified.

Heinrichs, Youngblood, Harter, and Dev (2008) discussed the importance of utilizing the Internet in preparing for a biological attack. Henrichs et al. (2008) stated that the following benefits of utilizing the Internet for crisis preparedness training are:

- Trainees do not have to present at the same location for the exercises.
- Training can be conducted at any time to accommodate the participant's schedules.
- Dangerous situations can occur without any physical danger to the trainees/participants involved.
- Scenarios can be played out more than once, therefore providing the participants the ability to immediately learn from their mistakes.

Utilizing the Internet may provide citizens and emergency officials great insight on how to prepare for a terrorist attack. Moreover, combining virtual training with hands-on training could subsequently benefit all stakeholders. Furthermore, the city government should examine how the effective use of an electronic document management system

could assist in retrieving important data in the event of an unexpected and disaster situation (Pummer, Wisniewski, & Krenzelok, 2009).

Hobfoll et al. (2007) discussed the importance of promoting calmness in a disaster situation. It should be said that constant practice by the local community will assist in promoting calmness if a disaster situation were to occur. In addition, throughout a situation such as a biological attack, it is imperative for officials in the local community to exhibit effective leadership. Avery and Zabriskie-Timmerman (2009) discussed how leadership is important in a crisis situation.

Key decision-makers tend to think that in a disaster situation it is best to withhold information from the public in hopes of maintaining a calm atmosphere and avoiding panic (Norwood, 2005). Consequently, however, if the public is not receiving adequate information in relation to a biological attack, this may cause an unwitting increase in the spread of biological agents. In the event of a biological attack, it is essential to provide the public with all essential details.

Nohria and Khurana (2010) discussed that leadership should significantly impact an organization. In a situation such as a biological attack, it is essential for city officials to exhibit effective leadership. As indicated by Hobfoll et al. (2007), it is essential for the public to remain calm in a disaster situation or else chaos will occur. Therefore, the ability for local leadership to exhibit effective leadership qualities will ultimately calm the public.

On September 11th and the subsequent release of anthrax spores in 2001 showed that the local, state, and national government needed to improve preparedness and

response time in reference to potential future terrorist attacks (Ippolito, Puro, & Heptonstall, 2006) . The purpose of this study was to examine hospital preparedness in the case of an attack (Ippolito et al., 2006).

Ippolito et al. (2006) stated that the overall objective of hospital preparedness in the event of an infectious disease emergency is to provide adequate medical care to those affected by the attack, while simultaneously providing essential medical care to the community. Therefore, the measures of preparedness for hospitals in the event of a biological attack should include identification of resources, as well as constant and efficient communication with other emergency officials within the region.

Stittelaar et al. (2006) indicated that nations should be focused and proactive in defeating threats concerning to biological agents. In the case of a natural disaster such as a hurricane, hospitals are likely to receive advance warnings, whereas this is not the case in relation to a biological attack (Mehta, 2006). Additionally, the increase in state-sponsored terrorism suggests that there will be a mass-casualty attack using biological or chemical agents (Mehta, 2006). It is extremely important for the local government to inform its citizens the importance of being vigilant and proactive in relation to a possible terrorist attack.

Edwards et al. (2006) stated that a main objective of any hospital in the event of a terrorist attack is to avoid being contaminated. Edwards et al. (2006) stated that patients should not be allowed access to a hospital until they have been decontaminated. Consequently, how emergency personnel can respond if a biological agent is not

identified in an efficient manner is restricted. Patients whose exposure to a biological agent has not yet been confirmed should remain isolated.

Pien, Saah, Miller, and Woods (2006) stated that the emergence of the West Nile virus and the deliberate release of anthrax in the United States in 2001, were first identified by clinicians and workers in labs rather than by the public health surveillance system. This prompts the question of whether such surveillance systems are capable of accurately detecting biological agents that are released in the event of a terrorist attack. Consequently, Nordin, Kasimow, Levitt, and Goodman (2008) discussed how syndromic surveillance is the practice of electronically monitoring and reporting data to identify unusual disease patterns. Emergency officials should constantly monitor and test the capability of its surveillance systems.

Additionally, Pien et al. (2006) ascertained that effective communication is warranted in preparation for a potential biological attack. The local emergency communication center in a city may be ideal for coordination purposes. Pien et al. (2006) stated that successful communication begins by having an outbreak preparedness plan, including a checklist of essential stakeholders who will assist in the preparedness aspect. The stakeholders that will assist in the terrorist attack should include but should not be limited to the infection control officer, laboratory director, hospital administrators, and first responders (Pien et al., 2006).

Another concern of preparing for the release of a biological agent is determining if the incident was covert or overt (Pien et al., 2006). If a biological agent is released intentionally this will enable the local emergency officials with the knowledge of how to

properly respond. Furthermore, Waterer and Robertson (2009) stated that in the event of a bioterrorist attack, early diagnosis is essential.

Kean and Hamilton (2004) indicated that emergency response requires preparedness. An aspect of preparedness is sharing information. In reference to September 11th, information was not shared, analysis could have been initiated with a higher level of confidence, and operations to intercept the threat of terrorism could have been implemented with an increased level of effectiveness (Hoffman & Kean, 2004). In the event of a biological attack, local government officials must understand the importance of sharing information with its stakeholders.

Individuals are absorbed with the possibility of a terrorist attack (Bersch, 2005). The goal and objective in defeating these potential terrorist attacks is to prepare and understand the dilemmas that these threats may cause to the community (Bersch, 2005). The ability to address preparedness thoroughly and effectively will provide the citizens with a sense of protection.

Dausey, Buehler, and Lurie (2007) stated that since 2001, state and local officials in the United States have accelerated efforts to prepare for a bioterrorism attack and other high-impact public health incidents. Federal funding assists local communities in preparing for a biological attack (Dausey et al., 2007). This trend prompts the question of whether an increase in funding correlates to better preparedness.

Recruitment, retention, and training of the next generation of public health professionals require change in defeating this threat (Olson, Hoeppner, Larson, Ehrenberg, & Leitheiser, 2008). Furthermore, one method in confronting possible attacks

is through innovation and lifelong learning (Olson et al, 2008). Consequently, American citizens may inquire if their taxes have been utilized properly by public health officials in preparing for a biological attack (Moodie, 2009).

In the event of a biological attack, it is essential that health officials have a stockpile of antibiotics to provide to citizens that have been impacted by the attack (Cooper et al., 2008). A biological attack would be a threat to the health of the public (Cooper et al., 2008). Proper planning and coordination is vital in having the necessary medicine and resources that are needed.

Additionally, Fyskse, Langseth, Olsen, Skogan, and Blatny stated that pathogenic bacteria either dispersed intentionally or nonintentionally is a major concern that will have a tremendous impact on the public (2008). Methods of detecting these biological agents are essential in encountering this threat (Fyskse et al., 2008). Emergency officials need to have a clear and concise mechanism for determining when and where a biological agent is released so that response time may be efficient.

Moreover, surveillance systems can not absolutely identify a disease outbreak (Chretien, Tomich, Gaydos, & Kelley 2009). There has been no major bioterrorist attack since most health indicator surveillance systems were put into place (Chretien et al., 2009). Moreover, surveillance systems should be viewed as a tool in the overall aspect of combating biological terrorism.

In reference to biodefense, it is important to improve technologies, diagnostics tools, and vaccines (Fricke, Rasko, & Ravel, 2009). However, there are few vaccines available against biological agents (Trull, du Laney, & Dibner, 2007). The local

government should remain vigilant and proactive in defeating this threat against terrorism. Additionally, leadership is crucial during a public health crisis to include a bioterrorism attack (Kahn, 2009).

Morrow and Cole (2009) indicated that individuals tasked with protecting the homeland must understand the possibility of potential biological agents being placed in the water system. It is essential for local governments to secure areas that may be a terrorist targets. Additionally, a biological attack in the water system will subsequently create enormous disaster. Table-top exercises are imperative in preparing for such biological attack (Broga et al., 2009). Table-top exercises will allow stakeholders to prepare and brainstorm about potential situations that may occur.

Not a single state admits to having a bioweapons program; however, the United States suggested that as many as 10 nations might have active bioweapons programs including North Korea, Iran, and Syria (Kellman, 2008). Local governments must prepare for the possibility of unknown biological weapons being used against cities in America. Consequently, the gap in literature is that in relation to preparation for a biological attack, information is lacking on how local officials should prepare for a biological attack that may use unknown biological weapons.

As indicated by Ryan and Glarum (2008), after the executive order, signed by President Richard Nixon, which called on countries to cease producing biological weapons, it was found the Soviet Union was not in compliance. Based on the system theory, an event happening today is impacted from previous events, and furthermore, by events that will occur in the future (Gunbeyi & Gundogdu, 2009). An objective of the

system theory is to utilize the dynamics of the situation and subsequently obtain a solution to the problem (Gunbeyi & Gundogdu, 2009).

Based on the system theory, if biological weapons were being produced after the signing of the Convention on the Prohibition of the Development, Production and Stockpiling of Biological and Toxin Weapons and on Their Destruction (Ryan & Glarum, 2008); it could be assumed that biological agents are being prepared at present. The question that should be examined is whether local governments are prepared to handle these potential unknown threats.

Furthermore, in reference to preparing for unknown biological threats, the concept of recognition, avoidance, isolation, and notification (RAIN) should be utilized (Ryan & Glarum, 2008). RAIN is imperative in providing guideline for first responders to utilize in the case of a biological threat (Ryan & Glarum, 2008). Additionally, it could be argued that in the case of an unknown biological agent, avoidance of the threat is essential until first-responders are able to identify the type of biological agent.

Responding to a bioterrorist attack is generally a local responsibility and requires the necessary coordination with its stakeholders (Ryan & Glarum, 2008). In the case of a biological attack, the local government must prepare emergency operations plans (Ryan & Glarum, 2008). Additionally, disease surveillance capacities are essential because they allow hospital personnel to identify a possible biological attack (Ryan & Glarum, 2008). If individuals are seeking medical attention in one specific area and exhibit symptoms of a biological attack, it is important for the medical staff to expeditiously provide these

details to its local partners within the law enforcement arena so that an investigation may be initiated.

Command and coordination are essential in responding to a biological incident (Ryan & Glarum, 2008). It is important in the case of a biological attack for city officials to have one unified reporting mechanism. Information may then be received and transmitted accurately. Local communities can not defeat this threat of bioterrorism without a committed effort by all stakeholders.

Literature Related to Methodology

As indicated by the Dark Winter case study, a small outbreak of a biological agent may possibly spread and cause an enormous amount of casualties (Tucker, 2008). Tucker explained that a biological attack could spread and result in impacting a myriad of individuals from other communities. It is imperative for city officials to remain cognizant of the potential of biological agents spreading to other communities.

Yin (2009) indicated that the importance of a case study methodology by discussing the case study that focused on the Cuban Missile Crisis. The importance of Graham Allison's original case study is that the findings could be applied to foreign affairs and other complex government issues (Yin, 2009). Therefore, the findings of one case study may be used as a guideline for other similar incidents.

Additionally, a case study performed in the city of Springfield Illinois also focused on preparedness for a biological attack (Habtes, 2006). This study was a qualitative case study that utilized interviews of city officials to examine if Springfield Illinois was prepared for a biological attack. The findings of this research were that the

city was not prepared due to it having to depend on other stakeholders in the event of a biological attack.

Conclusion

The responsibility for disaster management and preparedness resides with the local government (Edwards, 2007). It is imperative that the local government understands the necessity of being prepared in the event of a biological attack. The September 11th attacks showed that preparedness is a vital aspect in the event of a terrorist attack. Additionally, the anthrax attacks that occurred in October 2001 exhibited that cities are a target for biological attacks. Local governments must remain vigilant and focused on defeating this threat and preparing for a biological attack.

As discussed, Bossi et al. (2006) stated that if a successful biological attack was initiated by terrorists it could result in a tremendous amount of casualties. It is essential for local governments to be prepared with medication, resources, and emergency plans if a biological attack occurs. Consequently, the planning stages and collaboration efforts must be maintained and practiced regularly so that local government officials would remain in a state of readiness. Furthermore, having a central reporting structure in the event of a biological attack would assist in facilitating the flow of information. Constant planning and preparation is vital by local officials in addressing this social concern and subsequently being prepared in the event of a biological attack.

Chapter 3: Methodology and Research Design

Overview of the Research Design

The purpose of this study was to examine whether a city in the United States is prepared for a biological attack. This research utilized the city of Alexandria Virginia to determine its preparedness for a biological attack. A case study methodology should be used when a real-life issue wants to be understood in-depth (Yin, 2009). This single descriptive case study examined the issue in relation to whether the city of Alexandria is prepared for a biological attack.

An effective case study begins with a comprehensive literature review (Yin, 2009). The literature review was conducted in chapter 2 and discussed the importance of preparedness in the case of a biological attack. The literature reveals that there have been limited studies examining the preparedness of local governments in the case of a terrorist attack after September 11th (Giblin et al., 2009). Ryan and Glarum (2008) stated that preparedness for a biological attack consists of plans, procedures, and resources that should be identified and evaluated in advance. This theory was utilized to examine whether the city of Alexandria is prepared for a biological attack. In addition, the research in chapter 2 demonstrated that there may be unknown biological agents that may not have been used in prior terrorist attacks. Therefore, the gap in literature is that there have been limited studies examining the preparedness for a biological attack for local governments (Giblin et al., 2009). In addition, local officials should have a systematic method established in preparing for a biological attack that may utilize an unknown agent. This research addressed this social concern.

Additionally, this research measured whether the city of Alexandria is prepared for a biological attack by examining the city's needs and limitations; determining the department's needs and limitations will measure the city's preparedness level (Giblin et al., 2009). If the city of Alexandria is in need of personnel or resources, then the city is not prepared for a biological attack.

As discussed in chapter 2, system theory indicates that departments should constantly be in a proactive mode to determine how to strengthen its system and better prepare for a biological attack. System theory was utilized to determine if the city of Alexandria is prepared for a biological attack. Moreover, the literature states that preparedness for a biological attack consists of plans, procedures, and resources that should be identified and evaluated in advance (Ryan & Glarum, 2008).

A researcher should openly acknowledge the strength in limitations of their case study (Yin, 2009). The limitations and strength of this study is addressed in Chapter 1. A limitation of this study is that it utilizes one unit of analysis, the Emergency Operations Center to discuss the city of Alexandria's preparedness for a biological attack. However, as indicated by Yin (2009), a case study may be performed to examine an organization, an individual, or a decision. The Office of Emergency Management in Alexandria maintains the Emergency Operations Center. The Emergency Operations Center is an imperative component in Alexandria in preparation of a potential biological attack and merits an examination.

Rokach et al. (2010) discussed a survey that was conducted utilizing 76 randomly selected medical personnel to analyze between knowledge, profession, and the

willingness to treat individuals who have been exposed to a biological agent. The results of the study showed that increased knowledge pertaining to a biological attack revealed that health care professions are more willing to treat individuals who have been exposed by a biological agent (Rokach, 2010).

This research consisted of interviewing local government officials in the Office of Emergency Management which maintains the Emergency Operations Center located in Alexandria, Virginia. The function of the Emergency Operations center is to prepare and coordinate for a biological attack. The interviews assisted in examining the city of Alexandria's preparedness efforts. Preparedness for a biological attack consists of plans, procedures, and resources that should be identified and evaluated in advance (Ryan & Glarum, 2008). Specifically, the research examined plans, procedures, and resources that have been allocated in the event of a biological attack. This information was gained through the interviews of the officials assigned to the Emergency Operations Center in Alexandria, and through existing public records and documentation.

Giblin, Schafer, and Burruss (2008) stated that a method for determining an agency's preparedness level is to examine the department's needs and limitation. This theory assisted in measuring the preparedness level in the city of Alexandria. An organization in need of resources may lack adequate preparedness.

The utilization of theory in research is important in defining the appropriate research design and data collection procedure (Yin, 2009). This research focused on system theory. System theory utilizes the dynamics of a situation and subsequently obtains a solution to the problem (Gunbeyi & Gundogdu, 2009). When performing case

study analysis, the researcher should have an analytical strategy (Yin, 2009). Case study analysis depends on the researcher's thinking style, the sufficient presentation of evidence, and consideration of alternative interpretation (Yin, 2009).

The unit of analysis will be determined based on research (Yin, 2009). The unit of analysis that will be used in this research will be the Emergency Operation Center in Alexandria. The Emergency Operations Center is responsible for coordination, planning, and disaster response. The Emergency Operations Center is an integral component in the city of Alexandria in the event of a biological attack.

Research Question

Kean and Hamilton (2004) discussed that preparedness should be examined at the state and local level in preventing and detecting a terrorist attack. A lack of preparedness by local officials in the case of a biological attack is a social problem that this research addresses. The following research question was examined:

Is the city of Alexandria prepared for a biological attack (specifically anthrax and smallpox)? This research question was answered by performing a case study on Alexandria, Virginia. The Emergency Operations Center is the component that prepares for a biological attack in the city of Alexandria. This research allowed the participants to discuss training that is performed, emergency plans, table-top exercises initiated, availability of resources, communication efforts between stakeholders, and equipment that is used to determine if the city of Alexandria is prepared for a biological attack.

There have been limited studies examining local governments' preparedness in the case of a terrorist attack (Giblin et al., 2009). It is imperative that this gap in research

in relation to local governments' preparedness be examined. This research addressed this social concern.

Ethical Protection of Participants

IRB approval was sought and achieved prior to any research being conducted (Walden University IRB# 01-12-11-0151485). Prior to the interviews and data collection process, each participant was provided consent forms to sign. The participants were also provided an overview of the study.

Selection of Participants

The selection of the participants was identified by discussing this research with local officials in Alexandria Virginia who identified the Emergency Operations Center as a point of contact. I made contact with the Emergency Operations Center via phone. The contact information was obtained on the city of Alexandria's webpage (City of Alexandria, 2010). The participants were employees at the Emergency Operations Center who has direct involvement in preparing for disaster situations such as preparation for a biological attack.

Research Participants

The research consisted of interviewing five individuals from the Emergency Operations Center in Alexandria, Virginia. The participants had a diverse background and myriad experiences. They also had prior work experiences in the military and emergency services.

The participants in the study were both male and female, and they have varying levels of education in relation to their field. The education and experience that each

participant has is beneficial in preparing for a disaster situation such as a biological attack. Having a diverse group of people with sufficient familiarity in emergency management will assist in the preparedness efforts. The participants' diverse education and experience provides the city of Alexandria different manners in looking at preparedness and obtaining the best option of a particular incident.

The participants in the study were extremely open about the operations within the center. The participants appeared to work well together and they each discussed the importance of collaboration with local stakeholders. Additionally, the participants were articulate and expressed their ideas and visions in a professional manner.

A participant in the study also discussed the impact a nuclear attack would have on the city compared to that of a biological attack. A nuclear attack would have an immediate impact whereas a biological attack may have a longer impact due to the incubation period. This type of knowledge and diversity that was exhibited by the participants was an indicator of the preparedness level of the Emergency Operations Center because several of the participants had previous experience with terrorist incidents.

In addition, the participants were extremely knowledgeable in emergency management and preparing for a biological attack. One of the participants discussed their involvement in the anthrax attacks that occurred in 2001. Having direct involvement in a prior biological attack is beneficial in preparing for a future act of bioterrorism.

Moreover, the ability for the Emergency Operations Center to have personnel who are focused on preparedness will subsequently assist the city of Alexandria in preparing

for a biological attack. The personnel at the Emergency Operations Center are an essential component in the event of a biological attack. Maintaining adequate resources is an important benchmark for determining the city's preparedness.

Data Analysis

Data analysis consists of examining information and subsequently deriving at an empirically-based conclusion (Yin, 2009). This research utilized information obtained from the interviews, documents, literature review, and case study protocol. The ability to utilize multiple sources of information in case study research is advantageous (Yin, 2009). This research examined multiple sources of information by utilizing a critical, systematic, and analytical approach.

The research analysis occurred after the collection of the data. Using the research data to answer the question whether the city of Alexandria is prepared for a biological attack was an effective analytical strategy. Moreover, the analysis stage discussed system theory. System theory states that an event happening today is affected by previous events and by events that will occur in the future (Gunbeyi & Gundogdu, 2009).

Furthermore, pattern matching was utilized to analyze the data that was collected in this research. Pattern matching consists of attempting to connect two patterns where one is the theory and the other is the observed or operational entity (Trochim & Donnelly, 2008). In this case, the theory may originate from the researcher's thinking, an idea, or a combination of both (Trochim & Donnelly, 2008). A theory that was utilized for this research is if the city of Alexandria had the necessary resources in relation to preparation for a biological attack, and if so, this will be an indicator of the city's preparedness.

Yin (2009) indicated that published studies are essential in citing and measuring operational measures. Consequently, a case study performed in the city of Springfield, Illinois was examined. The focus of the study in Springfield was on preparedness for a biological attack (Habtes, 2006). Additionally, pattern matching indicates that if the findings, ideas, or theory matches, it is reasonable that the outcomes are credible (Trochim & Donnelly, 2008). This research also examined the results of the Dark Winter Study that occurred in Oklahoma City to obtain the impact that such an outbreak will have on the city of Alexandria. Consequently, comparing the published research that occurred in Springfield, Illinois, with the findings of this research in Alexandria, Virginia was beneficial in the overall analysis aspect of this study.

Additionally, this study examined whether the city of Alexandria is prepared for a biological attack based on the scholarly literature as discussed in chapter 2. This study did not focus on perception of the interviewees. The focus of this research was centered on policies, resources, plans, and procedures to examine the preparedness based on the scholarly literature and theory as discussed in chapter 2.

Case Study Design

A case study is performed when a researcher is attempting to understand a social issue in-depth (Yin, 2009). This research examined the preparedness of the city of Alexandria in the case of a biological attack. Examining the city's preparedness in the case of a biological attack is important because a lack of preparedness will result in the potential of an increase in casualties. Being prepared for a biological attack is a social concern that will ultimately assist in saving lives.

This single descriptive case study focused on the city of Alexandria, Virginia, which is located approximately 6 miles from Washington, D.C. The Emergency Operations Center is responsible for preparedness efforts for the city of Alexandria in the event of a biological attack. Additionally, 3.3 million people visit Alexandria throughout the year, and the city has an historic atmosphere (Alexandria.gov, 2008). A city such as Alexandria should be prepared for a biological attack. A case study approach was ideal to examine whether the city of Alexandria is prepared.

A case study approach may be used to describe, explain, illustrate, or enlighten a subject, situation, outcome, decision, organization, or individual (Yin, 2009). An objective in social science studies is to describe situations and events (Babbie, 2010). Additionally, scientific descriptions are considered to be precise and accurate compared to that of casual descriptions (Babbie, 2010). Descriptive case studies tend to examine and analyze their findings (Babbie, 2010).

Trochim and Donnelly (2008) ascertained that there is no sole method for conducting a case study. This research utilized a single case descriptive approach to describe if the city is prepared for a biological attack. A major impediment in using a single case design is defining the unit of analysis (Yin, 2009). Units of analysis are considered the units of observation (Babbie, 2010). This research examined plans, procedures, and resources that have been allocated in the event of a biological attack. The focus of this research did not focus on the participants' perceptions. Therefore, such questions phrased as "what do you think" or "how do you feel" were not asked.

In this research, the unit of analysis was the Emergency Operations Center in Alexandria, Virginia. The unit of analysis is an important element in research design (Babbie, 2010). Moreover, a single case study can be utilized to test a theory and to subsequently obtain whether a theory is believed to be true (Yin, 2009). A case study methodology was preferable for this study due to the ability to examine the city of Alexandria's preparedness in a manner that other qualitative approaches do not. Yin (2009) indicated that the benefit of utilizing a case study methodology is the ability to examine a social issue in-depth. Furthermore, if a qualitative approach such as the use of a survey was utilized, it would not have the same impact as a case study methodology, and the ability to examine this social issue in-depth.

Additionally, a case study can be a difficult process; however, a method in ensuring that a researcher's case study is effective is to remain systematic (Yin, 2010). In addition to the literature review, this study utilized outlines, note-taking, interviews, a review of documents, and a case study protocol. A case study protocol increases the reliability of case study research and is used as a template during the data collection process (Yin, 2009). A case study protocol should consist of an overview of the case study project, field procedures, case study questions, and a guide for the case study report (Yin, 2009).

Target Population

There have been limited studies examining local government's preparedness in the case of a terrorist attack after September 11th (Giblin et al., 2009).This research examined the Emergency Operation Center in Alexandria, Virginia. The Emergency

Operations Center is an important component in the city of Alexandria's preparedness efforts if a biological attack were to occur. The rationale for interviewing officials at the Emergency Operations Center is that the center is a vital component in the city of Alexandria for preparing for a biological attack and, therefore, these officials will assist in examining the city's preparedness. Documents pertaining to the city's preparedness were also examined.

The officials who were interviewed had extensive background in preparedness and readiness in the event of a disaster situation such as a biological attack. In addition, the participants interviewed are located in the Office of Emergency Management, which maintains the Emergency Operations Center. The Emergency Operations Center is used by the officials to provide and prepare a coordinated response to major emergencies and disasters (city of Alexandria, 2010).

Additionally, the officials who were interviewed are employed by the city of Alexandria and have the responsibility of protecting the citizens in the community. Due to their significant responsibility and public trust that is entailed in their position, this indicates that the responses were reliable and that bias was not an issue. In terms of preparedness, the Emergency Operations Center is the voice for the city and its citizens. Furthermore, the ability in interviewing several officials assisted in recognizing any potential conflicting statements. Moreover, during the data collection process, the ability to review and gather documents pertaining to the research was another avenue to obtain information and to potentially identify conflicting statements that may exist.

The research consisted of interviewing five officials within the Emergency Operation Center and discussing the preparedness efforts in the case of a biological attack. The interviews of the participants were focused on the city of Alexandria's preparedness. Based on the purpose of this research interviewing five individuals was sufficient. Prior to the actual data collection process, the participants were scheduled interviews. Each interview lasted approximately 45 minutes. The questions were from the study protocol. The data collection process was completed within a week.

The purpose of this study was to determine whether the city of Alexandria is prepared for a biological attack based on the scholarly literature as discussed in chapter 2. This study does not focus on perception of the interviewees. The focus of this research was on policies, resources, plans, and procedures to subsequently obtain whether the city is prepared for a biological attack.

As Yin (2009) indicated, the fewer number of participants will allow the researcher the ability to obtain more in-depth information in understanding the social issue being researched. Additionally, the responses were analyzed based on several factors such as resources, needs, limitations, and planning. A local community should coordinate training exercises on a yearly schedule to ensure proper preparedness and communication efforts are ongoing.

Furthermore, the research focused on the policies and procedures of the Emergency Operation Center in relation to Alexandria's preparation for a biological attack. The interviews were analyzed and compared based on the scholarly literature that indicated what is needed to be prepared in the event of a biological attack. Moreover, the

literature states that preparedness for a biological attack consists of plans, procedures, and resources that must be defined in advance (Ryan & Glarum, 2008). The interviewees were asked about the plans, procedure, and resources that are defined in advance in the event of a biological attack. Additionally, if through the course of the interviews, no plans, procedures, or resources would have been identified, then based on the scholarly literature, this would have shown a significant lack of preparedness. In addition to analyzing the responses of the participants, system theory as discussed in chapter 2 was utilized to analysis the responses of the participants.

Furthermore, the unit of analysis of this research is focused on the Emergency Operation Center and their function in the preparedness efforts for the city of Alexandria in the event of a biological attack. The unit of analysis is the Emergency Operations Center and all the relevant participants for the purposes of this study is within the EOC. A case study methodology is beneficial because it allows a researcher to examine an individual, an organization, or solely a decision (Yin, 2009).

The participants were employees of the city of Alexandria who voluntarily consent to be a part of this research. All participants in this research were adults. Additionally, the research consisted of questions to include communication efforts, table-top exercises, resources, and disaster plans. The interviews assisted in examining the city's needs and limitation in relation to a biological attack. Interviewing local officials at the Emergency Operations Center assisted in the overall aspect of this research and provided insight on whether the city of Alexandria is prepared for a biological attack.

The interviews were conducted in person. Babbie (2010) indicated that interviews may be conducted in a variety of manners to include a telephone interview, a focus group interview, or a one-one interview. The interviews will be structured and the questions will be asked in an unbiased manner. A case study interview requires the researcher to focus on the objective of the research while asking fair questions (Yin, 2009). The rationale for making initial contact by telephone is that it provided a greater sense of comfort and transparency.

The participants were asked questions and their responses were written down to assist in the data collection process. A pilot study was not performed because the city's preparedness was based on the scholarly literature. The questions that were asked are based on the scholarly literature on understanding and defining adequate preparation for a biological attack. After the interviews the notes were labeled and sealed in an envelope. To ensure accuracy of the data, immediately after the interviews a review of all notes and responses were evaluated and rewritten. The responses, notes, and data are maintained and secured in a lock-box that is designated for this research. As discussed, the analysis of the interviews/data was based on the scholarly literature's measurement of preparedness as discussed in chapter 2. Yin (2009) indicated that a method in analyzing case study data is to focus on the theoretical proposition that led to the case study. The responses were analyzed based on the theory and the literature pertaining to what is adequate preparedness.

Measuring Preparedness

Yin (2009) indicated that a challenge with case studies is the inability for researchers to set accurate operational measures. There are several methods for setting adequate operational measures. Operational measures may be utilized by citing published studies (Yin, 2009). This study measured if the city of Alexandria is prepared for a biological attack by examining the city of Alexandria's needs and limitations. By studying the department's needs and limitation one may then measure the preparedness level (Giblin et al., 2009).

Additionally, this case study compared Alexandria to the findings of a case study performed in Springfield, Illinois. This provided an addition measure in determining, comparing, and matching the preparedness level of Alexandria. Preparedness for a biological attack consists of plans, procedures, and resources that must be defined in advance (Ryan & Glarum, 2008).

Findings

Reporting a case study consists of bringing the results and findings to a conclusion (Yin, 2009). The analysis of data from this research was used to determine if the city of Alexandria is prepared for a biological attack. The research addressed the findings and subsequently provided recommendations.

Being adequately prepared for a biological attack is a social issue that this research addresses. In addition, the findings of this research and the recommendations will be shared and disseminated with the participants, city officials, and local law enforcement therefore having a social impact on local communities' preparedness. This

research will effect social change by improving preparedness in the event of a biological attack and subsequently saving lives.

Chapter 4: Analysis

Introduction

The Emergency Operation Center is an integral component in the city of Alexandria. The center is responsible for overseeing and managing operations in the city in the event of an emergency disaster such as a biological attack. The purpose of this research was to assess whether the city is prepared for a biological attack. This research consisted of interviewing officials in the Emergency Operations Center and discussing the existing procedures that are established in preparing for a biological attack. The interviews were in-depth and gave each participant the opportunity to elaborate on their responses. A review of public documentation was also analyzed in this research.

A lack of preparedness for a biological attack may result in the biological agent spreading and potentially causing additional causalities (Cole, 2009). As indicated in the Dark Winter study, a simple biological outbreak could cause panic and become impossible to contain (Tucker, 2008). The Emergency Operations Center is utilized in this research to determine if the city of Alexandria is prepared for a biological attack.

To understand the city of Alexandria's preparedness, this research consisted of performing interviews and reviewing documents pertaining to the city's preparedness in the event of a biological attack. The interviews were in-depth and the documents reviewed were public records. The ability to review documents and interview the participants assisted in analyzing the data.

In the event of a biological attack, plans and procedures should be defined in advance (Ryan & Glarum, 2008). This research examined the Emergency Operations

Center's plans, personnel, and resources. In addition, the research reviewed exercises and partnership that are established to prepare for a biological attack. Without proper and adequate planning, this will limit the city's ability in the event of a biological attack.

Additionally, to determine the preparedness level of an organization it is important to examine its needs and limitation (Giblin et al., 2009). This research discussed and critiqued funding and resources that the city of Alexandria has if a biological attack occurred. If a city does not have the proper funding and personnel to combat the threat of bioterrorism, its preparedness should be questioned.

Adequate funding is essential in disaster preparedness. A qualitative case study was completed in a study to determine the gap in homeland security funding and disaster preparedness in Riverside California (Munro, 2011). This particular study consisted of interviewing a total of five participants from the local, federal, and state level. The findings showed that a lack of funding was due to cooperative policy formulation.

Consequently, in reviewing the data, a systematic approach was utilized consisting of an analysis technique known as "pattern matching." The responses from the participants were analyzed to obtain if the patterns matched the theories that were discussed in the literature in relation to adequate preparedness. Another analysis technique that was used is theory building based on system theory. System theory was discussed in chapters 2 and 3. The third technique that was used in the analysis stage was to compare this data to that of other cities to identify best practices.

Data Collection Process

The data were collected through interviews and documentation. The interviews were conducted at the Emergency Operations Center in Alexandria in the conference room. Five employees within the Emergency Operation Center participated in the research and were subsequently interviewed. The Emergency Operations Center is responsible for overseeing and managing the city's operations in the event of a biological attack. Its mission is to assist in protecting the approximate 150,000 people in the city of Alexandria in the event of a disaster situation such as a biological attack.

The interviews questions that were asked are from the attached study protocol (see Appendix). The interview questions were focused on the preparedness of the city of Alexandria in the event of a biological attack. At the start of each interview, I explained the consent forms in detail, and the participants subsequently signed the consent forms.

The participants were provided copies of the consent form. The participants were informed that if there were any questions or concerns to please feel free to contact the numbers that are located on the consent forms. The original copies of the consent forms were immediately placed in envelopes and secured.

Throughout the interviews and data collection process, the participants provided clear and concise responses. The responses that were provided were discussed in detail. If there were data that were unclear, the participants elaborated further until it was completely explained and understood.

I recorded notes from participant interviews in my field notebook, which averaged four pages of notes per interview. A total of 21 pages of notes were taken from the

interviews. To this end, I reviewed Alexandria's public records on preparedness. The triangulation of data was helpful in establishing the validity of my findings (Yin, 2009)

Immediately after the interviews, I typed my notes into a password protected document, a process that ensured participants confidentiality. Password protecting the interview responses also assisted in maintaining the integrity of the data. Additionally, this process of rewriting the notes assisted in accurately remembering what was said during the interviews.

Findings

The findings of this research and the interviews are extremely important in Yin (2009) indicated that the importance of a case study methodology by discussing the case study that focused on the Cuban Missile Crisis. The importance of Graham Allison's original case study is that the findings could be applied to foreign affairs and other complex government issues (Yin, 2009). Therefore, the findings of one case study may be used as a guideline for other similar incidents, initiating social change. A successful biological attack would have an enormous impact on the city of Alexandria and potentially other surrounding communities. Consequently, the findings of my research revealed that the city of Alexandria has adequate resources and personnel to assist in preparing for a biological attack.

It is essential for the city of Alexandria to continue to prepare for and communicate with stakeholders to combat the threat of a biological attack. Proper preparedness is an ongoing issue that must have the commitment of all pertinent

stakeholders. In the case of a biological attack, the lack of preparedness would result in increased casualties.

Nonconforming Data

The data that was obtained in this research were from interviews, public records, and physical observation. Due to the officials being city officials, a certain level of public trust is warranted. The participants are public servants who are tasked with protecting the citizens in the community. The only nonconforming data was the communication aspect with other stakeholders and partners.

Evidence of Quality

The Evidence obtained in this research was important in understanding the preparedness level of the city of Alexandria. The plans and programs such as CERT provided an overview of the procedures that are established in the event of a biological attack. Additionally, the data obtained from the participants relating to their involvement in other disaster incidents such as the Anthrax Attacks was also evidence that benefited the totality of this research.

Analysis of Interviews

The Emergency Operations Center is responsible for coordinating the city's response in the occasion of an emergency situation such as a biological attack. The Emergency Operations Center is staffed with four full time employees and three grant funded temporary employees. The Emergency Operations Center has a total of seven employees. The objective of the center is to ensure that the citizens in the community are safe in the event of an emergency situation such as a biological attack.

This research consisted of interviewing five of the seven employees assigned to the Emergency Operations Center. For the purposes of this study, five participants were sufficient and did not create redundancy. A major benefit of a case study is the ability to utilize different forms of evidence (Yin, 2009). In addition to the interviews, public records and participant-observation were also utilized.

The city of Alexandria is home to approximately 150,000 individuals (U.S. Census Bureau, 2010). The estimated annual budget for the Emergency Operations Center is $300,000-$400,000. The overall budget for the city is approximately $1 million dollars for emergency disaster planning.

Furthermore, one participant discussed the importance of allowing citizens to be involved in the planning stages of emergency management. Emergency preparedness is an important concern for the city. Consequently, the participant discussed the benefit of Community Emergency Response Team Training (CERT).

CERT is an 8-week training program that the citizens in the community can take to learn about emergency preparedness. The training consists of emergency preparedness, fire safety, medical operations, disaster psychology, terrorism awareness, and incident command center. After the 8 weeks of training, the individuals who attend CERT training can then volunteer to be a part of a team. The citizens in this program assist in shoveling snow or assisting when it floods in the city. The ability for citizens to be stakeholders in the process is imperative for citizens' safety.

Additionally, Alexandria also has the Medical Reserve Corps, which consist of volunteers with experience in medical care (city of Alexandria, 2010). The objective of

the Medical Reserve Corps is to strengthen the health emergency preparedness in Alexandria (city of Alexandria, 2010). The Alexandria Neighborhood Watch Program is another program that is operated by the city (City of Alexandria, 2010). These programs are important in maintaining engagement for stakeholders.

The participants also discussed the importance of coordinating with other stakeholders in the event of a biological attack. The Emergency Operations Center prepares with local communities in the event of a biological attack. The center also coordinates with the Red Cross. The Red Cross was founded in 1881 and is the nation's premier emergency response organization (American Red Cross, 2010).

The American Red Cross responds to more than 70,000 disasters per year, consisting of fires, hurricanes, floods, earthquakes, tornadoes, hazardous material spills, accidents, explosions, and other natural and man-made disasters (American Red Cross, 2010). The participants reiterated the importance of coordinating with stakeholders. Proper preparedness is essential in emergency management.

A participant in this research also discussed how the volunteers in CERT assisted in the 2009 H1N1 epidemic. The participant in this research stated that the volunteers understood the importance of washing hands and coughing into a sleeve or tissue to decrease the spread of diseases. This information did not originally seem relevant to the preparation of a biological attack; however, the participant indicated that having well-trained volunteers in the event of a crisis such as a biological attack will be extremely beneficial.

The city of Alexandria empowers its citizens to constantly plan and prepare for a disaster condition. The participants discussed how imperative it is for citizens in the community to have enough food and water if a disaster occurs. Having adequate resources is essential in the event of a biological attack.

The Northern Virginia Region Commission, who coordinates with the city of Alexandria, suggests that citizens employ the following techniques when preparing for a disaster situation or terrorist incident (North Virginia Region Commission, 2010):

- Be alert and aware of the surrounding area;
- Take precautions when travelling and do not accept packages from strangers;
- Learn where emergency exits are located; think about evacuations in congesting areas such as buildings and subways; and
- Be aware of heavy objects that can explode or fall

In addition, one participant also discussed the presence of a nuclear plant located in Maryland, approximately 50 miles from the city of Alexandria. The participant stated that, due to the facility's proximity to Alexandria, it is essential that the city participates in additional exercises.

Additionally, a participant in the study discussed the danger of a biological attack compared to that of a nuclear attack. One participant discussed the dangers associated with the incubation period of a biological attack. A biological attack could have occurred days or weeks prior, and not be detected until individuals begin seeking medical care; whereas other forms of terrorism the impact will occur immediately.

An individual may be impacted by a biological agent by inhalation, consuming food or water, or contact with contaminated items. A participant in the study stated that a major concern is that an individual may attempt to place a biological agent in food at restaurants. A similar incident occurred in Oregon in the 1980s when salad bars in restaurant were contaminated causing hundreds of people to become ill.

Furthermore, a participant in this research stated that if a biological attack occurred, first responders should immediately isolate people, utilize decontamination techniques, and provide medication if necessary. Isolation is vital in the event of a biological attack. Immediate isolation will decrease the spread of the biological agent.

Another participant indicated how close Alexandria was to the anthrax incident that occurred at the Brentwood mail facility in Washington, DC. The city of Alexandria assisted throughout these incidents. The anthrax attacks that occurred in 2001 resulted in five deaths and numerous individuals being hospitalized (Cole, 2009).

One participant indicated that the anthrax attacks have strengthened the postal service's security. The United States Postal Service urges individuals to report all suspicious items, including items that have excessive postage, items with no return address, packages bearing improper spelling, parcels sealed with excessive amount of tape, and unexpected mail from a foreign country (The Northern Virginia Region Commission, 2010)

One of the participants stated that prior to the 2001 anthrax attacks, cities were not prepared for a biological attack. The participant stated that during these attacks, city officials were constantly relying on Federal resources regularly. Consequently, the city

learned and obtained equipment to enable it to test suspicious substances prior to contacting federal authorities and utilizing unnecessary resources.

A participant indicated that the city was not prepared in combating an anthrax attack prior to 2001. During the Anthrax attacks that occurred in 2001, the Emergency Operations Center assisted in coordinating and dispensing medication to individuals who may have been infected. In addition, a participant in the study discussed how the local fire department, health department, and police department will coordinate in the event of a biological attack. Alexandria's fire department employs more than 250 professionals, including firefighters, paramedics, fire prevention staff, and administrative support (city of Alexandria, 2010). Alexandria's fire department consists of nine fire stations in the city that protects 15 square miles as well as specialized teams that includes the Northern Virginia Regional Hazardous Materials Team, Technical Rescue, Marine Operations, and the Special Operations Team may also assist in the event of a biological attack.

The Alexandria police department consists of 320 sworn officers and 138 civilian employees (city of Alexandria, 2010). The department has been internationally accredited by the Commission on Accreditation for Law Enforcement since 1986 (city of Alexandria, 2010). This is an important benchmark for the city of Alexandria because this accreditation is a rigorous process that exhibits the professional status of law enforcement agencies and is recognized worldwide (city of Alexandria, 2010).

A participant in the study also discussed how the Alexandria health Department will assist if a biological attack were to occur. The Alexandria Health department is one of 35 district offices of the Virginia Department of Health's Division of Community

Health Services (city of Alexandria, 2010). Proper coordination with the health department is essential in preparing for a disaster situation such as a biological attack.

Moreover, the Emergency Operations Center participated in a biological exercise within a week of the interviews. The center indicated that the exercise was extremely beneficial because it allowed Alexandria to work with a myriad of stakeholders consisting of local, state, and Federal authorities. Further, a participant stated that if a biological attack were to occur the city has resources to perform swabs on locations that may have been exposed to a biological agent, such as anthrax or smallpox. However, there are not enough laboratories to test the results in an expeditious manner.

The participants stated that the fictional biological exercise occurred at a convention attended by citizens from different states. An individual at the convention was infected with a biological agent: smallpox. When the convention ended, the attendees departed back to their respective home state and subsequently carried the biological agent, infecting numerous citizens in their states. One participant indicated that this scenario is extremely dangerous and can cause a serious outbreak throughout the country. Additionally, the Emergency Operations Center stated that the biological exercise assisted in providing recommendations in the event of a biological attack.

The participant in this study stated that if a biological attack of that magnitude were to occur, Alexandria will have to rely on Federal authorities to assist. Additionally, the city of Alexandria has local agreements with other surrounding cities in the event of a biological attack. The other surrounding cities will bring in resources to assist. In addition, a case study completed on Springfield, Illinois about its preparedness for a

biological attack, also indicated that the city will have to rely on federal authorities in the event of an attack (Habtes, 2006).

A participant was also asked if a biological attack occurred, whether or not this would impact the city's personnel because of military obligations. The participants stated that the Emergency Operations Center supports the military, and that only a small number of emergency officials are in the military reserves. If these employees were called upon, the city can supplement with overtime or volunteers.

The participants were also asked about the city's surveillance abilities in determining if a biological attacked occurred. One participant stated that the Emergency Operations Center looks for "trigger points" in determining if a biological attack occurred. A potential trigger point would be if a large number of individuals in a specific area seek medical attention. Consequently, the city has liaisons at hospitals therefore if there is a sudden increase in patients arriving, the Emergency Operations Center would be notified.

Also, if there is an increase in students being sick, this will also be a concern. It is imperative for the city to have such surveillance measures in place to determine a potential outbreak. The Emergency Operations Center also has routine meetings to determine effective measures that are utilized in detecting a potential biological attack. These processes are constantly being monitored to determine the effectiveness of its responses to a biological attack.

A participant stated that the city also has sufficient vaccination and protective masks if a biological attack occurs in Alexandria. It is imperative that potentially affected

individuals are identified immediately so that they may be given the necessary and appropriate treatment. Furthermore, one participant stated that if an attack occurs, officials from the Center for Disease Control and Prevention and Health and Human Services would be directly involved.

The Center for Disease Control and Prevention (CDC) is responsible for providing information that may be utilized by individuals to understand health promotion, prevention of disease, injury and disease, and preparedness for new health threats (CDC, 2009). In addition, the CDC seeks to accomplish its mission by monitoring health concerns, detecting health problems, conducting research to enhance prevention, advocate health policies, implement prevention strategies, and provide leadership and training (CDC, 2009).

The CDC reiterates that early detection is imperative in the event of a biological attack (CDC, 2009). Additionally, the CDC indicates that a large scale biological attack could potentially overwhelm the local and national public health infrastructure (CDC, 2009). The CDC suggests that the preparedness efforts in the city should be concentrated on the biological agents that may result in the most destruction (CDC, 2009).

Additionally, one participant stated that Health and Human Services would also assist if a biological attack were to occur. The Department of Health and Human Services is the United States primary agency for protecting the health of citizens and providing essential services (Health and Human Services, 2009). Health and Human Services work directly with state and local governments (Health and Human Services, 2009). A

participant stated that the collaboration and support that will be provided in the episode of a biological attack are imperative.

Moreover, visionary leadership is also imperative in preparing for a biological attack. A public record for the city of Alexandria dated April 18, 2008, discussed the potential expansion of the Emergency Operations Center. The public record states that a new operations center will meet all of the city's needs in the case of unforeseen emergencies.

One participant also discussed the importance of timely notification in the event of a biological attack. The participant stated that the media may be utilized in a disaster situation by notifying citizens in the community. In addition, city alert/enews is another method in allowing citizens to remain informed. Utilizing these communication methods will assist in ensuring that citizens are notified in a timely manner. The city of Alexandria must continue to ensure that current communication methods are improved upon. Effective communication is imperative in the event of a biological attack.

A participant also discussed that the reverse 911 system, which is located in the local police department. The reverse 911 system contacts citizens in the community in the event of an emergency. In the case of a biological attack, the system can call a specific area in the community and request that citizens remain in place until Emergency Medical Services arrives. A participant discussed the importance of the reverse 911 system in the event of a biological attack. Additionally, a participant also stated that law enforcement personnel will also assist in notifying citizens by patrolling the streets or knocking door to door to ensure that citizens are informed.

The participants also discussed and provided a physical observation of the National Warning System (NAWAS). The NAWAS is a brown phone that is located in the Emergency Operations Center and is used to communicate threats to federal, state, and local authorities. The NAWAS is monitored 24 hours a day, 7 days a week. The NAWAS supports the function of immediately establishing notifications in the event of a threat or disaster. By using the NAWAS, the Emergency Operations Center can distribute a message to all appropriate stakeholders expeditiously.

The participants also discussed the limitations of the NAWAS in the event of a biological threat or emergency situation. The NAWAS is an unsecured line; therefore, if sensitive information pertaining to a biological attack is known, this system should not be utilized. For sensitive information or intelligences, other internal mechanism should be used. One participant reiterated that the NAWAS is an adequate system; however, the potential for leaks are increased because it is monitored by a myriad of partners.

Summary

The Emergency Operation Center is responsible for coordinating, preparing, and overseeing the city's operations in the event of a disaster incident such as a biological attack. The participants are experience in emergency management and they routinely prepare for the possibility of a biological attack. The participants reiterated that the Emergency Operations Center is a management tool that can subsequently enhance the city's ability to effectively prepare for a biological attack.

The literature states that an aspect of proper preparedness consists of plans, procedures, and resources defined in advance (Ryan & Glarum, 2008). The Emergency

Operations Center has defined resources that consist of local, state, and federal partners. These partners will assist if a biological attack occurred in Alexandria.

Furthermore, if a biological agent such as smallpox or anthrax was utilized, this will cause a potential for an increase in casualties. The city of Alexandria should utilize appropriate measures during a biological attack in order to be sufficiently prepared. Proper isolation of potentially impacted individuals is essential.

In addition, communication capabilities such as the 911 reverse system and social media are imperative in the event of an attack. These communication resources are an avenue that allows citizens to remain informed. Proper notification to the community will assist in decreasing the spread of a biological agent.

Additionally, surveillance detection systems are an integral aspect of adequately preparing for a biological attack. Surveillance detection systems allow city officials to immediately observe a potential outbreak. It is imperative for the Emergency Operations Center to ensure that constant coordination is initiated with the medical community. As a biological attack may go weeks without being detected, the health care community may be the first entity to notice a concern.

The benefit of the Emergency Operations Center is that it oversees operations and the city's preparedness efforts. Effective oversight is essential because it provides appropriate stakeholders an understanding of the city's needs and limitations in preparing for a disaster situation such as a biological attack. The Emergency Operations Center must remain proactive in its preparation for a biological attack.

Chapter 5: Summary and Conclusions

Overview

System theory states that an event happening today affects previous and future events (Gunbeyi & Gundogdu, 2009). Additionally, the system theory indicates that if events today are a result of past events, then the connection between these past and present events warrants examination (Gunbeyi & Gundogdu, 2009). Prior biological attacks such as the Anthrax attacks and other attacks discussed in the literature review were examined to assist in future preparation.

This research focused on understanding past events, such as the anthrax attacks in 2001, to assess whether the city of Alexandria has made improvements and is adequately prepared for future events of a similar occurrence. I also examined and analyzed data by using pattern matching and comparing other cities to Alexandria. Pattern matching provides the researcher the ability to examine prior studies and scholarly literature to determine if patterns exist (Yin, 2009). The scholarly literature suggests that proper preparedness for a biological attack will consist of plans and adequate resources defined in advance (Ryan & Glarum, 2008). Therefore, if the Emergency Operations Center did not have plans and resources defined in advance, the "pattern" of proper preparedness would not match. Pattern matching is an effective tool that allows the researcher to analyze data based on prior studies, literature, and theories.

The participants in this study acknowledged that the city has made tremendous improvements since the 2001 anthrax incidents; however, there are continuing issues that need to be examined. Constant planning and evaluation of resources should be examined

in preparing for a biological attack. Terrorists constantly modify their method of operations. It is essential for city officials to constantly evaluate their processes.

Preparedness

The participants at the Emergency Operations Center have an enormous amount of experience in emergency management and preparedness for disaster situations, including biological attack. Several of the participants have assisted and been involved in terrorism cases including the September 11th attacks in Virginia, and the Anthrax incidents that occurred in 2001. Thus, to determine whether a city is prepared for an incident such as a biological attack, it is essential to understand the experience level of the organization. The participants at the Emergency Operations Center are extremely skilled in preparation for a disaster situation based on their experience in emergency management.

Additionally, it is important for citizens to be involved in the planning stages of disaster response. Community Emergency Response Team Training (CERT) is an essential program for the citizens, and the city of Alexandria. The ability for citizens to be able to volunteer for CERT is crucial when preparing for the unexpected. Additionally, the training consists of 8 weeks, which is a reasonable amount of time. Another benefit of CERT is that after the 8 weeks of training, citizens continue to be engaged by assisting when they are needed. .

The literature discussed in chapter 2 states that proper preparedness for a biological attack requires participation in table-top exercises, plans defined in advance, and the availability of adequate resources (Ryan & Glarum, 2008). The Emergency

Operations Center participates in emergency disaster exercises. The ability for the city of Alexandria to regularly participate in these exercises provides the city an understanding of what is needed to improve upon.

Furthermore, as discussed in chapter 4, the city of Alexandria has sufficient personnel to perform 100% swab tests on a potentially infected location that may have been contaminated by a biological agent. However, the lack of laboratories to perform the tests on these swabs is a concern. All avenues should be explored to improve the number of available laboratories.

Further, participants discussed that if a biological attack occurred, federal resources will be called to assist. It could be argued that, if local communities must rely on federal authorities to assist, then this may suggest inadequate preparedness. However, the literature indicated that an aspect of preparedness for a biological attack is to coordinate with the appropriate stakeholders (Cole, 2009). In the event of a biological attack, the CDC and the Health and Human Services departments will be involved as appropriate stakeholders. Consequently, if a biological attack were to occur, the CDC and Health and Human Services are an integral aspect of the process.

Officials at the Emergency Operations Center also stated that an essential objective in the event of a biological attack is to isolate individuals who may have been impacted. It is imperative that isolation occurs immediately so that other individuals may not risk being infected. The next step is to decontaminate potentially infected individuals. The decontamination process may be an area for improvement. After the anthrax attacks in 2001, it was noted that people who were decontaminated felt a sense of unease. The

individuals stated that the process was intrusive because of having to remove clothing in the public, and possibly being filmed my media cameras (Cole, 2009).

If a biological attack was to occur and individuals had to be decontaminated, it is important that the Emergency Operations Center coordinate effective measures so that citizens do not feel violated in the process. Additionally, the participants stated that another important aspect in the event of a biological attack is that vaccination is immediately provided.

The Emergency Operations Center should constantly coordinate with Public health officials to ensure that the stockpile of vaccination is current and available if an attack were to occur. The Emergency Operations Center also utilizes the flu season as an indicator to determine how a potential vaccination process may be managed. This proactive course of action is important in preparing for a potential attack. This process of examining mechanisms prior to an attack is a case in point of effectively utilizing system theory.

The Emergency Operations Center also has liaisons in local hospitals, which is beneficial in detecting unusual patterns that may be indicators for suspicious activities. The liaisons at the local hospitals are essential components in the preparation stages of a biological attack. Furthermore, because a biological attack could happen without instantaneously being detected, it is vital that local cities understand the importance of having essential personnel assigned to hospitals.

Alexandria's coordination and exercises with Federal, state, and local partners is important in preparedness efforts. The literature states that proper preparedness with

essential stakeholders is an important function in preparing for a biological attack (Cole, 2009). The city of Alexandria also coordinates with local businesses to ensure their safety in the case of an emergency disaster situation. The business community should be central partners in the preparation stages. It is important for the business community to be engaged in preparation for a biological attack.

In preparing for a biological attack, all stakeholders should be involved in a consolidated biological exercise drill to include the Emergency Operations Center, Health and Human Services, the CDC, the business community, regional and national partners, the Police, Fire, and Emergency Medical Services; however, such an exercise may not be feasible because of the enormous amount of resources and components that will be required.

Funding is crucial in ensuring that a city is properly prepared for a disaster situation such as a biological attack. The Emergency Operations Center's annual estimated budget per year is estimated to be $300,000- $400, 000. Most agencies tend to request additional funding; however, in the analysis of the Emergency Operations Center, it appears that their funding is sufficient. Additionally, the overall budget for the city of Alexandria is approximately 1 million dollars. For a city the size of Alexandria, based on the experience of the participants, funding is adequate.

Additionally, the role of the Emergency Operations Center is to coordinate the city's response in the event of an emergency situation such as a biological attack. The Emergency Operations Center is a management tool that should be utilized in overseeing operations, preparedness, and providing necessary information to the appropriate

stakeholders. Moreover, the Emergency Operations Center is not the component that performs the actual response in the event of a biological attack.

Further, effective communication in a disaster situation is vital. The city of Alexandria attempts to engage all appropriate stakeholders in the preparedness efforts. In the case of a biological attack, it is important for citizens to be informed, and if warranted, remain isolated. If a terrorist were to utilize a biological agent such as smallpox, it could cause an enormous devastation by spreading and potentially causing other citizens in the community to be infected. As discussed in the Dark Winter Study (Tucker, 2008), a biological attack would result in a significant impact on the community.

Consequently, the reverse 911 system that the Emergency Operations Center has access to is essential to stopping other citizens from being infected. The reverse 911 system can automatically contact citizens in the community advising them that a biological attack occurred and to remain isolated. Moreover, if law enforcement officials observe that a biological attack occurred in a specific area, the system could be programmed to call that particular area.

A participant in the study explained how devastating misinformation would be in a disaster situation. The participant stated that in the 1990s there was a water quality issue in Virginia, D.C., and Maryland, and different agencies provided the public with different answers on how long to boil water. A participant further stated that this is an example on how there should be only one voice speaking to the public if a biological attack occurs so that information will remain consistent.

Timely and accurate communication is essential. Another channel that the city of Alexandria will use is the media. The media is an integral stakeholder that provides the citizens with information. The media has access to an enormous audience in a moment's notice. However, one concern about media outlets is that officials must ensure that certain sensitive information does not disclose to the media; this may cause further chaos and panic. As discussed in chapter 4, city officials should utilize other methods of communication whenever information is sensitive.

Interpretation of Findings

The research shows that the city of Alexandria, Virginia is prepared in the event of a biological attack. The purpose of this research was to examine whether the city of Alexandria is prepared for a biological attack by utilizing the Emergency Operation Center as the unit of analysis. An objective of the Emergency Operations Center is to prepare for and oversee the operations for the city of Alexandria in the occurrence of a disaster situation such as a biological attack.

Scholars have stated that an aspect of proper preparedness consists of plans, procedures, and resources that should be identified and evaluated in advance (Ryan & Glarum, 2008). The Emergency Operations Center has plans established, procedures, and resources that are defined in advance in the event of a biological attack, and they are as follows:

- The Emergency Operations Center has plans including table top exercises, volunteer programs, isolation procedures, coordination with regional partners, and adequate supplies of vaccination and personal protective equipment.

- The Emergency Operations Center also has defined procedures established. These procedures consist of immediately isolating potential victims, decontamination, and providing vaccination if applicable. The Emergency Operations Center regularly coordinates with stakeholders to ensure that the necessary resources are readily available in the event of a biological attack.
- CERT is an important volunteer program that provides the citizens an understanding of what to do in the event of a terrorist attack. This program is imperative in keeping citizens engaged and informed within the community. The participants involved in this training have a diverse amount of experience in emergency situations.
- The city of Alexandria also has adequate resources to assist if a biological attack occurs. The Emergency Operations Center's annual estimated budget per year is estimated to be $300,000- $400,000. In addition, the city of Alexandria has a budget of approximately $1 million for emergency disaster planning. The city's fire department in Alexandria employs over 250 individuals that could be utilized in the event of a biological attack. Additionally, the police department consists of over 300 officers that may be utilized to assist in the event of a biological attack. The Emergency Operation Center discussed that boots on the ground which includes police officers, Emergency Medical Services, and Firefighters will be essential in the event of a biological attack.
- Additionally, the anthrax attacks in 2001, and its proximity to Alexandria, subsequently assisted the city on how to adequately prepare for a biological

attack. Unlike other cities that did not have a direct involvement in the anthrax attacks, the city of Alexandria was able to obtain direct experience in dealing with a biological attack.

Further, the anthrax attacks that occurred in 2001 resulted in five deaths, and caused panic throughout the country, especially in the D.C. area to include Alexandria, Virginia and cross-contamination was a major concern in these attacks. The literature suggests that the anthrax attacks in October 2001 showed that the United States was not prepared for a biological attack (Bossi et al., 2006). Additionally, the participants in this study validated that local cities were not prepared for the Anthrax attacks. However, the city of Alexandria has had approximately a decade to improve its response and preparedness in relation to a potential biological attack since that time. As a result, the city of Alexandria has improved its response plan, and is prepared for a biological attack.

Recommendations for Action

1. The Emergency Operations Center should coordinate additional biological exercises with all stakeholders to include local, state, and federal authorities. In addition, local businesses and citizens should be included in this process. However, additional biological exercises will require further resources that may not be feasible.
2. The city and all pertinent stakeholders should invest in a laboratory, overseen by the city of Alexandria. Local communities do not have complete access to laboratories and must rely on federal entities to perform testing of potential

biological agents. The ability for the city to test potential biological agents will be beneficial and will result in impacted locations being cleared expeditiously.

3. The city should require all citizens and local businesses in the community to participate in a condense version of CERT. CERT allows citizens a mechanism to prepare for a terrorist attack.
4. The Emergency Operations Center should consist of a staff whose sole purpose is to regularly examine potential vulnerabilities in the event of a biological attack. As indicated in the system theory, constant evaluation is needed to improve an event in the future.
5. The Emergency Operations Center should have liaisons within research and technology companies to improve upon the city' ability to respond and detect potential biological threats. The city of Alexandria must constantly examine its technological abilities for improvements in preventing biological threats.
6. The city of Alexandria should perform random biological drills to test its process and preparedness. These random tests should not be planned and would allow the city to understand what processes need to be improved upon. These drills will exhibit a close to real life experience and will enable the city to respond as appropriate.
7. The city of Alexandria should think globally and have partnerships with other countries to establish programs and protocols for coordination of information in relation to bioterrorism.

8. In the event of a biological attack, isolation is imperative. The ability to isolate potentially infected individuals will assist local communities from the agent spreading from one city or state to another location. Appropriate stakeholders should develop a computer based website with virtual technology that may be used in the event of a biological attack. Utilizing this method to communicate with first responders and medical personnel will be detrimental in decreasing the spread of the disease.

Recommendations for Further Study

It is important for the city of Alexandria to learn from the lessons of the 2001 Anthrax attacks. Effective communication is a necessity in the event of a biological attack. A biological attack if not properly contained will have an enormous impact on the city, state, and federal response if proper coordination and communication is not established. Preparation and coordination should be performed on a regular basis with stakeholders. In addition, further studies could review the decontamination process and implementation measures that could be utilized in the event of a biological attack

Reflections

This qualitative case study pertaining to the city of Alexandria's preparedness in the event of a biological attack is important for the city and its citizens. This study allowed me to critically examine what is warranted to be properly prepared in the event of a biological attack. The participants were extremely helpful in providing all requested information to assist in this study. The data collection process was rewarding and

provided an insight on the professionalism of the employees within the city of Alexandria that are tasked with preparing for an emergency situation such as a biological attack.

Conclusion

This qualitative case study utilized the Emergency Operations Center as the unit of analysis to determine whether the city of Alexandria, Virginia is prepared for a biological attack. The Emergency Operations Center is a management tool that coordinates and oversees the city's response in the event of a disaster situation such as a biological attack. Additionally, there have been limited studies examining local government preparedness in the case of a terrorist attack after September 11th (Giblin et al., 2009). Performing a case study is important in understanding a social issue (Yin, 2009).

Moreover, the purpose of this research was to focus on the Emergency Operation Center to assess if the city of Alexandria is prepared for a biological attack. The literature states that a case study may be performed to examine an individual, organization, or solely a decision (Yin, 2009). In addition, social science research focuses on diverse needs and requires researchers to investigate different entities (Yin, 2009). This research focused on the Emergency Operations Center in Alexandria, Virginia. In addition to interviews, this study utilized data consisting of documentation and participant observation. This triangulation of data assisted considerably in this research.

Furthermore, a researcher should openly acknowledge the strength in limitations of his or her case study (Yin, 2009). A limitation of this study is that the research only utilized the Emergency Operations Center in determining whether the city of Alexandria

is prepared in the event of a biological attack. However, the primary function of the Emergency Operations Center is that it is a management tool that manages the city's operations in the event of a disaster situation. The Emergency Operations Center consists of a staff of seven individuals. The Emergency Operations Center is an effective entity within the city of Alexandria that consolidates information, therefore negating individuals from having to acquire information from various components within the city. The Emergency Operations Center promotes efficiency.

In addition, this study examined previous biological attacks to understand what is necessary to be adequately prepared. The city of Alexandria is unique and different compared to other cities, however, both large and small cities were analyzed in this study. The ability to examine diverse types of cities is essential in identifying best practices and initiating social change.

A biological attack could result in tremendous devastation and social panic. A major concern is the elevated possibility of a biological agent such as smallpox or anthrax spreading from one community to another, and infected a multitude of individuals. Consequently, potentially infected individuals should remain isolated.

The findings of my research revealed that the city of Alexandria has adequate resources and personnel to assist in preparing for a biological attack. As part of the evidence of this preparedness, the Emergency Operations Center is constantly coordinating exercises and volunteer efforts. Preparation for a biological attack is an ongoing effort that requires a daily commitment, which Alexandria exercises daily.

This case study demonstrates that the city of Alexandria is prepared for a biological attack. The city has adequate plans and resources established to prepare for a biological attack. The city also has the local police and fire departments that are nationally recognized. Having adequate personnel is important in preparing for a biological attack. The city coordinates and prepare with its local, state, and federal counterparts routinely. Furthermore, the direct involvement in the 2001 Anthrax attacks assisted the city of Alexandria in understanding what is warranted in preparing for a biological attack.

The findings and recommendations provided are best practices and a foundation that the city may utilize to enhance its preparedness for a biological attack. Additionally, the recommendation such as the utilization of computers and virtual technology during a biological attack are imperative because the ability for citizens to communicate solely by computers in the event of a biological attack will drastically decrease, and potentially eliminate, the spread of a disease. The spread of a disease is a major concern in the event of a biological attack. These recommendations are essential in the development of social change and will subsequently assist in preparing for a biological attack and resulting in saving lives by ameliorating this spread of disease.

References

Ahmad, Z. (2009). The very real threat of bioterrorism: are we prepared? *Internet Journal of Rescue & Disaster Medicine, 8*(1), 1-4. Retrieved from http://web.ebscohost.com.ezp.waldenulibrary.org

Astley, W. & Van de Ven (1983). Cenral perspectives and debates in Organization Theory. *Administrative Science Quarterly,* 28:

Avery, G., & Zabriskie-Timmerman. (2009). The impact of Federal Bioterrorism funding programs on local health department preparedness activities. *Evaluation & Health Professions, 32*. doi: 10.1177/0163278709333151

Babbie, E. (2010). *The practice of social research* (12 Ed.). Belmont, CA: Wadsworth.

Bersch, C. (2010). Predicting disasters. *Medical Laboratory Observer*, *42*(1). Retrieved from http://web.ebscohost.com.ezp.waldenlibrary.org

Biesecker, C. (2010). House Committee Approves WMD Legislation. *Defense Daily*, *246*(60), 3. Retrieved from http://web.ebscohost.com.ezp.waldenlibrary.org

Bossi, P., Garin, D., Guiholt, A., Gay, F., Crance, J., Debord, T.,… Bricaire, F. (2006). Bioterrorism: management of major biological agents. *Cellular and Molecular Life Sciences*, 63, 2196.

Broga, D., Vetter, R., & Orton, C. (2009). Preparation for a terrorism-related event should be no different from that for a biological or chemical event. *Medical Physics, 36(2*), 283-285. doi: 10.1118/1.3056465

Caruson, K., & MacManus, S. (2008). Disaster Vulnerabilities: how strong a push toward regionalism and intergovernmental cooperation? *The American Review of Public*

Administration, *38*(286). doi: 10.1177/0275074007309152

Cary, S. (2009) The tipping point: Biological Terrorism. *Journal of Strategic Security*, *2*(3), 13-24. Retrieved from http://web.ebscohost.com.ezp.waldenlibrary.org

Center for Disease Control and Prevention. (2009) Retrieved from http://www.cdc.gov/

Chalk, P. (2004). *Hitting America's soft underbelly: The potential threat of deliberate biological attacks against the U.S. agricultural and food industry*. Arlington, VA: RAND.

Chretien, J., Tomich, N., Gaydos, J., & Kelley, P. (2009). Real- lime Public Health Surveillance for Emergency Preparedness. *American Journal of Public Health, 99*(8), 1360-1363.

City of Alexandria, VA. Alexandria. Gov (2010). Retrieved from http://www.alexandiava.gov

Cole, L. (2009). *The Anthrax Letters: A Bioterrorism Expert Investigates the Attacks that Shocked America*. New York, NY: SkyHorse Publishing.

Colette, H., Stacey, A., Jeanne, G. (2007). Environment Health and Toxicology Resources of the United States National Library of Medicine. *Medical References Service Quarterly*.

Cooper, W., Hernandez-Diaz, S., Arbogast, P., Dudley, J., Dyer, S., Gideon, P., Hall, K., Kaltenback, L., Ray, W. (2009). Antibiotics potentially used in response to bioterrorism and the risk of major congenital malformations. *Paediatric & Perinatal Epidemology*, 23 (1), 18-28. doi: 10.1111/j.1365-3016.2008.00978.x

Considine, J., & Mitchell, B. (2009).Chemical, bioloical, and radiological incidents:

prepardeness and perception of emergency nurses. *Disasters*, 33 (3). doi: 10.1111/j.1467- 7717.2008.01084.x

Dausey, D., Buehler, J., & Lurie, N. (2007). Designing and conducting tabletop exercises to assess public health preparedness for manmade and naturally occurring biological threats: *BMC Public Health*, Vol. 7. doi: 10.1186/1471-2458-7-92

Edwards, F. (2007). Federal intervention in local emergency planning: nightmare on main street. *State and Local Government Review*, 39(1) doi: 10.1177/0160323X0703900104

Edwards, N., Caldicott, D., Eliseo, T., Pearce, A. (2006). Truth hurts-hard lessons from Australia's largest mass casualty exercise with contaminated patients. *Emergency Medicine Australasia*, 18(2). doi: 10.1111/j.1742-6723.2006.00827.x

Foxell Jr, J., & McCreight, R. (2002). U.S. Disaster Recovery Readiness for a Biological Terrorist Incident: Part Four. *American Foreign Policy Interests*, *24*(4), 323-337. doi:10.1080/10803920290032498.

Fricke, W, Rasko, D, Ravel, J (2009). The role of genomics in the identification, prediction, and prevention of biological threats. *Plos Biology*, 7(10), 1-5. doi: 10.1371/journal.pbio.1000217

Gerber, B., Cohen, D., Cannon, B., Patterson, D., & Stewart, K. (2005). On the front line: America cities and the challenge of Homeland Security Preparedness. *Urban Affairs Review*, 41(182), 182-189. doi: 10.1177/1078087405279900

Giblin, M., Schafer, J., Burruss, G. (2009). Homeland Security in the Heartland: Risk

Preparedness, and Organizational Capacity. *Criminal Justice Policy Review.* Retrieved from http://web.ebscohost.com.ezp.waldenulibrary.org

Granen, Linette (2005). Bioterror workshops: See the real bugs. *Medical Laboratory Observer*, 37(6) pg 29. Retrieved from http://web.ebscohost.com.ezp.waldenulibrary.org

Grayson, M. (2003). The difference between biological warfare and bioterrorism: Australia finally makes a start towards real preparedness for bioterrorism. *Internal Medicine Journal*, *33*(5/6), 213-214. doi:10.1046/j.1445-5994.2003.00407.x.

Gronvall, G. (2008). Biodefense countermeasures: the impact of the Title IV of the US Pandemic and All-Hazards Preparedness Act. *Emerging Health Threats Journal*, 1. doi: 10.3134/ehtj.08.003

Gunbeyi, M. & Gudogdu, T, (2009). Looking into fighting against terrorism from the system theory perspective. *University of Gaziantep Journal of Social Sciences*, 8 (1), 49-61. Retrieved from http://web.ebscohost.com.ezp.waldenulibrary.org

Habtes, F. (2006). Local government preparedness for a bioterrorist attack: case study of Springfield, Illinois. Retrieved from http://web.ebscohost.com.ezp.waldenulibrary.org

Hall, M. (2005). Nation Unready forgerm attacks. USA Today, pp. 1. Retrieved from http://web.ebscohost.com.ezp.waldenulibrary.or

Hamilton, Lee. & Kean, Thomas H. (2004). National Commission on Terrorist Attacks upon the United States. (2004). *The 9/11 Commission report including executive summary: final report of the National Commission on Terrorist Attacks upon the*

United States. New York: W.W. Norton & Company.

Health and Human Services (2010). Retrieved from http://www.hhs.gov

Healy, M., Weston, K., Romilly, M., Arbuthnot, K. (2009). A Model to support CBRN Defence. *Defense & Security Analysis*, Vol. 25 Issue 2, 119-135. doi: 10.1080/14751790902985157

Heinrichs, W., Youngblood, P., Harter, P., Dev, P. (2008). Simulation for Team Training and Assessment: Case Studies of Online Training with Virtual Worlds. *World Journal of Surgery,* Vol 32, Issue 2. doi: 10.1007/s00268-007-9354-2

Hendrickson, Robert. (2005). Terrorist Chemical Releases: Assessment of Medical Risk and Implications for Emergency Prepardness. *Human & Ecological Risk Assessment*, 11(3), 487-499. doi: 10.1080/10807030590949609

Hobfoll, S., Watson, P., Bell, C., Bryant, R., Brymer, M., Friedman, M. J., Friedman, M., Gersons, M., Berthold, P., de Jong, J., Joop, V., Layne, C., Maguen, S., Neira, Y., Norwood, A., Pynoos, R., Reissman, D., Ruzek, J., Shalev, A., Solomon, Z., Steinberg, A., Ursano, R. (2007). Five Essential Elements of Immediate and Mid--Term Mass Trauma Intervention: Empirical Evidence. *Psychiatry: Interpersonal & Biological Processes*, 70(4), 283-315. Retrieved from http://web.ebscohost.com.ezp.waldenulibrary.org

Holly, E., Lee, J., Lemyre, L., Krewski, D. (2008). Canadians' representation of chemical, biological, radiological, nuclear, and explosive terrorism: a content analysis. Human and Ecological Risk Assesment, 14 (3). doi:10.1080/10807030802073776

Hoffman, A., Eisenkraft, A., Finkelstein, A., Schein, O., Rotman, E., Dushnitsky, T.

(2007). "A Decade after the Tokyo Sarin Attack: A Review of Neurological Follow-Up of the Victims." *Military Medicine,* 172(6). Retrieved from http://web.ebscohost.com.ezp.waldenulibrary.org

Hoffman, B. (2009). The capability of emergency departments and emergency medical systems in the United States to respond to mass causality events resulting from terrorist attacks. Studies in Conflict & Terrorism, 32 (1). doi: 10.1080/10576100802564097

Howitt, A., & Pangi, R. (2003). Countering Terrorism: Dimensions of Preparedness. Cambridge, Massachusetts: Belfer Center for Science and International Affairs, JFK School of Government, Harvard University.

Ippolito, G., Puro, V., & Heptonstall, J. (2006). Hospital Preparedness to bioterrorism and other infectious disease emergencies. *Cellular and Molecular Life Sciences*, Vol. 63, Issue 19/20. doi: 10.1007/s00018-006-6309-y

Johnson, Y., Herrmann, J., Wallace, R., Troutt, H., Myint, M. (2009). Development and Implementation of a functional Exercise to Assess Public Health Agency Response to Foodborne Bioterrorism. Journal of Homeland Security & Emergency Management, 6(1), 1-11. Retrieved from http://web.ebscohost.com.ezp.waldenulibrary.org

Kahn, L. (2009). Who's in Charge? Leadership during Epidemics, Bioterror Attacks, and Other Public Health Crises. Santa Barbara, CA.

Kalvatchev, Z. (2010). Chapter 41: Threats and counteractions Con Viruses for

Biological Terrorism, *Journal of Medical Chemical, Biological Defense*, 8314-323. Retrieved from http://web.ebscohost.com.ezp.waldenlibrary.org

Kanev, K. (2010). Chapter 3: Medical Support in case of chemical and biological threat. *Journal of Medical Chemical, Biological, & Radiological Defense*, 834-39. Retrieved from http://web.ebscohost.com.ezp.waldenlibrary.org

Kellman, B. (2008). Bioviolence: A growing threat. *The Futurist*. Retrieved from http://wwww.wfs.org

Kollek, D.,Welsford, M.,& Wanger, K. (2009). Chemical,biological, radiological and nuclear preparedness training for emergency medical providers. *The Journal of the Canadian Association of Emergency Physicians*, Vol. 11 Issue 4. Retrieved from http://web.ebscohost.com.ezp.waldenlibrary.org

Lakoff, A. (2008) The Generic Biothreat, or, how we became unprepared. *Cultural Anthropology,* 23(3), pg 399-428. doi: 10.1111/j.1548-1360.2008.00013.x

Lentzos, F., & Rose, N. (2009). Governing insecurity: contingency planning, protection, resilence. Economy & Society, 38(2), 230-254. doi: 10.1080/0308514090278611

Mehta, S. (2006). Disaster and mass casualty management in a hospital: How well are we prepared? *Journal of Postgraduated Medicine*, 52 (2), 89-90. Retrieved from http://web.ebscohost.com.ezp.waldenlibrary.org

Moodie, M. (2009). The bioterror threat. *Issue in Science and Technology*, pp 92. Retrieved from http://web.ebscohost.com.ezp.waldenlibrary.org

Morrow, J. & Cole, K.(2009). Enhanced decontamination of bacillus spores in a

simulated drinking water system by germinant addition. *Environmental Engineering Science*, 26(5), 993-1000.

Munro, D. (2011). The allocation of federal homeland security grant funds in Riverside County, California. Ph.D. dissertation, Walden University, United States-Minnesota.

Nicogossian, A., Metscher, K., Zimmerman, T., Hanfling, D., & Wise, R. (2007). Community Training in Bioterror Response. *Journal of Homeland Security & Emergency Management*, *4*(3), 1-16. Retrieved from http://web.ebscohost.com.ezp.waldenlibrary.org

Nohria, N., & Khurana, R. (2010). Handbook of leadership theory and Practice. United States: Harvard Business School.

Nordin, J., Kasimow, S., Levitt, M., & Goodman, M. (2008). Bioterrorism surveillance and Privacy: Intersection of HIPAA, the common rule, and public health law. American Journal of Public Health, 98(5), 802-807 Retrieved from http://web.ebscohost.com.ezp.waldenlibrary.org

Norwood, A. (2005). Debunking the myth of panic. *Psychiatry*, 68(2), pp 114. Retrieved from http://web.ebscohost.com.ezp.waldenlibrary.org

Olson, D., Hoeppner, M., Larson, S., Ehrenberg, A., & Leitheiser, A. (2008). Lifelong learning for public health practice education: A model curriculum for bioterrorism and emergency readiness. *Public Health Reports*, 123(S2), 53-64.

Pappalardo, J. (2005). DHS seeking technology to protect food supply. *National Defense*, 89 (618), p10. Retrieved from http://web.ebscohost.com.ezp.waldenlibrary.org

Pien, B., Saah, R., Miller, S., & Woods, C. (2006). Use of sentinel laboratories by clinicians to evaluate potential bioterrorism and emerging infections. *Medical Microbilogy,* Vol. 18, Issue 2, 1311-1321.doi:10.1111/j.1742-6723.2006.00827

Pummer, T., Wisniewski, C., & Krenzelok, E. (2009). The cost-effective implementation of an Electronic Document Management System at a Poison Information Center to improve preparedness for a terrorism incident. *Journal of Homeland Security & Emergency Management*, 6(1), 1-7. Retrieved from http://web.ebscohost.com.ezp.waldenlibrary.org

Ranta, J.,Siekkinen, K., Nuotio, L., Laukkanen, R., Hellstrom, S., Korkeala, H., and Maijala, R. (2010). Causal hidden variable model of pathogenic contamination from pig to pork. *An International Journal*, 10 (1), 69-87. doi:10.1177/1471082X0801000105

Ritchie, E., Friedman, M., Watson, P., Ursano, R., Wessely, S., Flynn, B. (2004) Mass violence and early mental health intervention: A proposed application of best practices guidelines to chemical, biological, and radiological attacks. *Military Medicine*, 169 (8), 575-579. Retrieved from http://web.ebscohost.com.ezp.waldenulibrary.org

Rokach, A., Cohen, R., Shapira, N., Einav, S., Mandibura, A., & Bar-Dayan, Y. (2010). Preparedness for anthrax attack: the effect of knowledge on the willingness to treat patients. *Disasters*, *34*(3), 637-643. doi:10.1111/j.1467-7717.2010.01161.x.

Ryan, J., & Glarum, J. (2008). Biosecurity & Bioterrorism: Containing and Preventing Biological Threats. Burlington, MA: Elsevier.

Samimian-Darash, L. (2009). A pre-event configuration for biological threats: preparedness and the constitution of biosecurity events. AMERICAN ETHNOLOGIST, 36 (3), 478-491. doi: 10.1111/j.1548-1425.2009.01174.x

Shea, D. (2003). Terrorism: Background on Chemical, Biological, and Toxin Weapons and Options for Lessening Their Impact: RL31669. *Congressional Research Service: Report*, 1. Retrieved from http://web.ebscohost.com.ezp.waldenlibrary.org

Silenas, R., Akins, R., Parrish, A., Edwards, J. (2008). "Developing Disaster Preparedness Competence: An Experiential Learning Exercise for Multiprofessional Education." *Teaching & Learning in Medicine*, Vol. 20, Issue 1. doi: 10.1080/10401330701798311

Soltaninejad, K. (2010). Preparedness against chemical terrorism: Poison information centers roles. *Journal of Medical Chemical Biological, and Radiological Defense,* 8. Retrieved from http://web.ebscohost.com.ezp.waldenlibrary.org

Sprinkle, R. (2008). From here to biosecurity: advice for an incoming administration. *BioScience,* 58(11) pp 1006-1007. doi: 10.1641/B581102

Stittelaar, K., Neyts, J., Naesens, L., Van Amerongen, G., van Lavieren, R., Holy, A., De Clercq, E., Niesters H., Fries, E., Mass, C., Mulder, P., Van der Zeijst, B., Osterhaus, D. (2006).Antiviral treatment is more effective than smallpox vaccination upon lethal monkeypox virus infection. Nature Publishing Group. Nature, 439(7077), 62- 68. doi: 10.1038/nature04295

Tegnell, A., Van Loock, F., Baka, A., Wallyn, S., Hendriks, J., Werner, A., & Gouvras,

G. (2006). Development of a matrix to evaluate the threat of biological agents used for bioterrorism. Cellular and Molecular Life Sciences, 63, pp 2223-2228. doi: 10.1007/s00018-006-6310-5

Tiemann, M. (2004). Safeguarding the Nation's Drinking Water: EPA and Congressional Actions: RL31294. *Congressional Research Service: Report*, 1. Retrieved from http://web.ebscohost.com.ezp.waldenlibrary.org

Trochim, W., & Donnelly, J. (2008). The research methods knowledge base (3rd Ed.). Mason, Ohio, Cengage.

Trull, M., du Laney, T., & Dibner, M. (2007). Turning biodefense dollars into products. *Nature Biotechnology*, *25*(2), 179-184. doi:10.1038/nbt0207-179.

Tucker, Patrick. (2008). *Futurist*, 42 (3), pg 29. Retrieved from http://web.ebscohost.com.ezp.waldenlibrary.org

Urbano, M. (2006). *The complete bioterorism survival guide*. Boulder, Colorado: Sentient Publications.

U. S. General Accounting Office. (2005). *Bioterrorism: Federal research & preparedness activities*. New York: Cosimo.

U.S. Census Bureau. (2010). U.S. Census Bureau: state and county quickfacts. Retrieved from http://quickfacts.census.gov/qfd/states/51/51510.html

Vogel, K. (2006). Bioweapons proliferation: where science studies and public policy collide. *Social Studies of Science*, 36 (5), 659-690. doi: 10.1177/03063127060596460

Waterer, G. & Robertson, H. (2009). Bioterrorism for the respiratory physician.

Respirology, 14(1), 5-11. doi: 10.1111/j.1440-1843.2008.01446.x

Wood, K. (2009). Community Health Centers: The untapped resources for public health and medical preparedness. *Homeland Security Affairs*, 5 (1). Retrieved from http://web.ebscohost.com.ezp.waldenulibrary.org

Wray, R., Becker, S., Henderson, N., Glik, D., Jupka, K., Middleton, S., Henderson, C., Drury, A., Mitchell, E. (2008). *American Journal of Public Health*, 98 (12) doi: 10.2105/AJPH.2006.107102

Yin. R. (2009). Case study research: design and methods (4th Ed). Washington, D.C: SAGE.

Appendix: Dissertation Case Study Protocol

A) Introduction to the Case Study

- Research Question- Are cities prepared for a biological attack? A case Study of Alexandria Virginia.
- System Theory- City officials must examine the system to prevent or deter biological attacks

(Protocol is a step by step tool in the dissertation/data collection process)

B) Data Collection Process

Unit of Analysis- Emergency Operation Center (EOC)- The Office of Emergency Management maintains the city Emergency Operation Center

Location: The EOC is based in the city of Alexandria's Fire Department.
Participants: TBD

Planning

Intend to collect/discuss plans pertaining to preparedness for a biological attack and overview of emergency disasters plans

Officials will be interviewed from the Office of Emergency Management/Emergency Operation Center (EOC). To initiate additional validity for the interviews the individuals will be questioned separately therefore each participant will be able to provide their own feedback. Additionally similar questions will be asked of the participants therefore each response may be examined appropriately. Observation of the facility and interaction of the participants will be observed.

Items to Bring for Interview/Data Collection

- Consent Forms
- Questions for interviews
- Notebook
- Pen, Pencils
- Approval from IRB
- Brief Case-place documents and maintain data collection items
- Separate Envelopes to place responses from interviewees-(seal envelopes after the responses have been placed inside

C) **Projected Time Frame**

1) 60 minutes (Anticipated amount time per interview)
2) Between 3-5 individuals from EOC/Office of Emergency Management will be interviewed

3) Interviews/data collection performed within 1-3 days

D) **Utilization of System Theory**

1) How can EOC enhance it system/procedures to better prepare for the potential of a biological attack.
2) How does the EOC focuses on the aggressor of acts of terrorist?

E) **Case Study Questions for Participants**

1) What is the function of the Emergency Operation Center (EOC) and its role in preparing for a biological attack?
2) Please provide a brief background of your professional experience.
3) How many employees are employed in your department?
4) What is the total department budget?
5) Does your department has an emergency response plan, if so, please explain
6) What is the function of your role in the EOC
7) Does the EOC coordinates with the Health community in preparing for a biological attack, please explain.
8) How does the department assess hospital readiness for emergency response?
9) How does the EOC coordinates with other components within and outside the city to prepare for a biological attack?
10) How does the city of Alexandria coordinates with citizens in the community in preparing for a biological attack?
11) How often is full scale exercises performed in preparation of a biological attack?
12) Please explain in greater detail what entails full-scale exercises?
13) What other aspects does the city of Alexandria perform to prepare for a biological attack?
14) In the event of a biological attack how many resources/personnel are planned to be used?
15) Please explain in detail the plans and resources that have been identified in advance if a biological attack were to occur.
16) How does the EOC prepare for the release of a category A B,C, agent?
17) Are preparation the same or different for the release of a Category A,B,C agent?
18) After 9/11 have there an increase in potential biological attacks prior to the events of 9/11? (Please explain)
19) How does the EOC utilizes Surveillance Detection Systems to combat the threat of a bioterrorism?
20) Has there an increased threat of the possibility of a biological attack in the city of Alexandria due to its proximity to the nation's capital.
21) If a terrorist attack were to occur in D.C., being that Alexandria is approximately 6 miles away, how will the EOC coordinate and allocate resources.
22) How does the EOC coordinates with medical personnel in preparation for a biological attack.

23) Are there any terrorist groups that are more likely to commit a biological attack in the city of Alexandria as compared to others?
24) Please explain any types of special training there is for residents in the community to assist in preparing for a biological attack.
25) Has the city ever experienced a biological attack; what was the outcome?

26) What hours and days are the EOC operational?
27) What is the best way to get in contact with you are the EOC in the event of a bioterrorism attack during off hours?
28) In the event of a national crisis has the EOC identified how many personnel within the city, tasked with emergency preparedness are in the reserves/military and may be active? (What impact will the loss of personnel have in the event if an attack were to occur in Alexandria?)
29) What procedures are established to disseminate information to stakeholders or citizens in an efficient manner?
30) How can current policies be enhanced to better prepare for a biological attack?

F) **Analysis**

Based on scholarly literature, the EOC's preparedness for a biological attack will be based on the following:

- Preparation for a biological attack can be measured based on the departments limitations and needs (Discussed in Chps 1-3; This theory is based on the scholarly literature)

- Pattern Matching- Examine if the findings of the city of Alexandria/Emergency Operations match with the scholarly literature and prior published studies pertaining to being prepared.

- Plans, procedures, and resources defined in advance. (Discussed in Chps 1-3; This theory is based on the scholarly literature)

- System Theory (Discussed in Chps 1-3)

E) **Findings/Summary**- TBD after approval of IRB, Collection of data, Analysis

JOSEPH T. MOORE

OBJECTIVE: To obtain a managerial position within the public sector arena to best utilize my experience and education by facilitating the effectiveness and efficiency of an organization.

EDUCATION: **Walden University,**
School of Public Policy and Administration
Candidate for Ph. D. in Public Policy and Administration
Anticipated degree date: April 2011; GPA: 3.7

Rutgers University, Newark, NJ
School of Public Affairs and Administration
Masters of Public Administration Degree, January 2007
GPA: 3.6

Seton Hall University, South Orange, NJ
College of Arts and Science
Bachelor of Arts Degree, August 1999
Major: Criminal Justice GPA 3.02

HONORS:
*Letters of Appreciation from local government officials
*Commendation from Customs and Border Protection
**Who's Who Among American Students"*
*Deans List

SKILLS:
*Proficient at utilizing various computer systems
*Ability to Perform Quantitative and Qualitative research
*Knowledge of the Spanish language at the intermediate level
*Trained at interviewing/ rating potential candidates for federal government positions

EXPERIENCE:

03/2008-Present Department of Homeland Security
Customs and Border Protection; Washington, DC
Field Liaison Officer, Headquarters
*Responsible for obtaining accurate information and data for senior-level managers in the agency
*Responsible for responding to Congressional inquiries and providing efficient solutions
*Responsible for writing reports and evaluating policy to further enhance the agency
*Responsible for coordinating events throughout the country for appropriate stakeholders

03/2004-03/2008 Department of Homeland Security
Customs and Border Protection; Newark, NJ
Supervisory Customs Officer, Newark Liberty International Airport
*Responsible for monitoring and overseeing the planning and scheduling of work for a multi-unit organization
*Responsible for reviewing budget requests to support or justify obligations due to staffing needs
*Responsible for reviewing work products of subordinates and accepting, rejecting, or amending their work
*Responsible in deciding or recommending the dispositions of apprehended persons suspected of violating laws enforced by Customs and Border Protection

08/1999-03/2004 Department of the Treasury
United States Customs Service; Newark, NJ
Customs Inspector, Enforcement Branch/Passenger Processing Branch
*Performed Cargo examinations to ensure compliance with U.S. laws.

*Responsible for executing numerous arrests that involved individuals trying to import illegal narcotics into the United States
*Responsible for having direct interaction with other federal, state, and local agencies.
*Verify airline itineraries and other computer databases that may suggest patterns of possible terrorists' activity.

REFERENCES: Available Upon Request